ABSTRACT

Title of Thesis: CONTINUING THE LEGACY OF RACHEL CARSON THROUGH LANDSCAPE DESIGN

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This thesis explores how the ideas expressed in Rachel Carson's work can be translated into landscape architecture through the development and application of design guidelines. Carson's writing demonstrated the power of combining scientific knowledge with emotional engagement to shape public understanding of the natural world. Four key themes are identified from her work and used as a framework for investigating how landscape design can communicate ecological relationships and promote deeper connections between people and the environment; they are the interconnectedness of all life, the moral responsibility to protect nature and non-human life, nature as a source of wonder, and storytelling as a way to engage emotions and communicate ecological knowledge.

The literature review examines these themes through related fields including ecology, environmental ethics, human-nature connectedness, phenomenology, aesthetics, and storytelling, with a focus on identifying design and programming strategies that support ecological function while also shaping human experience. These findings are synthesized into a set of landscape

design guidelines that emphasize working with ecological systems, promoting stewardship, engaging the senses, and creating opportunities for participation and learning.

To explore how these guidelines can be applied in practice, they are tested through a site design on the University of Maryland campus. The proposed design integrates ecological restoration, sensory experience, and educational programming to create a landscape that supports biodiversity while also encouraging awareness, reflection, and stewardship. While the site design serves as an example, the primary contribution of this project is the development of a design framework that demonstrates how landscape architecture can extend Rachel Carson's legacy by creating spaces that communicate ecological knowledge and inspire more meaningful relationships between people and the natural world.

CONTINUING THE LEGACY OF RACHEL CARSON THROUGH LANDSCAPE DESIGN

by

Laura Sweeney

Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Master of Landscape Architecture
2026

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Dedication

This project is dedicated to Levon, my faithful little helper.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Research Motivation

As human activity continues to degrade the environment, landscape architects have a unique opportunity to shape social and ecological consciousness by designing spaces that can educate, inspire, and reconnect people to the natural world. Because Rachel Carson achieved these goals with her writing, understanding what it was about her work that made it so effective could help landscape architects design environments that connect to people in a similar way.

Research Question

This thesis asks whether landscape architects can draw on the work of Rachel Carson to design landscapes that cultivate ecological awareness, foster a deeper connection to nature, and inspire a sense of responsibility for the protection of the natural world. To explore this question, it examines what core values and design-relevant principles can be derived from Carson's work, how landscape architecture can be used to encourage environmental responsibility and care, and whether existing landscapes successfully embody Carson's legacy through specific design and programming strategies.

Thesis Objectives

This study begins by identifying key themes in Rachel Carson's work and then investigates interdisciplinary concepts related to these themes to inform their translation into landscape design. Building on this research, it develops a set of landscape design guidelines that communicate Carson's message and explores how these principles can be applied in practice

through a site design, demonstrating how landscape architecture can incorporate and extend Rachel Carson's legacy.

Summary of Thesis Objectives

- Identify key themes in Rachel Carson's body of work
- Research interdisciplinary concepts related to these themes to inform their interpretation into landscape design
- Develop landscape design guidelines that communicate Rachel Carson's message
- Apply the guidelines to a site design to explore how landscape architecture can incorporate Rachel Carson's legacy

Chapter 2: Rachel Carson

A Brief Account of The Life of Rachel Carson

Figure 1: Photo of Rachel Carson (Photo from NOAA.gov)

At the end of her life on April 14, 1964, Rachel Carson was a celebrated author and public figure whose work would shape both cultural attitudes and environmental policy long after her death. Much of her life she struggled to balance familial obligations with professional and creative aspirations, working as a government employee and struggling to support dependent family members while longing to be a full-time writer. Ultimately, her sense of duty and extraordinary talent came together in the creation of one of the most influential environmental works of the twentieth century.

Born on May 27, 1907, Carson spent her childhood in the town of Springdale, Pennsylvania, just outside of Pittsburgh. Her mother, Maria Carson, played a formative role in the development of both her lifelong appreciation for nature and her talent for writing. She grew up being encouraged both to explore the sixty-four acres of land where her family lived, and to submit stories she had written about her experiences to children's magazines. These childhood pursuits influenced Carson throughout her life and laid the foundation for her future career as a famous and successful nature writer (Greenwood, 2020). Despite owning a large parcel of land, her father, Robert, always struggled to earn a steady income and the family, which also included older siblings Marian and Robert, experienced persistent economic hardship (Lear, 1997).

Carson attended the Pennsylvania College for Women in Pittsburgh from 1925 to 1929. She initially struggled with the decision of whether to major in English to follow her dream of becoming a writer, or to major in biology to pursue her interest in nature and become a scientist. Eventually, mentorship from a science professor led her to choose biology, a decision that would define her career. She went on to earn a master's degree in zoology from Johns Hopkins University in Baltimore from 1929 to 1932, supporting herself by teaching at the University of Maryland Dental School. Although she began doctoral studies, she left academia during the Great Depression to find work to support her family, who had relocated to Maryland (Lear, 1997).

This decision marked the beginning of Carson's lifelong role as the primary financial provider for her family. Her father died in 1935, leaving her as the sole supporter of her mother until her death in 1958. After her sister Marian's death in 1937, she became financially responsible for her two nieces, Virginia and Marjorie. Following Marjorie's premature death in 1957, she adopted her great-nephew, Roger, when he was 5 years old. Carson accepted her role to provide for all of these people despite the constraints on her time, finances, and emotional energy (Lear, 1997).

In 1935, Carson began working for the U.S. Bureau of Fisheries (later the Fish and Wildlife Service), where she steadily advanced to become Editor-in-Chief of Publications, a position she held until her resignation in 1952. Although she longed to write full-time, her government job provided financial stability and opportunities aligned with her interests. Notably, she developed the *Conservation in Action* booklet series, a project she initiated to explain the purpose of the national wildlife refuge system to the general public. This work involved

extensive travel and fieldwork, giving her first hand encounters with ecosystems across the country (Lear, 1997).

Throughout her years working for the government, Carson built up her writing career on the side, tirelessly submitting science and nature-based articles that she had researched and written on nights and weekends to various publications. Eventually in November 1941, she published her first book, *Under the Sea Wind*, which was critically acclaimed, but not a commercial success. Carson continued to work at the U.S. Fish and Wildlife Service through the war years, while still supporting her family. Her literary breakthrough came with *The Sea Around Us* in 1952. The success allowed Carson to finally leave her government job to write full time, however she was not fond of the fame and attention she received and was not often inclined to make public appearances (Lear, 1997).

Carson's newfound financial stability also allowed her to build a summer cottage in 1953 in West Southport, Maine where she met Dorothy and Stanley Freeman. Dorothy Freeman became one of Carson's closest confidants and emotional supporters for the rest of her life. They wrote to each other almost daily when they were apart and there is some speculation that they had a romantic relationship (Lear, 1997; Souder, 2012).

The last book in what came to be known as Carson's Sea Trilogy, *The Edge of the Sea*, was published in 1955 and was another critical and commercial success, proving that she had a faithful audience of readers. Also importantly, around this time Carson published an essay that was later released as *The Sense of Wonder* (1965) after her death (Lear, 1997).

In 1958, Carson began researching the effects of pesticides for her landmark work, *Silent Spring*. Over the following four years, she conducted extensive research about the environmental consequences of these chemicals, working with a network of scientific experts and government

insiders who provided data, case studies, and critical evidence. Published in 1962, *Silent Spring* marked a significant departure from her earlier writing in both subject and tone, but it was critically and commercially successful and became extremely influential, due in part to her established audience of readers. Although she anticipated strong opposition from the chemical industry, Carson felt it was necessary to make the public aware of the dangers synthetic pesticides posed to both wildlife and people. Not knowing the extent of the impact the book would have, she wrote to a friend:

> "I have felt bound by a solemn obligation to do what I could—if I didn't at least try I could never again be happy in nature. But now I can believe I have at least helped a little. It would be unrealistic to believe one book could bring a complete change" (Lear, 1997, p. 397).

While Carson was writing *Silent Spring*, she experienced significant personal hardship. It was during this time that her niece Marjorie died, leaving Carson to adopt Roger. Her mother also died after a stroke in December 1958. In addition to these losses and the added responsibility of raising a child on her own, Carson privately battled breast cancer (Lear, 1997).

In April 1960, Rachel Carson underwent a mastectomy for a breast tumor, though her surgeon initially misled her about the severity of her condition. She learned the truth later that year after new symptoms emerged. Despite undergoing exhausting radiation treatments, she continued writing *Silent Spring* and kept her diagnosis secret from everyone except her closest friends and collaborators, fearing it could affect the reception of her work or be used as a reason to discredit her (Lear, 1997). After it was published, Carson took opportunities to rebut criticisms

of the book including testifying before a Senate subcommittee and participating in a television special despite being severely weakened by her illness (Lear, 1997; Lytle, 2007).

Rachel Carson died at the age of 56, only 18 months after the publication of *Silent Spring*. Although she did not live to see the full impact of her work, its influence was long-lasting and far-reaching. Her ability to make complex scientific content compelling and accessible awakened widespread awareness of the environmental destruction occurring from pesticide over-use, prompting government investigations and ultimately contributing to the establishment of the Environmental Protection Agency and major environmental legislation (Cafaro, 2013; Lear, 1997). Additionally, Carson reshaped cultural understanding by introducing key ecological concepts into everyday language, while challenging the unchecked faith in technological progress (Cafaro, 2013; Lear, 1997; Mangrum, 2021; Snodgrass, 2021). Finally, her unique writing style that conveyed factual scientific knowledge with beautifully written language pioneered a new genre of environmental communication that continues to influence science and nature writers into the present day (Lockwood, 2012). Ultimately, Rachel Carson's legacy is that her work transformed public consciousness by bringing awareness to both the destruction of the natural environment and the importance of nature to human life.

Rachel Carson's Major Works

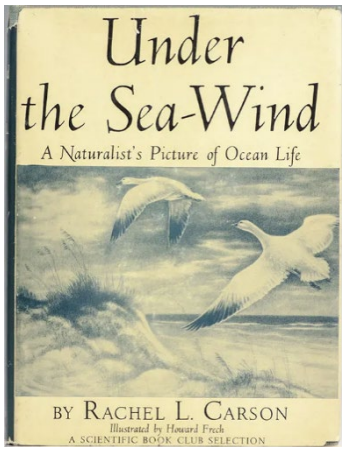

Figure 2: Under the Sea-Wind (Image from raptisrarebooks.com)

Under the Sea- Wind: A Naturalist's Picture of the Ocean (1941)

Rachel Carson's first book, *Under the Sea-Wind*, is an expansion of her 1937 *Atlantic Monthly* essay "Undersea". Published by Simon & Schuster on November 1, 1941, the book received critical acclaim for its poetic writing style and scientific accuracy. However, it was a commercial failure and sold barely 2,000 copies; this is often attributed to the attack on Pearl Harbor that occurred a month later causing it to be overlooked amid the onset of World War II. It later became a bestseller when it was reissued in 1952 after the overwhelming success of Carson's second book, *The Sea Around Us* (Lear, 1997).

Under the Sea-Wind is structured as a narrative that explores the interconnected lives of coastal and oceanic animals with the intent of portraying the marine world as it looks and feels from the animals' points of view, without human bias. The book is divided into three sections that explore different habitats: the shore, the open sea, and the deep abyss. In each section, Carson tells the story from the point of view of a specific animal protagonist to provide a comprehensive understanding of the ocean world while providing scientifically accurate accounts of their behaviors and habitats. Characters include Scomber the mackerel in the open sea, Anguilla the eel in the deep abyss, and the sanderlings Blackfoot and Silverbar along the shore. The result is a factually dense, unsentimental, and comprehensive portrait of each animal's struggle to survive and reproduce within complex marine ecosystems shaped by environmental forces and the constant threat of predators. It is supplemented by an extensive glossary that

defines the diverse inhabitants of the sea. Overall, the book reveals to its readers the beauty and biological complexity of sea life in an engaging and accessible way.

The Sea Around Us (1951)

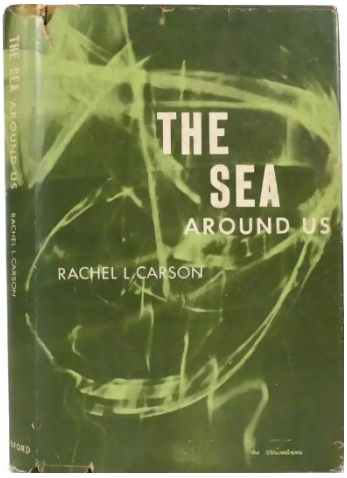

Figure 3: The Sea Around Us (Image from rarebookcellar.com)

In Rachel Carson's second book, *The Sea Around Us*, she continues to explore her fascination with the ocean. It was published by Oxford University Press on July 2, 1951, and became an instant best-seller, remaining on the *New York Times* best-seller list for a record eighty-six weeks. The book earned Carson immense critical acclaim, winning the National Book Award for nonfiction and the John Burroughs Medal in 1952. Its massive commercial success brought Carson financial independence and allowed her to resign from the U.S. Fish and Wildlife Service in June 1952 (Lear, 1997).

The Sea Around Us is a biography of the sea that traces its origins from the formation of the earth and moon through the long processes of geological change that shaped the ocean basins, continents, and climate systems over millions of years. As a government scientist, Carson had access to a wealth of new, formerly classified oceanographic military research that utilized new technologies to map the ocean floor, study underwater sounds, and measure deep-sea currents that had been generated during World War II which she used to explain the global system of tides and currents and examine ecosystems of marine life (Lear, 1997). Additionally, the book addresses human interactions with the sea, detailing the history of navigation. In the preface for the 1960 revised edition, Carson expands her warning about the modern environmental threat posed by radioactive waste disposal. The book concludes by emphasizing

that despite significant technological progress, much of the mysterious underwater world of the ocean remained unexplored.

The Edge of the Sea (1955)

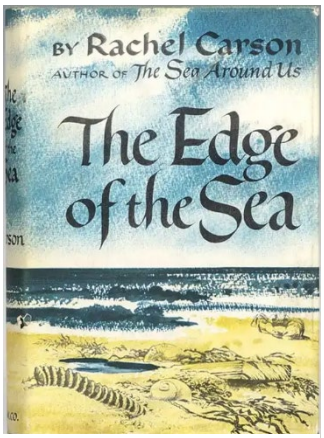

Figure 4:The Edge of the Sea (Image from raptisrarebooks.com)

Carson's third book, *The Edge of the Sea,* completes what is now referred to as her Sea Trilogy. It was published by Houghton Mifflin on October 26, 1955, after a condensed version appeared in *The New Yorker* in two installments the previous August. While slightly less so than *The Sea Around Us*, it was a huge critical and commercial success, remaining on the *New York Times* best-seller list for five months and receiving a nomination for the National Book Award in nonfiction (Lear, 1997).

The idea for the book, a field guide to teach people about common shore animals, was proposed to Carson by an editor at Houghton Mifflin. Finding it difficult to adapt her writing style to the traditional format of this type of book, she restructured it to focus on the ecosystems of three basic types of shores: rock, sand, and coral (Lear, 1997). Within these three sections, Carson explores the intertidal zone as a living, interconnected ecological community and details how organisms must adapt to constantly shifting conditions shaped by tides, waves, and exposure. As in her earlier work, Carson blends scientific precision with vivid, accessible prose, drawing on both her own field observations and the contributions of other scientists to show her readers details not immediately visible to the casual observer. The book also has a philosophical side as Carson shares reflections on the nature of existence inspired by her encounters with life on the shore.

The Sense of Wonder (1965)

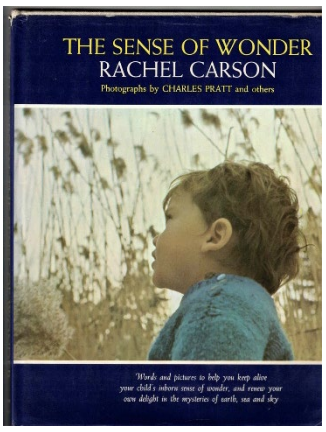

Figure 5:The Sense of Wonder (Image from abebooks.com)

The Sense of Wonder was originally published as an essay titled "Help Your Child to Wonder" in the July 1956 issue of *Woman's Home Companion*. After Carson died in 1964, it was published posthumously as a book by Harper & Row in 1965 (Lear, 1997). The book is Rachel Carson's argument for preserving and cultivating the innate sense of wonder that everyone is born with and can easily access as a child. She advocates for introducing children to the beauty and mystery of the natural world to help them develop a lifelong appreciation for nature. Carson demonstrates this philosophy through personal anecdotes of exploring the Maine coast and woods with her grandnephew, Roger. Throughout the book, she explains what it means to experience wonder in nature, how to access it, and the effects of being able to use this connection with nature as a resource throughout one's life.

Silent Spring (1962)

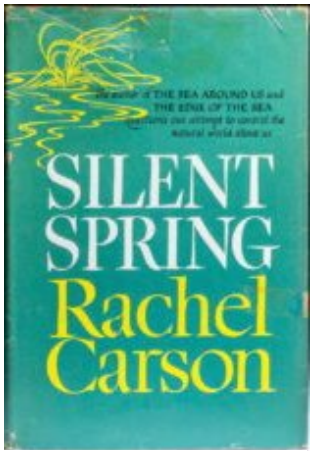

Figure 6: Silent Spring (Image from thefirstedition.com)

Carson's last book, *Silent Spring,* was officially published by Houghton Mifflin on September 27, 1962, after being serialized in *The New Yorker* in three installments the prior June (Lear, 1997). It is a meticulously researched and powerfully written indictment of the indiscriminate use of synthetic chemical pesticides. Carson details the catastrophic environmental and biological consequences of these chemicals, including how their contamination of soil and water systems and their accumulation within the food chain kill wildlife and threaten human health. She argues that widespread

pesticide use creates resistance in the targeted insects while eliminating the natural predators that keep ecosystems in balance. She also calls attention to the value of nature and wildlife, expressing how they enhance the experience of human life and demonstrating the impact of their loss. It is important to note that Carson's argument in the book is often oversimplified. She does not advocate for a complete ban on all chemical spraying, instead, she recommends using these technologies more carefully and turning to other less destructive (and often more effective) methods first.

Silent Spring became an immediate bestseller and was met with both widespread acclaim and intense criticism. While it garnered public enthusiasm, there was also a well-funded backlash from the chemical industry and agricultural trade groups who launched personal attacks against Carson, but these efforts largely backfired and increased public attention to her work (Lear, 1997).

Rachel Carson's Message: Prominent Themes in Her Body of Work

While Rachel Carson's work contains many interconnected themes, four were identified for this project and used to guide the development of a landscape design framework. The first is the idea that all life on Earth is part of an interconnected system with each life form depending on relationships with others and the physical environment to survive. The second is the recognition that humans, as part of this system, have a responsibility to protect the environment and value non-human life. Third, Carson presents direct experience with nature as a source of wonder that reveals the complexity of the living world which enhances human experience and provides relief from the stresses of daily life. Finally, she communicates these ideas through

storytelling, using both her own point of view and the stories of others to engage emotions and facilitate understanding of scientific and ecological knowledge.

The Interconnectedness of All Life

One of the most prominent themes in Rachel Carson's work is the interconnectedness of all life. Throughout her work, she consistently emphasizes that all the living and non-living elements that make up earth's environment are part of a complex, interdependent system. Carson also makes clear that human beings are not separate from this web of life, but included within it, demonstrating that "neither man nor any other living creature may be studied or comprehended apart from the world in which he lives" (Carson, 1998, "Biological Sciences″). While this idea appears throughout her work, it evolves significantly over time. In her earlier writing, interconnectedness is conveyed as a literary theme through narrative and imagery. Later, it becomes more explicitly ecological, grounded in scientific explanation and systems thinking. By the time of *Silent Spring* (1962), interconnectedness takes on an ethical dimension as the basis for an urgent call to action (Code, 2012; Hagood, 2013; Lear, 1997; Montefiore, 2001).

Under the Sea-Wind

In *Under the Sea-Wind* (1941), Carson uses a narrative approach to dramatize the web of life. By writing from the perspective of animals, she intentionally grounds her narrative by depicting each feature character within its larger community of other species (Hagood, 2013). These relationships are often expressed in the context of cycles that sustain the whole system, for example, the predator and prey dynamics of the food chain. Carson also describes the concept of what she calls "material immortality", explaining how the elements of life are continuously dissolved and reused. She writes that "in the sea, nothing is lost. One dies, another lives, as the

precious elements of life are passed on and on in endless chains" suggesting that death is not an endpoint, but a transformation that reconnects individual organisms to the larger system (Carson, 2021, p. 59). Even the structure of the book reflects this idea of interconnectedness; it is divided into three parts (shore, open sea, and abyss), illustrating how animals move between and depend upon different parts of ocean throughout their lives (Lear, 1997; Montefiore, 2001).

The Sea Around Us

The Sea Around Us (1951) expands the theme of interconnectedness in several ways. Carson does not just focus on ecological relationships, but includes the context of time, evolution and geology. In doing so, she situates human life as one small piece within a much larger, ongoing system (Hagood, 2013). She emphasizes that human existence occupies only a brief moment within the earth's long history, writing that "in the artificial world of his cities and towns [man] often forgets the true nature of his planet and the long vistas of its history, in which the existence of the race of men has occupied a mere moment in time" (Carson, 2021, p 213). She also develops interconnectedness by reflecting on the evolutionary relationship between land animals and the ocean, illustrating this connection by describing how the "salty stream" of blood contains elements such as sodium, potassium, and calcium in nearly the same proportions as seawater (p. 212).

On a larger scale, Carson presents the ocean as a dominant force shaping the earth's systems, particularly through its regulation of climate. Ocean currents connect distant regions and influence the conditions necessary for life on land, reinforcing that ecosystems cannot be understood in isolation (Montefiore, 2001). She also links the present to the long ago past, describing the sea as containing "all that came before us" and suggesting that all matter eventually returns to what she calls the "ocean river," both "the beginning and the end" (p. 392).

Through these layered connections, interconnectedness expands into a concept that operates across both space and time.

The Edge of the Sea

Carson biographer Linda Lear notes that it was during the writing of *The Edge of the Sea* (1955) that Carson's thinking about interconnectedness shifted from geographical to explicitly ecological (Code, 2012). When faced with the task of creating a field guide to the seashore, she critiqued the tendency of the genre to present fragmented information, writing that most seashore books offer "separate little capsules of information about a series of creatures, which are never firmly placed in their environment" (Carson, 1950, as cited in Hagood, 2013). In the book's preface Carson argues that true understanding requires more than identifying individual species; it demands awareness of the dynamic relationships that shape life along the shore, writing:

> "To understand the life of the shore, it is not enough to pick up an empty shell and say "This is a murex," or "That is an angel wing." True understanding demands intuitive comprehension of the whole life of the creature that once inhabited this empty shell: how it survived amid surf and storms, what were its enemies, how it found food and reproduced its kind, what were its relations to the particular sea world in which it lived" (Carson, 2021, p. 415).

This perspective is reflected in the organization of the book. Rather than grouping organisms taxonomically, Carson organizes them by habitat (rocks, sand, and coral) demonstrating how environmental conditions determine the forms of life that can exist there. By emphasizing relationships between organisms and their environments, interconnectedness becomes a methodological approach to understanding ecological systems.

The Sense of Wonder

In *The Sense of Wonder* (1963), Carson presents interconnectedness as an emotional necessity that must be directly experienced in order to be fully understood, emphasizing its importance for human well-being to satisfy what Linda Lear refers to in the book's introduction as an "ancient longing for unity with the living world" which can only be fulfilled through meaningful contact with nature (Carson, 2017, p. 10). Carson emphasized that the "lasting pleasures of contact with the natural world ... are available to anyone who will place himself under the influence of earth, sea and sky," indicating that those who open themselves up to appreciating the interconnected web of life will benefit from the experience, allowing them to perceive their place within a larger system, making the abstract concept of interconnectedness tangible and personally meaningful (p. 78).

Silent Spring

In *Silent Spring*, Carson transformed the concept of interconnectedness into a warning about the dangers of disrupting natural systems. Drawing again on the structure of the food chain, she demonstrates how synthetic pesticides accumulate and magnify as they move through trophic levels, illustrating that actions directed at one part of a system inevitably affect the whole (DeMarco, 2017). For example, she explained that poisoning insects impacts the birds that feed on them and the soil that depends on them, creating an "ever-widening wave of death" (Carson, 2018, p. 113). She also understood the importance of biodiversity, writing "Nature has introduced great variety into the landscape, but man has displayed a passion for simplifying it" (p. 17). In a section on Dutch elm disease, she references ecologist Charles Elton’s concept of the conservation of variety as “the key to a healthy plant or animal community” and noting that

the human inclination “to fill large areas with a single species of tree was to invite disaster” (p. 105).

Central to her argument is that humans fail to realize that they are within this interconnected system and will also be subjected to the effects of the substances released into the environment. This idea is reinforced through numerous examples of illness and death caused by exposure to synthetic chemical pesticides, leading Carson to conclude that “Man, however much he may like to pretend the contrary, is part of nature. Can he escape a pollution that is now so thoroughly distributed throughout our world?” (2018, p. 166). In *Silent Spring*, interconnectedness becomes not only a scientific reality but an urgent ethical argument (Cafaro, 2013).

Carson’s works consistently feature the concept of interconnectedness as it evolves from a literary theme to ecological understanding and ethical implication. Across all her writings, Carson presents nature as a system in which all components are bound together through relationships of dependence and exchange. This understanding forms a central foundation for her overall message and proposes the need for a more integrated relationship between humans and the natural world.

The Moral Responsibility to Protect Nature and Non-human Life

The second major theme in Rachel Carson’s work is the moral responsibility to protect nature and non-human life. More specifically, humans are not only part of nature but have a duty to act as its stewards with obligations to both present and future generations. Throughout her work, Carson consistently challenges the assumption that humans exist outside of or above nature, instead emphasizing that human actions carry consequences for both human and non-

human life. While this theme is expressed implicitly in her earlier works, it develops over time into an explicit ethical argument when, in *Silent Spring*, she identifies the widespread use of chemical pesticides as a moral crisis. Carson emphasized that humanity's unprecedented capacity to alter ecosystems creates an ethical responsibility to protect them, while also asserting the public's right to know about the environmental harms that result from actions undertaken by government agencies and the chemical industry in order to make informed decisions (Mangrum, 2021).

It is important to note that Carson's personal ethics were highly influenced by Albert Schweitzer's philosophy of "reverence for life;" Schweitzer's work was so significant to Carson that *Silent Spring* is dedicated to him (Lear, 1997). The fundamental premise of Schweitzer's philosophy is captured with the phrase "I am life, which wills to live, in the midst of life, which wills to live." This phrase expresses both a realization of self-awareness about one's own existence and the recognition that all living beings share the same will to live. It is meant to elicit a profound sense of awe and respect for the inexplicable mystery of life while instilling a sense of empathy, creating a moral duty to treat all lives with the same respect given to one's own. It also establishes the ethical principle that supporting life is good, while harming it is wrong. (Cicovacki in Schweitzer, 2023). Carson's adherence to this philosophy is evident in her writing, as she argues that a truly civilized society must extend its moral concern beyond human relationships to include all living systems (Cafaro, 2013).

Under the Sea-Wind

Carson introduces her ethical perspective in *Under the Sea-Wind* by decentering the human perspective and emphasizing the intrinsic value of non-human life. By telling the stories of animals from their own points of view, she presents human beings as one species among

many. This narrative approach encourages readers to recognize non-human lives as subjects with their own experiences, rather than as objects defined by human use (Hagood, 2013; Lear, 1997). This idea is particularly evident in one passage in the book where Carson does employ a human point of view. It belongs to a fisherman that is part of a crew attempting to capture the school of fish that contains her featured mackerel character, Scomber. The fisherman's thoughts are described:

> "He sometimes thought about fish as he looked at them on deck or being iced down in the hold. What had the eyes of the mackerel seen? Things he'd never see; places he'd never go. He seldom put it into words, but it seemed to him incongruous that a creature that had made a go of life in the sea, that had run the gauntlet of all the relentless enemies that he knew roved through that dimness his eyes could not penetrate, should at last come to death on the deck of a mackerel seiner, slimy with fish gurry and slippery with scales" (Carson 2021, p 112).

The fisherman's reflection on the life of the fish and what it has seen and endured in a world he will never know suggests a recognition of the depth of non-human existence, as well as a sense of unease about its end on the deck of the boat, a setting that is implied as unworthy of its life. The implication that such a life deserves something more than this outcome elevates the value of the fish's experience. The description of the boat deck also suggests that the fisherman holds the human world in lesser esteem than the mackerel's world of the sea and invites a reconsideration of human relationships with other species.

Carson also gestures toward the ethical implications of human action through her descriptions of wasteful fishing practices, including forgotten nets harvesting sea life that will never be collected and the number of animals killed that are not the intended target. Although presented without overt judgment, these moments convey a sense of tragedy that results from human carelessness, encouraging readers to respond emotionally to the consequences of human disregard for other forms of life.

The book's conclusion further reinforces this perspective by imagining a future in which human landscapes are erased as the sea reclaims the land and natural processes continue without reference to human presence; Carson writes:

> "…for once more the mountains would be worn away by the endless erosion of water and carried in silt to the sea, and once more all the coast would be water again, and the places of its cities and towns would belong to the sea" (p. 151).

In this vision, there is little concern for the fate of human civilization; instead, the focus remains on the persistence of ecological systems and the fulfillment of non-human life, implying that humans should reconsider their place and significance on earth as part of a larger ecological system (Hagood, 2013).

The Sea Around Us

Carson continues to decenter the human perspective in a similar way in *The Sea Around Us*. By noting the briefness of humanity's time on earth, she challenges anthropocentric assumptions about the centrality of human life. Her descriptions of the ocean as a powerful and formative force support this perspective because it is shown to be something beyond human control or full comprehension, implying that it should be approached with humility and respect

on account of its vast and enduring existence that dwarfs the scope of humanity (Hagood, 2013; Montefiore, 2001).

Carson added a more ethical dimension to *The Sea Around Us* in the preface to the revised 1960 edition, written while she was in the midst of composing *Silent Spring*. In this addition, she reexamines humanity's role as a "steward of the natural resources of the earth," describing that record as deeply troubling and acknowledging that her earlier belief that the ocean was too powerful to be significantly altered by human actions had proven naive in light of new scientific understanding about disposing radioactive waste in the sea (Carson 2021, p 191). She directly confronts the moral implications of this practice, arguing that it is fundamentally irresponsible to introduce hazardous materials into a system that is not fully understood and warning that such actions are irreversible and carry long-term consequences. She grounds her argument in the fact that radioactive elements can move through marine food chains and eventually return to humans, making a similar point to her argument about pesticides in *Silent Spring.* Overall, Carson frames this behavior as a profound moral failure, pointing to the irony that the ocean, which gave rise to life, is now threatened by human activity (Sideris, 2008).

The Edge of the Sea

In *The Edge of the Sea*, the value that Carson places on non-human life is expressed through her admiration for the resilience and adaptability of shoreline inhabitants. While the book functions as a guide to coastal environments, it also conveys a deep respect for the ability to survive in such constantly changing environments, reinforcing the idea that non-human life possesses inherent value independent of human use or perception. Consider the following passage:

> "Only the most hearty and adaptable can survive in a region so mutable, yet the area between the tide lines is crowded with plants and animals. In this difficult world of the shore, life displays enormous toughness and vitality by occupying almost every conceivable niche" (Carson 2021, p 421).

Additionally, by structuring the book with a focus on the relationships between organisms and their habitats, Carson places value on both the individual species and their environments, extending moral consideration to entire ecological communities.

The Sense of Wonder

In *The Sense of Wonder*, Carson presents the ability to value nature and nonhuman life as an educational and spiritual imperative when she asserts that anyone willing open themselves to emotional experiences in natural outdoor environments will be inspired to learn more about what is encountered and never grow "weary of life" (Carson, 2017). Carson famously asserted a direct link between wonder and a disinclination to engage in environmentally damaging behavior in her 1952 speech accepting the John Burroughs Medal: "the more clearly we can focus our attention on the wonders and realities of the universe about us the less taste we shall have for destruction of our race" (Carson, 1998, "Design for Nature Writing").

Silent Spring

This theme reaches its most explicit and forceful expression in *Silent Spring*, where Carson transforms her ethical values into a direct critique of human actions and institutions. Here, she articulates both the rights of non-human life and the responsibilities of human society, arguing that environmental destruction represents a moral failure as well as a scientific one,

while challenging the dominance of economic and technological priorities and criticizing reducing the value of nature to its utility (Cafaro, 2013).

Carson emphasizes that non-human organisms possess intrinsic value and should not be subjected to unnecessary suffering or destruction, arguing that actions like indiscriminate pesticide use not only harm ecosystems but also diminish human moral character and the integrity of human society. She writes: “The question is whether any civilization can wage relentless war on life without destroying itself, and without losing the right to be called civilized” (Carson 2018, p. 91). Considering the painful deaths that animals suffered due to pesticide exposure, she asks: “By acquiescing in an act that can cause such suffering to a living creature, who among us is not diminished as a human being?” (Carson 2018, p. 91).

She also frames environmental protection as a matter of human rights, asserting that individuals have a fundamental right to know about environmental hazards and a right to be protected from them (Mangrum, 2021). Carson also extends this argument to the right of people to enjoy aesthetic value of nature, writing:

> “To the bird watcher, the suburbanite who derives joy from birds in his garden, the hunter, the fisherman or the explorer of wild regions, anything that destroys the wildlife of an area for even a single year has deprived him of pleasure to which he has a legitimate right” (Carson 1962/2018, p. 91).

Finally, she considers the right of future generations, arguing that present actions must be evaluated in terms of their long-term impacts on future generations (DeMarco, 2017).

Summary

Carson's theme of moral responsibility begins as an implicit respect for non-human life in her earlier work and evolves to a fully articulated environmental ethic grounded in humility and stewardship. Across all her works, Carson consistently challenges the assumption of human superiority to other forms of life and the idea that human life somehow exists separately from the other species that share the planet and can be immune from the environmental harm wrought by human action. Her message is that there must be recognition that the outsized ability to disrupt natural processes comes with an obligation to act with care, restraint, and foresight.

Nature as a Source of Wonder

A third major theme in Rachel Carson's work is the idea of nature as a source of wonder. It is a foundational element of her legacy, connecting her childhood experiences, her work as a scientist, her literary style, and her ethical perspective. For Carson, the sense of wonder is the ability to perceive and respond to the complexity, beauty, and mystery of the natural world; it is a profound emotional, spiritual, and aesthetic experience derived from direct sensory engagement with the environment.

Throughout her work, Carson presents wonder as a mode of perception through which humans come to understand, value, and protect the natural world, tying it closely to the other themes of interconnectedness and moral responsibility. She believed that direct, sensory experience with nature cultivates empathy and identification with non-human life, allowing humans to recognize their place within larger ecological systems and to value other forms of life more deeply. She elevates the aesthetic appreciation of nature into a form of ethical reasoning, using wonder as a basis for environmental responsibility (Mangrum, 2021).

Wonder also carries a spiritual dimension for Carson. She describes it as an awareness of something beyond human understanding; a recognition of mystery that resists complete explanation. This encounter with the unknown promotes humility and challenges human-centered assumptions, opening the possibility of a deeper, more meaningful relationship with the natural world that becomes a source of meaning and purpose (Lear, 1997). To root this assertion clearly in Carson's own words, consider this excerpt from a 1954 speech:

> I am not afraid of being thought a sentimentalist when I stand here tonight and tell you that I believe natural beauty has a necessary place in the spiritual development of any individual or any society. I believe that whenever we destroy beauty, or whenever we substitute something man-made and artificial for a natural feature of the earth, we have retarded some part of man's spiritual growth.
>
> I believe this affinity of the human spirit for the earth and its beauties is deeply and logically rooted. As human beings, we are part of the whole stream of life. We have been human beings for perhaps a million years. But life itself – passes on something of itself to other life – that mysterious entity that moves and is aware of itself and its surroundings, and so is distinguished from rocks or senseless clay –[from which] life arose many hundreds of millions of years ago. Since then it has developed, struggled, adapted itself to its surroundings, evolved an infinite number of forms. But its living protoplasm is built of the same elements as air, water, and rock. To these the mysterious spark of life was added. Our origins are of the earth. And so there is in us a deeply seated

response to the natural universe, which is part of our humanity (Carson, 1998, "The Real World Around Us".).

Under the Sea-Wind

In *Under the Sea-Wind* the theme of nature as a source of wonder is present through the narrative approach that dissolves the boundary between observer and environment. By immersing the reader in the lives of animals, Carson creates a form of experiential understanding that allows non-human life to be perceived from within rather than from a detached, human-centered perspective. This narrative strategy promotes a sense of curiosity and excitement, encouraging readers to engage with the natural world in a new way through the eyes of another life form. Additionally, Carson's descriptions create vivid imagery that allow the reader to marvel at both nature's intricacy and immensity. For example, describing mackerel eggs as, "a cloud of transparent spheres of infinitesimal size, a vast, sprawling river of life, the sea's counterpart of the river of stars that flows through the sky as the Milky Way" (Carson, 2021, p. 66). Carson's ability to convey the processes of nature with both scientific accuracy and poetic depth allow the cycles of life to take on metaphorical and emotional significance. Her dual voice as both scientist and writer enables readers to experience the ocean ecosystem not only as a subject of study, but as a source of wonder (Lear 1997).

The Sea Around Us

In *The Sea Around Us*, wonder expands from the intimate scale of the individual lives in *Under the Sea-Wind* to the vastness of the history of the earth and the ocean. Carson uses the immensity and complexity of the ocean to evoke a sense of awe, emphasizing its scale, power, and enduring mystery, writing, "even with all our modern instruments for probing and sampling

the deep ocean, no one now can say that we shall ever resolve the last, the ultimate mysteries of the sea" (Carson 2021, p 392). Even as she presents detailed scientific knowledge, the ocean remains unknowable in its entirety (Hagood, 2013). Carson also invites readers to share in her own sense of awe with the wonders of the sea as she describes the darkness, bioluminescence, and unfamiliar sounds beneath the surface of the ocean, allowing her audience to share in her scientist's perspective (Montefiore, 2001).

The Edge of the Sea

In *The Edge of the Sea,* wonder becomes a more intimate and immediate experience grounded in direct, sensory experience and close observation as Carson explores the intricate ecology of the shoreline and captures her personal fascination with the minute details of tide pools and the ability of life to survive in the ever-changing boundary between land and water. Although the book functions as a field guide, it also serves as an invitation to experience nature directly; Carson presents the shoreline as a place where complex ecological relationships can be encountered firsthand and describes her own process of interacting with and appreciating nature. She emphasizes how careful attention and observation reveal layers of beauty, mystery, and meaning. Her descriptions often take on a reflective and spiritual tone, suggesting that moments of deep attention can lead to a sense of connection that transcends ordinary perception. In these encounters, wonder emerges not only from what is seen, but from what remains partially unknown. Carson suggests that the pursuit of understanding is itself a meaningful engagement with the natural world. It is worth quoting the following two passages at length to illustrate the deep meaning that Carson derived from her experiences in nature. First is Carson's nocturnal encounter with a ghost crab:

> "The shore at night is a different world, in which the very darkness that hides the distractions of daylight brings into sharper focus the elemental realities. Once, exploring the night beach, I surprised a small ghost crab in the searching beam of my torch. He was lying in a pit he had just dug above the surf, as though watching the sea and waiting. The blackness of the night possessed water, air, and beach. It was the darkness of an older world, before Man. There was no sound but the all enveloping primeval sounds of the wind blowing over water and sand, and of waves crashing on the beach. There was no other visible life and – just one small crab near the sea. I have seen hundreds of ghost crabs in other settings, but suddenly I was filled with the odd sensation that for the first time I knew the creature in its own world – that I understood, as never before, the essence of its being. In that moment time was suspended; the world to which I belonged did not exist and I might have been an onlooker from outer space. The little crab alone with the sea became a symbol that stood for life itself – for the delicate, destructible, yet incredibly vital force that somehow holds its place amid the harsh realities of the inorganic world."
>
> (Carson 2021, p 425)

Next, consider an existential inquiry that arises from her observations:

> "Contemplating the teaming life of the shore, we have an uneasy sense of the communication of some universal truth that lies just beyond our grasp. What is the message signaled by the hordes of diatoms, flashing their microscopic lights in the night sea? What truth is expressed by the legions of the barnacles,

> whitening the rocks with their habitations, each small creature within finding the necessities of its existence in the sweep of the surf? And what is the meaning of so tiny a being as the transparent wisp of protoplasm that is a sea lace, existing for some reason inscrutable to us and – a reason that demands its presence by the trillion amid the rocks and weeds of the shore? The meaning haunts and ever eludes us and in its very pursuit we approach the ultimate mystery of Life itself." (Carson 2021, p 654)

The Sense of Wonder

Unsurprisingly, Carson communicates this theme most directly in *The Sense of Wonder*, where she defines wonder as essential to both human development and environmental understanding. She argues that emotional engagement with nature must precede intellectual knowledge and provides the foundation upon which learning is built. She explains that "Once the emotions have been aroused – a sense of the beautiful, the excitement of the new and the unknown, a feeling of sympathy, pity, admiration, or love – then we wish for the knowledge about the object of our emotional response" (Carson, 2017, p 41).

She emphasizes the importance of maintaining the capacity to experience nature as a source of wonder throughout life, noting that while children have a "true instinct for what is beautiful and awe-inspiring," it is often lost as adulthood approaches (Carson, 2017, p 38). Carson also emphasizes the importance of actively engaging with sensory experience while exploring nature, calling it "largely a matter of becoming receptive to what lies all around you. It is learning again to use your eyes, ears, nostrils and finger tips, opening up the disused channels of sensory impression" (p.48). She continues by pointing out that while sight is the sense most

commonly used to relate to the surrounding world, it is not typically employed to its full capacity, writing:

> "For most of us, knowledge of our world comes largely through sight, yet we look about with such unseeing eyes that we are partially blind. One way to open your eyes to unnoticed beauty is to ask yourself, "What if I had never seen this before? What if I knew I would never see it again?" (p.48)

Carson presents wonder not only as a means of reconnecting with the natural environment but also a "recognition of something beyond the boundaries of human existence" (p. 75) making it a source of emotional and spiritual well-being that provides a respite from the alienation of modern life writing:

> "Those who contemplate the beauty of the earth find reserves of strength that will endure as long as life lasts. There is symbolic as well as actual beauty in the migration of the birds, the ebb and flow of the tides, the folded bud ready for the spring. There is something infinitely healing in the repeated refrains of nature – the assurance that dawn comes after night, and spring after the winter" (p.75).

Silent Spring

In *Silent Spring*, the sense of wonder is transformed from a mode of perception into a powerful motivation for environmental protection. Carson frames the destruction of the natural world as not only an ecological crisis, but also as a loss of beauty, meaning, and emotional connection. The absence of birdsong in the book's title symbolizes this loss, representing the

disappearance of the sensory and aesthetic experiences that give life depth and significance. She expresses the importance of this along with the unconcealed anger that is present throughout the book as she asks:

> "Who has decided —who has the *right* to decide—for the countless legions of people who were not consulted that the supreme value is a world without insects, even though it be also a sterile world ungraced by the curving wing of a bird in flight?" (Carson, 2018, p. 113).

The opening "Fable for Tomorrow" reinforces this idea by depicting a landscape once characterized by harmony and vitality, now rendered silent and lifeless. Through this contrast, Carson highlights what is at stake. The destruction of ecological systems diminishes the human capacity to experience wonder through the severing of the aesthetic and emotional connection to nature. Carson's critique of synthetic pesticides is grounded not only in science, but in a defense of the beauty of the living world and the emotional and spiritual experiences it sustains. In this way, wonder becomes the driving force behind her environmental advocacy, transforming aesthetic appreciation into a call for responsibility and action.

Summary

Overall, Carson's work presents the sense of wonder as an essential way for people to understand and relate to the natural world. What begins as an immersive, narrative experience in her early writing expands into an awareness of vast ecological systems through direct and sensory engagement and eventually becomes the ethical and emotional foundation for environmental protection. Across her body of work, wonder functions not only as a way of

seeing the world, but as a means of shaping human values, linking perception, knowledge, responsibility, and spirituality into a unified understanding of the human relationship with nature.

Using Storytelling to Engage Emotions and Communicate Ecological Knowledge

A fourth major theme in Rachel Carson's work is the use of storytelling as a means of engaging emotions and communicating ecological knowledge. Carson's writing is characterized by its ability to combine scientific accuracy with literary expression, allowing her to present complex ecological ideas in ways that are both accessible and emotionally engaging. Instead of relying solely on abstract data or technical explanation, she uses narrative to make the natural world vivid, meaningful, and intelligible to a wide audience. Carson demonstrates that storytelling is essential to ecological understanding, adapting her storytelling techniques across her books as her point of view evolved from one of sharing the wonder of the natural world to an urgent call to action. By engaging both intellect and emotion, narrative allows readers to grasp the significance of environmental processes and recognize their own place within them, linking knowledge to empathy and responsibility.

Under the Sea-Wind

Carson establishes her storytelling approach in *Under the Sea-Wind* by structuring the book around the lives of animal protagonists. Through these characters, she constructs a narrative that follows experiences of survival, migration, and reproduction, creating a story that is both scientifically accurate and emotionally engaging as readers are taken on a journey through marine ecosystems with suspense and tragedy. One reviewer described it as "skillfully written as to read like fiction," despite being a factually accurate account of ocean life (Lear, 1997). When relaying an account of Pandion the osprey's attempt to outmaneuver an eagle from

stealing a just-caught fish, it reads as a tense and action-packed scene from a novel, complete with tragic errors in judgment and narrow escapes. Yet, her depiction of the animals is unsentimental and she deliberately avoids anthropomorphism. In a letter to her editor Carson wrote:

> "The entire book must be written in narrative form …The fish and the other sea creatures must be central characters and their world must be portrayed as it looks and feels to them—and the narrator must not come into the story or appear to express an opinion. Nor must any other human come into it except from the fishes' viewpoint as a predator and destroyer. You understand I am not trying to make this a series of bedtime stories or to create any plot as such—that will be supplied by the normal but always strange and sometimes incredible everyday lives of sea dwellers (Carson, 1938 as cited in Hagood, 2013).

This approach allows readers to access the world of the ocean from a non-human perspective, and grounds ecological information in imagination and empathy (Hagood, 2013). By rendering the struggles and behaviors of animals in narrative form, Carson makes complex biological processes relatable without sacrificing scientific accuracy. While deliberately trying to avoid human bias, Carson made the animals' lives emotionally resonant to her audience by implying human psychological states like fear and relief. In doing so, she demonstrates that storytelling can function as a powerful tool for understanding ecological relationships (Lytle, 2007) .

The Sea Around Us

In *The Sea Around Us*, Carson expands her use of storytelling to a bigger scale, constructing an omniscient epic narrative of the ocean's history detailing the formation of the moon, the emergence of islands, and the movement of tides. Rather than focusing on individual organisms, she presents the ocean itself as a central character, tracing its formation, movements, and influence over geological time to reveal what makes it interesting and significant (Lear, 1997). Because there are no human witnesses to these processes, Carson frames scientific knowledge as a story pieced together from multiple sources, transforming abstract data into a coherent and compelling narrative. Her prose often adopts a rhythm and structure reminiscent of origin stories, effectively creating a scientific account of the earth that parallels traditional creation narratives (Hagood, 2013).

She further adds to this narrative by incorporating myths and cultural stories about the sea, demonstrating how humans have historically sought to understand the natural world through storytelling. For example, she speculates that what science had discovered to be undersea mountains could be the origin of the legend of Atlantis. By placing scientific knowledge alongside these narratives, Carson highlights both the continuity and evolution of human attempts to make sense of ecological systems and places equal value on both methods.

The Edge of the Sea

Carson adapts her storytelling approach again in *The Edge of the Sea*, where she transforms the traditional field guide into a narrative account of ecological relationships. Instead of presenting organisms as isolated entries, she organizes the book around different types of shore environments telling the story of each as an interconnected community shaped by environmental conditions. This structure allows her to explain not only what organisms are

present, but why they exist where they do and how they interact with one another. By placing scientific information within a narrative framework, Carson enables readers to understand ecological systems as dynamic and interdependent (Lear, 1997). Carson's storytelling also became much more intimate and personal, shifting to a first-person perspective of her own adventures and direct experiences, sharing her musings on the deep meaning she found while observing life on the shoreline (Hagood, 2013).

The Sense of Wonder

Like *The Edge of the Sea*, *The Sense of Wonder* also employed a personal, anecdotal narrative approach. This time instead of recounting her solitary experiences with nature, Carson told the story of her outdoor adventures exploring the woods and shores with her young grandnephew, Roger, demonstrating how narrative can be used to communicate ways of seeing and engaging with the natural world. She describes with detail how Roger responds to what they encounter and the activities they do together like walking through the woods, listening to the night sounds, and observing the small details of tide pools, using these personal vignettes to emphasize the importance of curiosity, attention, and shared experience. Carson tells stories from her own life to guide readers toward their own direct experiences of wonder. In this context, narrative becomes a means of teaching not only ecological concepts, but also a way of perceiving the world.

Silent Spring

In *Silent Spring*, Carson brings her storytelling to its most powerful and strategic form, adapting her approach for the task at hand: communicating the urgency and moral significance of environmental degradation. Recognizing that technical scientific language alone would not engage a wide audience, she employs multiple narrative strategies to make the consequences of

pesticide use both understandable and emotionally compelling (Lockwood, 2012). She famously opens the book with “A Fable for Tomorrow,” a fictional yet representative account of a town devastated by ecological collapse that reads like a familiar fairy tale, but functions as a terrifying cautionary tale. An idyllic, harmonious community is suddenly struck by an evil spell and an eerie silence, which is soon revealed to be the result of a white powdery pesticide the townspeople applied themselves. The story draws readers in before revealing that the events it describes are grounded in real-world conditions. This technique allows Carson to establish emotional stakes immediately, making the abstract dangers of pesticides tangible and relatable, avoiding a straightforward scientific opening that might alienate nonscientific readers (Lear, 1997; Lytle, 2007).

Throughout the book, Carson also incorporates analogies and references to well-known stories to clarify complex scientific concepts. By comparing systemic insecticides to the poisoned robe of Medea and likening the bioaccumulation of pesticides in the food chain to a "house-that-Jack-built sequence," she provided her readers with accessible touchpoints to understand scientific concepts (Sideris, 2008).

Significantly, Carson also integrates real-life accounts from individuals affected by pesticide exposure, including farmers, homeowners, and birdwatchers. These testimonies convey experiences of loss, shock, and grief, transforming localized events into a broader collective narrative, giving voice to regular citizens all over the country who had been harmed by pesticides (Lockwood, 2012). Placing importance on the everyday narratives and emotions of people who were witnessing environmental destruction firsthand echoes the importance she places on emotion and direct and experience in *The Sense of Wonder*, but instead of the enchantment of the natural world, she documents their shock, anger, and heartbreak as they discovered dead birds

and poisoned pets in their own backyards. Carson's use of experiential-testimonial evidence was considered highly subversive by the scientific establishment because she dared to elevate the everyday stories and anecdotes of citizens to the same level of importance as laboratory data. In doing so, Carson challenged conventional hierarchies of knowledge while demonstrating the importance of lived experience in understanding environmental issues (Code 2012).

Through these combined strategies, storytelling becomes a means of overcoming public indifference, translating scientific evidence into a compelling moral argument, and mobilizing awareness and action.

Summary

Carson's work demonstrates that storytelling is central to the communication of ecological knowledge. Throughout her writing, it functions as a bridge between science and emotion, enabling readers to understand ecological systems not only intellectually, but also experientially and ethically. In doing so, Carson shows that narrative can be an essential way to enhance the meaning, accessibility, and impact of scientific knowledge.

Conclusion

In summary, Rachel Carson's work articulates a cohesive vision of the human–nature relationship grounded in interconnectedness, ethical responsibility, wonder, and storytelling. She demonstrates that human beings are within the same ecological systems that they harm, and that human actions carry consequences for all life, including their own. From this understanding arises a moral obligation to act as stewards of the natural world. Carson further shows that this responsibility is cultivated not only through scientific knowledge, but through an emotional relationship with nature. By using storytelling to communicate complex ecological ideas, she

makes these relationships both accessible and meaningful. Together, these themes form the message that understanding, valuing, and protecting nature are inseparable processes essential to sustaining both ecological integrity and human life.

Chapter 2: Literature Review

The purpose of this literature review is to address the second objective of this thesis: to investigate how the ideas expressed in Rachel Carson's work can be translated into landscape design using the four themes identified in the previous section (the interconnectedness of all life, the moral responsibility to protect nature and non-human life, nature as a source of wonder, and storytelling as a way to engage emotions and communicate ecological knowledge) to guide research into related interdisciplinary topics.

The literature review does not aim to provide a comprehensive overview of each topic but instead focuses on concepts that help interpret these themes in ways that are relevant to landscape architecture. Drawing from fields such as ecology, environmental ethics, phenomenology, human–nature connectedness, storytelling, and Indigenous knowledge, the review is organized to move from understanding ecological systems, to examining human relationships with nature, to exploring how these ideas can be perceived and communicated through experience. Through this process, the literature review establishes a foundation for developing design guidelines that translate Carson's message into physical and experiential landscapes.

Ecology, Environmentalism, and Nature

The concepts of ecology, environmentalism and nature connect the themes in Rachel Carson's writing to contemporary landscape design practice. These topics are at the foundation of Rachel Carson's work and provide a framework for translating her message into landscape design because they address the role of humans as part of interconnected ecological systems. Ecology explains how these systems function, environmentalism introduces the responsibility to

protect them, and the concepts of what people consider nature to be shape how they are understood and experienced.

Rachel Carson's work is grounded in the science of ecology, and it is relevant to all of the identified themes. Ecology is defined as the study of the relationships between living organisms and their physical environment making the interconnectedness of life is a core ecological principle; the work of ecologists is to understand why species exist where they do, how organisms adapt to environmental conditions, and how communities of species interact through complex networks of interdependent relationships. These ecological networks often reveal intricate patterns of communication, cooperation, and competition that demonstrate how actions affecting one species or environmental process reverberate throughout entire ecosystems (Schmitz, 2016). These ecological principles form the basis for the responsibility to protect the environment. Additionally, as described in *The New Ecology* (2016), "Ecology is a science devoted to studying the mysteries of the natural world…It is a science that stirs awe as it demystifies nature's complexity," expressing similarities to the way Carson presents nature as both a source of scientific insight and a source of beauty, mystery, and wonder capable of providing both emotional and intellectual experiences. Finally, early ecologists often relied on literary narrative structures to explain the complex relationships among species and environments (Miller, 2024). Carson continued this tradition by using storytelling to convey ecological information to her audience.

Ecology first emerged as a branch of biology in the 1860's and developed into a specialty field throughout the early twentieth century (Woudstra, 2004). Since the mid twentieth century, ecology has continued to evolve as a scientific discipline, but has also come to serve as the foundation for environmentalism (Bocking, 2017). Concern for protecting the natural

environment has been present since the onset of the industrial revolution in the late 18th century, however, environmentalism did not emerge as a force that could engage the public with cultural concern and influence public policy until the 1960s, when a movement that is considered with "surprising unanimity" to be instigated by the publication of *Silent Spring* began to coalesce (Guha, 2000). Until this time, the concept of ecology was known to people in the scientific and naturalist communities, but it was not a well-known or commonly understood set of ideas in mainstream culture. Due in part to the influence of Rachel Carson, ecology came to provide the broader intellectual and moral framework for understanding human responsibility toward protecting nature. For many of her readers, Carson's work served as an introduction to ecological thinking, helping reshape cultural understandings of nature by promoting the idea that humans are participants within an interconnected web of life, helping to transform ecology from a relatively specialized scientific field into a widely recognized term (Code, 2012; Dritschilo, 2006).

When thinking about protecting nature, it is important to note that "nature" is not an objective reality, but an abstract mental construct. The concept of nature is complex, historically variable, and shaped by cultural beliefs about the relationship between humans and the non-human world (Ducarme & Couvet, 2020). In ancient Greek thought, nature was not understood as a separate physical environment but as a dynamic, living, and rational whole in which humans, animals, and gods all participated in an ongoing process of growth, motion, and becoming (Collingwood, 1960; Ducarme & Couvet, 2020). During the Renaissance, however, this understanding shifted, and nature came to be reconceptualized as a material resource without its own life essence that was provided by God for human use (Collingwood, 1960). As a result,

the material world lost its moral value, opening it to exploitation. This change is identified by historians as a root cause of the modern ecological crisis (Ducarme & Couvet, 2020).

In contemporary Western thought, the term “nature” has multiple, often conflicting meanings. It may refer to a realm separate from humans, the entirety of the universe including humans, a dynamic force driving life and change, or the essential character of things (Ducarme & Couvet, 2020). A culture’s definition of nature often reflects how its people understand their relationship with their outdoor surroundings, frequently hinging on the conceptual boundaries of separation (dualism) and inclusion (monism). Western perspectives have tended to be dualistic, positioning humans as separate from and dominant over nature, whereas many Indigenous and Eastern traditions adopt more monistic views, seeing humans as an integral part of interconnected ecological systems (McHarg, 2006; F. O. Ndubisi, 2014; Ohlsson, 2022).

Because each of these definitions implies a different relationship between humans and the environment, the ambiguity surrounding “nature” continues to shape and complicate debates in conservation and ecology, however a standardized definition would favor a single, culturally specific worldview. Alternative solutions are to clearly define the term in context and supplement it with more precise scientific concepts like "biodiversity," "ecosystem," and "wildness” (Ducarme & Couvet, 2020).

The ways people tend to conceptualize nature generally fall into three categories: descriptive, normative, and experiential. Descriptive conceptions focus on the physical elements like plants, animals, and landscapes. Normative perspectives are based on ideas including conservation, balance, and the notion of life itself. Experiential understandings center on direct engagement with nature resulting from activities, emotional responses, and aesthetic appreciation. Some individuals have complex perspectives that draw on a combination of two or

more of these categories (Hatty et al., 2022). Contemporary research further suggests that many people define nature as wilderness untouched by human activity and separate from the built environment, particularly those who live in highly urbanized settings with limited direct contact with ecosystems (Hatty et al., 2022; Schultz, 2002; Vining et al., 2008). Yet it is increasingly difficult to identify places on Earth that have not been directly or indirectly influenced by humans, as nearly all environments are shaped by human activity. As this realization becomes more widely understood, prevailing conceptions of nature must evolve to acknowledge that humans are not separate from ecological systems but are an inherent part of them (Ndubisi, 2014; Schmitz, 2016).

Ecology, environmentalism, and the concept of nature are central to understanding how to apply Rachel Carson's message to landscape architecture because they shape how landscapes are understood, designed, and valued. Ecology provides the scientific foundation for creating designs that honor the interconnectedness of life. Environmentalism introduces an ethical dimension that humans must act as responsible members of a broader ecological community and shapes design toward stewardship and sustainability. The concept of nature is central to understanding how people relate to the environment and their experience of it. Existing approaches that apply these three concepts to the planning of landscapes include ecological design, landscape ecology, and ecological restoration.

Ecological design

Ecological design is a broad concept that describes design approaches intended to balance human needs with ecological systems and environmental processes by integrating human activities with functioning ecosystems (Ndubisi, 2014). Frederick Law Olmsted is a foundational

figure who framed nature as essential to social well-being and integrated ecological principles into the design of metropolitan park systems in the nineteenth century (Ndubisi, 2014).
Ian McHarg advanced the field in the 1960s with *Design with Nature* (1969), introducing ecological inventories and suitability analysis as methods for guiding land-use decisions. By mapping factors such as geology, climate, hydrology, soils, and habitats, he promoted designing with natural processes and emphasized the need to preserve ecosystem functions like water purification, microclimate regulation, and flood control (McHarg, 1994; Steiner et al., 2014). His work positioned ecology as a scientific foundation for landscape architecture and expanded the field beyond ornamental design while acknowledging that landscape interventions take place within interconnected natural systems (McHarg, 1994).

Ecological design is now understood as an interdisciplinary practice that integrates human and natural systems while emphasizing conservation, regeneration, and stewardship (Van der Ryn, 2007). Landscape architects play a central role in this field by synthesizing ecological science, design, and public engagement to address environmental challenges (Ahern et al., 2014). Initiatives such as the American Society of Landscape Architects' *Landscape Architecture 2040: Climate and Biodiversity Action Plan* reflect a shift toward climate-positive and biodiversity-positive design. Overall, ecological design represents an understanding of landscapes as complex living systems that support both ecological health and human well-being (Ndubisi, 2014).

Landscape Ecology

Ecological planners and designers often rely on the principles of landscape ecology to integrate design within existing landscape conditions. Landscape ecology is the study of how ecological processes interact with spatial patterns across large, heterogeneous areas of land, or

land mosaics, composed of different habitats and land uses (Dramstad, 1996; Turner, 2001). Rather than examining ecosystems in isolation, landscape ecology focuses on how the arrangement of landscape elements influences ecological processes, including species movement, energy flows, and environmental change across multiple spatial scales (Turner, 2001). Because it examines entire landscapes, including urban, agricultural, and natural systems, it provides a regional framework for understanding the ecological context surrounding a particular design site (Dramstad, 1996).

Unlike traditional ecology, which has historically studied undisturbed environments, landscape ecology directly addresses landscapes shaped by human activity. Scholars emphasize that modern ecosystems exist within a world dominated by humans, requiring analysis of how settlement patterns, agriculture, and infrastructure alter ecological processes and biodiversity (Nassauer, 1997). As a result, landscape ecology integrates ecological science with land-use planning and design, encouraging interdisciplinary approaches that balance human needs with environmental resilience (Dramstad, 1996; Nassauer, 1997).

A fundamental concept in landscape ecology is the land mosaic, the overall spatial pattern created by the interaction of three basic landscape elements: patches, corridors, and the matrix. Together, these elements determine how water, energy, and species movement occur across a landscape (Dramstad, 1996; Forman, 2008). Patches are distinct areas that differ from their surroundings in habitat type or land use, ranging from small habitat fragments to large forests. They may originate from remnants of previous ecosystems, disturbances such as fires, introduced land uses like housing developments, or environmental resources such as wetlands. Patch characteristics like size, shape, number, and location strongly influence ecological function and biodiversity (Dramstad, 1996; Forman, 2008). Corridors are linear landscape features that

connect patches or divide landscapes. Natural corridors such as rivers and streams often facilitate ecological movement, while human-made features such as roads, railways, and powerlines may function as barriers that restrict species movement and fragment habitats (Dramstad, 1996; Turner, 2001). The matrix is the dominant background land-cover type in which patches and corridors occur. Because it occupies the largest area, the matrix strongly influences the degree of habitat connectivity or isolation within a landscape. Agricultural land, suburban development, or continuous forest can all function as matrices depending on the landscape context (Dramstad, 1996; Turner, 2001).

Where different landscape elements meet, edges form transitional zones with environmental conditions distinct from interior habitats. These edge areas often experience increased sunlight, wind, and predation, creating what ecologists describe as the edge effect. As habitats become smaller or more irregular in shape, edge conditions expand and interior habitat cores shrink, reducing the viability of species that depend on stable interior environments (Dramstad, 1996).

One of the most significant spatial processes shaping modern landscapes is fragmentation, the division of large, continuous habitats into smaller, isolated patches. Fragmentation frequently results from human land-use changes such as agriculture, infrastructure, and urban development, and it can dramatically reduce interior habitat even when total habitat area appears relatively unchanged (Dramstad, 1996). In response, landscape ecologists emphasize the importance of connectivity, the degree to which habitats remain linked across a landscape. Connectivity allows for the movement of organisms, energy, and ecological processes between patches, helping maintain biodiversity and ecosystem resilience. Corridors and networks of smaller habitat patches called stepping-stones can provide pathways for species

movement across fragmented landscapes. Maintaining these connections has become a central strategy in landscape planning and conservation, allowing landscapes altered by human activity to continue supporting ecological processes (Dramstad, 1996). Applying landscape ecology to landscape architectural practice requires integrating ecological science with cultural expectations and design practices so that landscapes can support both human communities and ecological resilience (Nassauer, 1997).

Ecological Restoration

Ecological restoration is an extension of ecological design that aims to assist the recovery of degraded systems through the reactivation of natural processes (Clewell, 2007). Restoration practitioners design interventions that reduce the harm caused by human activity while supporting an ecosystem's capacity to heal itself (Carver, 2019). The goal of restoration is to achieve ecosystem wholeness, defined by resilience, continuity, and self-sustainability (Clewell, 2007). Its benefits span multiple domains: ecologically, it reinitiates disrupted natural processes; from a conservation perspective, it restores biodiversity amid a human-driven extinction crisis; socioeconomically, it renews essential ecosystem services; culturally, it strengthens communities through shared stewardship; and personally, it reconnects people with the natural world. Ecological restoration is an acknowledgment that because nature sustains human life, sustaining nature supports human well-being (Clewell, 2007).

Restoration is not solely a scientific or physical process but must be grounded in the understanding that humans and nature form an interconnected ecological family, where active human intervention is a natural part of ecosystem dynamics (Senos et al., 2006). Community involvement is a necessary component as local volunteers and Indigenous groups contribute to

long-term environmental sustainability (Clewell, 2007). In urban contexts, restoration must integrate ecological function with human values, perceptions, and behaviors (Gobster, 2010). Participation in restoration fosters deeper human-nature relationships (Furness, 2021).

In practice, ecological restoration operates across a spectrum of intervention intensities, ranging from prescribed natural regeneration to complete reconstruction, reflecting varying degrees of human involvement in reestablishing ecological function (Clewell, 2007). This range can also be understood through approaches that allow landscapes to recover autonomously, and strategies that actively reintroduce species and remove disruptive elements (Carver, 2019). Practitioners must carefully reintroduce coadapted species and ensure that all necessary functional groups are present to effectively restore ecosystem complexity and function (Clewell, 2007).

Central to these practices is the use of ecological reference models like intact ecosystems or historical descriptions which provide benchmarks for restoration while recognizing that ecosystems must ultimately be restored for the future rather than replicated as static past conditions, as attempting to perfectly recreate historical states is both impossible and counterproductive (Clewell, 2007). In highly altered urban areas, reliance on historical references may be unrealistic; instead, practitioners must work with existing, novel conditions to achieve sustainability (Gobster, 2010).

There is also growing emphasis on incorporating Traditional Ecological Knowledge (TEK), acknowledging that many landscapes were historically shaped by Indigenous management practices and that effective restoration integrates Western science with adaptive, culturally rooted approaches (Senos et al., 2006). Finally, the success of restoration depends not only on ecological outcomes but also on public perception and acceptance. Community support

varies by intervention type, with greater acceptance for low-impact practices and resistance to more intensive methods, highlighting the need for education and engagement to align ecological goals with social values (Gobster et al., 2016).

Applying Ecology to Design

Applying ecology-informed approaches to landscape design requires understanding environments as dynamic systems that support both ecological function and meaningful human–nature relationships, rather than seeing them as static, human-centered landscapes (Hwang & Jain, 2021). This begins with ecological inventories that analyze climate, hydrology, soils, vegetation, and human use to guide design decisions to ensure that interventions respond to existing environmental conditions (Steiner, 2008; Yang & Li, 2016). This approach is reinforced by designing in response to local climate, topography, soils, and cultural context rather than relying on standardized models (Van der Ryn, 2007).

Designing for biodiversity is a central component of ecological design and requires maintaining heterogeneity across the landscape rather than isolating habitat within designated areas (Hwang & Jain, 2021). Strategies such as incorporating layered plantings and introducing species-specific features support diverse microhabitats and ecological function over time (Hwang & Jain, 2021). At a broader scale, this is reinforced through spatial strategies such as core habitats, buffer zones, and wildlife corridors that maintain connectivity and support viable populations (Van der Ryn, 2007). Designers must also account for ecological succession, recognizing that maintaining biodiversity may require intentional disturbance or management interventions to prevent dominant species from reducing diversity over time (Dagenais, 2008).

Preserving existing vegetation, particularly tree canopy and understory, is also critical for maintaining ecological stability and mitigating urban heat island effects (Yang and Li, 2016). Hydrology, soil, and topography also play a critical role in shaping ecological design decisions. Designers are encouraged to work with natural processes by implementing open surface drainage systems such as swales, preserving permeable soils, slowing runoff, and supporting groundwater recharge (Yang and Li, 2016). Similarly, living systems can be used to perform infrastructural functions, such as constructed wetlands for water purification or vegetative stabilization of slopes, replacing more rigid and resource-intensive approaches (Van der Ryn, 2007). These strategies reflect a broader shift toward aligning human systems with natural flows of water, energy, and materials.

Recognizing landscapes as continuously evolving systems also requires flexible management strategies that support ongoing ecological processes. Practices such as reducing pruning, eliminating insecticides, reusing organic matter, and allowing for spontaneous plant growth promote biodiversity, resilience, and long-term stability (Hwang & Jain, 2021). However, because ecological processes unfold over long timescales, they can be difficult to perceive and design for, creating a tension between ecological change and human experience (Dagenais, 2008). This highlights the importance of adaptive management approaches that anticipate change while maintaining legibility and engagement, recognizing that ecological landscapes are ongoing processes shaped by both natural dynamics and human stewardship.

Successful ecological design also depends on balancing human access with ecological protection so that human use reinforces ecological function (Hwang & Jain, 2021). Integrating biodiversity into everyday experiences through trails, boardwalks, and accessible landscapes can strengthen stewardship and foster appreciation for ecological systems. Educational and

participatory strategies including citizen science, community workshops, and ecological monitoring further support public engagement (Van der Ryn, 2007; Hwang & Jain, 2021). Infrastructure must also be adapted to reduce ecological harm through strategies such as minimizing impervious surfaces, incorporating wildlife passages, reducing light pollution, and buffering noise (Hwang & Jain, 2021). Making ecological processes visible, such as exposing stormwater flows or using vegetation to reveal seasonal change, can further support public understanding and engagement (Van der Ryn, 2007).

Landscape ecology provides a framework for applying ecological design within human-dominated environments by emphasizing connectivity, multifunctionality, and the integration of ecological systems within the urban matrix by designing multifunctional landscapes that integrate ecological processes into everyday environments. Spaces such as residential areas, parks, and infrastructure corridors can provide ecosystem services including food production, climate regulation, stormwater management, and cultural value (Lovell & Johnston, 2009). Urban areas can be understood as networks of interconnected systems, where individual sites contribute to broader ecological function while delivering social, economic, and environmental benefits (Lovell & Johnston, 2009).

Enhancing connectivity between fragmented habitats is essential for supporting species movement, reproduction, and resilience, and can be achieved through continuous vegetated corridors, tree canopies, green infrastructure, and wildlife crossings that mitigate the impacts of urban barriers (Dramstad, 1996; Hwang & Jain, 2021). Where infrastructure intersects ecological systems, such as roads crossing riparian corridors, bridges should be designed to allow species movement beneath them while maintaining native vegetation, and additional interventions such as amphibian tunnels can support safe passage across transportation networks (Dramstad, 1996).

The design of boundaries and edges further influences ecological function; curvilinear edges with lobes increase habitat diversity and reduce erosion, while buffer zones protect core habitats from invasive species and external disturbance (Dramstad, 1996). Because these systems operate across scales and evolve over time, their success depends on ongoing monitoring, evaluation, and adaptive management, using both field-based measurements and broader spatial analysis to guide long-term decision-making (Almusaed, 2016; Lovell & Johnston, 2009).

Restoration design represents a critical application of these principles, requiring a balance between ecological integrity and human experience. Design elements such as fences and boardwalks may protect sensitive systems but can also reduce opportunities for experiential learning. To address this, restoration strategies can incorporate volunteer stewardship, spatial and temporal zoning, and resilient informal areas that allow for exploration without compromising ecological function (Gobster, 2007). Restoration should begin with repairing abiotic conditions, such as hydrology, soils, and water quality before introducing plant and animal communities, ensuring that the physical environment can support long-term ecological function (Clewell, 2007).

Invasive species management should follow a triage approach, focusing on removing those that pose the greatest threat while designing plant communities that fill ecological niches and reduce opportunities for reinvasion (Clewell, 2007). The use of locally sourced genetic material is strongly recommended to maintain ecological function, while plant material from other regions should only be used when intentionally anticipating future climate conditions (Clewell, 2007). Reinstating keystone species and selectively removing human-made elements can further restore ecological function and system dynamics (Carver, 2019). Structural interventions, such as introducing woody debris or restoring soil systems, can further support

ecological processes and habitat complexity (Carver, 2019; Clewell, 2007). Restoration should prioritize reestablishing ecological processes rather than relying on intensive intervention, allowing systems to recover over time (Clewell, 2007; Senos et al., 2006).

Planting Design

Planting design is one of the primary ways ecological theory is translated into tangible landscape interventions. Contemporary ecological planting design emphasizes dynamic, community-based systems that emulate natural processes that requires understanding plant life cycles and ecological habitats rather than treating vegetation as static visual ornamentation (Cai, 2020). The concept of "naturalistic planting" encompasses a wide spectrum of approaches, ranging from restoration ecology to highly stylized interpretations of natural systems (Dunnett & Hitchmough, 2026). Across this spectrum, successful planting design must balance artistic intent with ecological function by acknowledging that plant communities are always in flux, shaped by life cycles, environmental constraints, and competition over time (Dunnett, 2026). In response to climate change and biodiversity loss, contemporary movements such as rewilding, reduced mowing regimes, and the increased use of native species further position planting design as a critical tool for transforming urban landscapes into functioning ecosystems (Higgins & Russo, 2025).

In ecological planting design, environmental processes are used to guide the spatial arrangement of plant communities. Instead of arranging plants based only on visual patterns, environmental conditions that influence where different species can grow are considered; for example, soil conditions can be used as a guide because less fertile soils can limit dominant species and help support biodiversity with less maintenance over time (Dunnett and Hitchmough, 2026). Material strategies, such as the use of deep mineral mulches instead of organic compost,

further reinforce these systems by suppressing weed germination and stabilizing plant communities (Hitchmough, 2026). Plant selection is closely aligned with site-specific conditions like water availability, nutrient levels, pH, oxygen, and light to ensure resilience and minimize resource-intensive management (Sjöman et al., 2026). Ecological theory is applied in planting design through frameworks like Grime's Plant Strategy Theory, which helps guide how different species are selected and combined so they can coexist more successfully (Dunnett, 2026). As climatic conditions shift, planting design also becomes a forward-looking practice, incorporating drought- and heat-tolerant ecotypes or even carefully selected non-native species, particularly in highly engineered urban environments such as green roofs and bioretention systems where novel conditions require adaptive strategies (Dunnett, 2026).

The structural composition of planting further reinforces ecological function by organizing vegetation into layered, interconnected systems. High-density planting achieved through vertical and temporal layering enhances resilience and reduces opportunities for weed invasion (West, 2026). Groundcover layers play a particularly critical role, supporting plant survival in shaded conditions, stabilizing soils, suppressing invasive species, and replacing conventional mulch systems (Cai, 2020). Dense, shade-tolerant base layers contribute to habitat complexity while supporting invertebrate populations and reducing maintenance demands (Hitchmough, 2026). Intentionally including native plants that serve as host species for insects helps support food webs and increases biodiversity in urban areas (Higgins & Russo, 2025).

Planting strategies also enable ecological design to respond to specific environmental contexts, particularly in relation to water systems and urban woodlands. Planting across different moisture conditions helps manage how water moves through the site while supporting a wider range of plant species, and certain plants can also help filter pollutants and absorb excess

nutrients (West, 2026). Material and management decisions, such as avoiding peat-based substrates, fertilizers, and pesticides near water bodies, further reinforce ecological performance and protect water quality (West, 2026). In woodland systems, shrubs and understory plantings provide essential structural continuity, offering habitat, seasonal interest, and food resources, while practices such as coppicing can rejuvenate vegetation and increase permeability (Hitchmough, 2026). The use of nurse trees to facilitate the establishment of long-term canopy species demonstrates how planting design can guide ecological succession over time, while careful species selection ensures resilience to human use and safety within urban environments (Sjöman et al., 2026).

Finally, meadow-based planting systems illustrate how ecological design can be integrated into urban landscapes at broader scales. The introduction of annual and perennial meadows supports pollinator populations, reduces mowing requirements, and enhances climate resilience (Hoyle, 2026). However, these systems also highlight the importance of long-term, adaptive management. Because ecological plantings are inherently dynamic, their success depends on succession-based strategies that incorporate disturbance, controlled colonization, and ongoing management of species performance (Dunnett, 2026). Through these approaches, planting design becomes both a representation of ecological principles and an active, evolving process that shapes how landscapes function over time.

Summary

Together, these approaches demonstrate how ecological knowledge can be applied to landscape design and demonstrate Rachel Carson's messages about interconnectedness and the importance of protecting ecosystems from human activity. By working with existing systems, supporting biodiversity and connectivity, and allowing landscapes to evolve over time, applying

ecological design can shift the role of the designer from one of control to one of guidance and stewardship. Additionally, while these strategies support ecosystems they also create opportunities for people to recognize their place within them, further contributing to the communication of Rachel Carson's message.

Environmental Ethics

Environmental ethics provides a moral lens that connects Rachel Carson's themes to the value-based decisions that shape landscape design. Environmental ethics is a branch of philosophy and applied ethics that examines the moral principles, values, and responsibilities that shape how humans understand, interact with, and impact the natural world (Attfield, 2014; Rolston, 2012). While classical ethical traditions historically focused on how humans relate to one another, environmental ethics asks whether moral consideration should extend beyond people to include animals, plants, endangered species, ecosystems, wilderness areas, and even the Earth itself (Rolston, 2012; Thompson, 2019).

Debates within environmental ethics center on which entities possess moral standing and how to value nature. Anthropocentrism is a human-centered approach that argues that the value of nature is derived from its utility to humans. Applications of anthropocentric environmental ethics to protect the environment are used to benefit people; these include managing pollution for human health, conserving natural resources to support recreation and aesthetic enjoyment, engaging in sustainable development to meet present and future human needs, and advocating for environmental justice to ensure that environmental harms do not disproportionately burden marginalized communities (Attfield, 2014; Rolston, 2012; Thompson, 2019).

There are several approaches that argue for extending moral consideration to other types of life regardless of their utility to humans. Sentientism or pathocentrism contends that all beings capable of feeling pleasure or suffering deserve ethical regard, challenging how humans interact with wild and domestic animals and calling for scrutiny in practices like factory farming, sport hunting, and the use of animals in scientific research (Attfield, 2014; Rolston, 2012; Thompson, 2019). Biocentrism says that all living organisms, including plants, insects, microbes and any other non-conscious creatures, have intrinsic value on the grounds that every living being has a right to exist regardless of its usefulness to humans or its ability to feel pain, but simply because it is a self-sustaining living system (Beatley, 2014; Rolston, 2012). Ecocentrism is a holistic approach that attributes moral value to the entire biosphere rather than only to individual organisms including species, ecosystems, and evolutionary processes. Aldo Leopold's Land Ethic, which proposes that “a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community” is a foundational concept of this perspective (Leopold, 2020; Rolston, 2012; Thompson, 1998; Vromans et al., 2012). Within ecocentrism there is also the philosophy of deep ecology, in which nature has an ethical status equal to humans; deep ecologists reject the notion of stewardship because the human role of caretaker maintains a hierarchy where humans are of higher consideration than nature (Nash, 1989; Rolston, 2012).

Rachel Carson is widely recognized as a foundational figure in modern environmental ethics. In *Silent Spring*, she transformed scientific evidence of ecological harm into a compelling moral argument about humanity’s responsibility to the natural world that forced society to confront the unintended and far-reaching consequences of human technology and to reconsider its ethical relationship with nature (Cafaro, 2013; DeMarco, 2017). By documenting the impacts of synthetic pesticides, she revealed the extensive ecological damage caused by modern chemical

technologies and challenged a prevailing mindset that prioritized industrial progress and economic gain over ecological health, exposing the fundamental unsustainability of human exploitation of the landscape (Ndubisi, 2014; Rolston, 2012). By linking human health, animal welfare, and ecological preservation, Carson helped expand the boundaries of ethical consideration to include the integrity of ecosystems and the intrinsic value of nonhuman life, shaping the intellectual foundations of contemporary environmental ethics (Cafaro, 2013; Nash, 1989). Furthermore, her work explores many of the issues that still concern the field today including toxic pollutants, sustainability, and biodiversity (Rolston, 2012). Carson believed that non-human creatures possess their own moral considerability and right to persist. Silent Spring reflects a combination of anthropocentric and biocentric principles, although some scholars suggest that her emphasis on human health impacts was a strategic choice to strengthen the political effectiveness of her argument (Nash, 1989).

When environmental ethics intersects with landscape architecture, it challenges the profession's historical priorities. Landscape architecture has traditionally been dominated by anthropocentric values, prioritizing human use, amenity, and visual aesthetics over ecological health (Thompson, 1998). The works of Leopold and Carson are often cited as significant because they link ecological knowledge with moral responsibility and reflect a significant historical shift from viewing the environment as property to understanding it as part of a broader moral community (Ndubisi, 2014). Ian McHarg also critiqued the dominant Western worldview that positions humans above nature, advocating instead for an “Ecological View” grounded in the interdependence of all living systems (McHarg, 2006). As the profession has increasingly been forced to grapple with broader environmental duties and acknowledge that land-use practices threaten the planet's ecological integrity, there has been a moral imperative to recognize

the inherent worth of non-human life and ecosystems, advocating for land-use practices that minimize human impact and restore degraded environments (Beatley, 2014). Additionally, because landscapes are repositories of social, philosophical, and environmental values that reflect and constitute the ethos of a culture, designers have a responsibility to understand whose interests they are serving and how those values are reflected in their work (Deming, 2015).

Today, ethical landscape architecture requires careful negotiation of diverse and sometimes competing responsibilities. Ethical landscape design must incorporate social equity, environmental stewardship, and cultural integration. This means not only mitigating environmental impacts through sustainable practices but also ensuring that marginalized communities have equitable access to safe, functional outdoor spaces (Adegbola et al., 2025). Furthermore, the ethical function of landscape architecture is to speak to how humans are to live in the contemporary world (Gill, 2017). However, implementing these ethics is complex; landscape designers often grapple with competing values, economic constraints and conflicting stakeholder interests, frequently having to balance human comfort and aesthetic ideals against ecological integrity. Practitioners, particularly under economic pressures, frequently trade off qualitative and intrinsic environmental values for short-term functional utility (Adegbola et al., 2025; Breed, 2022).

To reconcile these tensions, some sources suggest landscape architects can look beyond technical solutions and short-term economic or capitalist interests and instead internalize ethical values to cultivate a good moral character by fostering traits like humility, compassion, and respectfulness toward nature to be better equipped to identify environmentally right actions and sustainably balance human needs with ecological integrity (Thompson, 2019; Vromans et al., 2012). To turn environmental commitments into action, the ASLA Biodiversity Plan (2025)

recommends that professionals adopt stringent, measurable benchmarks and use nature-based solutions. Because environmental ethics is "as much applied geography as it is applied ecology," landscape architects can incorporate bioregionalism into their practice, the idea that people should deeply identify with and responsibly manage the specific geography, topography, and life forms of their local region (Rolston, 2012, p. 189). Professional bodies can take an active role in ethical self-regulation through codes of conduct, certifications, and continuing education that explicitly articulate sustainable and environmental group values (Breed, 2022). Ultimately, ethical land use demands that we minimize the human footprint, acknowledge both the instrumental and inherent worth of the natural environment, and responsibly share the planet with all forms of life (Ndubisi, 2014).

Design and Programming

Ecological design grounded in moral responsibility requires integrating stewardship, sustainability, and long-term care into both the physical design of landscapes and the social systems that support them. At its core, sustainable landscape design seeks to create environments that are ecologically sound and socially equitable, addressing challenges such as habitat loss and pollution while balancing human comfort, aesthetics, and long-term ecological integrity (Adegbola et al., 2025; Breed, 2022). This approach positions landscape architecture as an ethical practice, where design decisions must consider not only immediate outcomes but also the long-term health of ecosystems and communities. Multifunctionality serves as a key strategy in this effort, with heterogeneous landscape features intentionally designed to deliver multiple ecosystem services simultaneously. By applying ecological principles from individual sites to

regional systems design can support adaptive, place-based solutions that foster resilience over time (Lovell & Johnston, 2009; Van der Ryn, 2007).

Environmental stewardship functions as the social foundation that sustains these ecological systems over time. Stewardship is not only an ethical principle but also a participatory process that engages communities in the ongoing care of landscapes. Design can facilitate stewardship by creating opportunities for public involvement and transforming landscapes into spaces of civic action and shared responsibility. Volunteer stewardship programs like tree planting, park restoration, and community gardening strengthen civic engagement while democratizing environmental governance (Sorensen et al., 2018). These programs are often motivated by personal meaning and memory, highlighting the emotional and psychological connections people form with place (Klaniecki et al., 2018). Design interventions that support experimentation and public engagement, such as urban ecological projects, can further cultivate a culture of stewardship by making ecological processes visible and participatory (Hwang & Jain, 2021).

Maintenance and long-term care are essential components of ethical ecological design, requiring both technical strategies and cultural acceptance. Ecological landscapes often challenge conventional expectations of order and upkeep; the concept of an aesthetic of care suggests that visible signs of human intention, like mown edges or defined pathways, are necessary for public acceptance of complex, naturalistic systems (Mozingo, 1997; Nassauer, 1995). Additionally, sustainable maintenance practices must reduce environmental impacts through strategies such as composting organic waste, minimizing fossil-fuel-based inputs, and using low-emission equipment (American Society of Landscape Architects, 2025). Maintenance can also be used as a design tool, as demonstrated through selective management practices that guide ecological

processes, such as controlling succession to maintain biodiversity (Dagenais, 2008). Integrating maintenance strategies into the design phase ensures that landscapes remain functional, legible, and ecologically productive over time.

Monitoring and adaptive management further extend the ethical responsibility of design beyond implementation. To ensure that landscapes perform as intended, ongoing evaluation is required to assess ecological function and inform future interventions. Continuous monitoring allows designers and managers to respond to changing conditions, refine strategies, and maintain system resilience (Lovell & Johnston, 2009; Yang et al., 2013). Monitoring also plays a critical role in meeting broader environmental goals, such as climate adaptation and mitigation, by providing feedback that enables practices to evolve alongside changing conditions (American Society of Landscape Architects, 2025). Because ecological systems operate within specific limits, intentional observation and feedback mechanisms are necessary to guide corrective actions and support long-term ecosystem health (Ndubisi, 2014).

Long-range planning positions ecological design as an ongoing, cyclical process rather than a finite intervention. Because ecosystems are dynamic, design must incorporate strategies for maintenance, monitoring, and adaptation from the outset. Proposing long-term management frameworks during the design phase ensures that landscapes continue to function effectively throughout their life cycle (American Society of Landscape Architects, 2025) This approach moves beyond sustainability and emphasizes regenerative design (Ndubisi, 2014). Therefore, ecological planning is an iterative process that links interdisciplinary knowledge with practical action and enables communities to learn from and respond to environmental change over time (Steiner, 2008).

Programming serves as a critical bridge between design and long-term ecological responsibility by incorporating stewardship into everyday human activity. Achieving sustainability requires shifting from passive observation of landscapes to active participation, where users become contributors to ecological processes. Community-based programming, such as educational initiatives, participatory design processes, and grassroots environmental campaigns, fosters environmental awareness and shared responsibility (Deming, 2015; Steiner, 2008; Van der Ryn, 2007). Stewardship programming, which can include community gardening, restoration activities, and nature-based events, engages individuals directly in caring for landscapes while strengthening social cohesion and sense of place (Klaniecki et al., 2018; Sorensen et al., 2018). Educational programming in schools and public spaces further enhances ecological literacy, while unstructured nature play and hands-on experiences allow individuals, particularly children, to develop meaningful relationships with the environment (American Society of Landscape Architects, 2025; Clewell, 2007; Gobster et al., 2016).

Programming can also support monitoring and maintenance by integrating the public into ongoing ecological processes. Citizen science initiatives invite community members to participate in data collection, increasing both scientific understanding and public engagement (Klaniecki et al., 2018; Sorensen et al., 2018). Similarly, maintenance activities such as planting, weeding, and habitat management can be structured as participatory events, transforming routine upkeep into opportunities for stewardship and education (Gobster et al., 2016; Sorensen et al., 2018). Co-developing maintenance and monitoring programs with local communities ensures that long-term care strategies are accessible, feasible, and sustained over time (American Society of Landscape Architects, 2025).

Finally, long-range programming integrates communities into the life cycle of landscapes, ensuring that ecological responsibility is sustained across generations. Early involvement in the planning process helps build a sense of ownership within the community, encouraging people to feel invested in the landscape and more likely to care for it over time. (American Society of Landscape Architects, 2025). Thinking of projects as investments in both ecological systems and community well-being helps strengthen their long-term impact by connecting environmental restoration with social benefits (Clewell, 2007). Building agreement around shared environmental priorities helps strengthen this connection by aligning ecological goals with what the community values and supporting continued engagement over time (Hwang & Jain, 2021).

Summary

When applying environmental ethics to landscape design, the result is ecological design grounded in moral responsibility that integrates stewardship, sustainability, and long-term care into both landscapes and the social systems that support them. It positions landscape architecture as an ethical practice that must balance ecological health, human use, and resilience. Strategies such as multifunctional design, stewardship, maintenance, monitoring, and adaptive management ensure that landscapes remain functional and responsive to change. Programming further reinforces this approach by engaging communities in ongoing care and participation. These approaches offer strategies to communicate Rachel Carson's messages about the importance of protecting nature for future generations through stewardship, management, and programming that encourages people to value ecological systems and take responsibility for the damage caused by human activity while building stronger personal connections to the environment.

Sensory Experience

Understanding how people experience the natural world through the senses is central to translating Rachel Carson's idea of nature as a source of wonder into landscape design; it also ties into the communication of interconnectedness and moral responsibility towards nature. Because direct sensory experience is the foundation for perception, meaning, and connection, it gives rise to emotional, cognitive, and ethical responses and can influence how people perceive, value, and relate to the natural world.

Aesthetics and Phenomenology

Two ways of understanding human sensory experience are aesthetics and phenomenology. The study of aesthetics is concerned with how experiences that arise through the senses are perceived, felt, and evaluated; it involves emotional responses, cognitive interpretation, and shared judgments about what is meaningful or worth valuing (Brook et al., 2013; Giovannelli, 2012; Parsons, 2008). An aesthetic experience is a focused and immersive engagement with the sensory qualities of an object, environment, or moment, in which perception, emotion, and thought come together. It involves not just seeing or hearing, but a total body awareness shaped by feeling and interpretation, often producing a sense of deep connection or meaning (Berleant, 2010; Brook et al., 2013).

When applying aesthetics to the experience of landscapes, there is a distinction between the overlapping terms of environmental aesthetics and ecological aesthetics. Environmental aesthetics examines the aesthetic experience of both human-influenced and natural environments; ecological aesthetics is an approach that aims to align aesthetic appreciation of landscapes with ecosystem health, biodiversity, and environmental ethics (Carlson, 2018;

Toadvine, 2010). Contemporary ecological aesthetics often combines two dominant approaches: scientific cognitivism, which argues that aesthetic appreciation of natural environments relies on factual knowledge provided by the natural and environmental sciences such as biology and ecology, and the non-cognitive aesthetics of engagement, that argues instead that appreciation is derived by the continuous, multisensory interactions that occur from being embedded within an environment (Berleant, 2010; Carlson, 2009; Toadvine, 2010).

Because aesthetic values are not universal and are in part socially constructed, cultural expectations can shape aesthetic responses and influence behavior, making human aesthetic perception a driver in landscape change (Gobster, 2007). A person's aesthetic experience can be informed by a scenic aesthetic based on cultural norms, or an ecological aesthetic based on an appreciation of ecological functions, as ecologically healthy landscapes are not always perceived as aesthetically pleasing. For example, highly diverse ecosystems like wetlands or prairies are often not valued because their biological diversity is not easily recognized and their sights, sounds, and smells are not familiar (Gobster, 2007). Additionally, people's personal values can significantly shape their aesthetic experiences; individuals with nature-centered values rate wilder, naturalistic plantings as more attractive than people who do not identify as nature-connected (Hoyle, 2026).

Phenomenology is a branch of philosophy that aims to elucidate and express the meaning and nature of phenomena, meaning things in the world, through a direct focus on human lived experience, sensation, and perception (Wylie, 2019). It is the study of direct experience that questions the modern assumption of a single, completely determinable, and objective reality that aims to describe as closely as possible how the world makes itself evident to sensory awareness rather than explaining the world through abstract science (Abram, 1996). Edmund Husserl, the

founder of phenomenology, explained it as a way to see the world before it is labeled with a concept or theory (Abram, 1996; Herrington, 2017). Another significant phenomenologist, Maurice Merleau-Ponty, established that the body (rather than the mind) is the true subject of experience, and that perception is a reciprocal interplay between the body's senses and the surrounding world. For example, to touch the bark of a tree is to simultaneously experience oneself being touched by the tree (Abram, 1996). Merleau-Ponty also noted that preconceptual experience is inherently synesthetic, meaning that the different senses naturally overlap and intercommunicate; when engaged with something (a "phenomenon"), the physical senses are experienced simultaneously as a unified whole (Abram, 1996; Berleant, 2010).

When applied to landscapes, phenomenology shifts the focus from viewing nature as a static picture to experiencing it as an active, inhabited world; a landscape is not a visual totality that can be looked at, but is perceived from within and interacted with in a participatory, multisensory manner (Abram, 1996; Berleant, 2010; Toadvine, 2010; Wylie, 2019). Studying a landscape phenomenologically involves lived practices that actively shape one's sense of self and the world such as walking, gardening, touching, and looking (Wylie, 2019).

Awe, Wonder, Mindfulness and Spirituality

Wonder is the emotional state that accompanies a person's response to novel, unexpected phenomena, particularly things that are experienced as intensely powerful, real, true, or beautiful (Fuller, 2006). Awe is a closely related emotion that arises when individuals experience something vast that challenges their existing understanding (Piff et al., 2025). Experiences of awe and wonder shift attention away from the individual self and toward the larger world, producing what has been described as a "small self" that expands one's perspective to include

broader ecological and social systems (Piff et al., 2025). Nature serves as one of the most reliable and frequent catalysts for awe and wonder; people often experience these emotions when confronted with nature's immense size, scope, or complexity, such as when gazing at towering trees, looking up at the night sky, or witnessing a total solar eclipse (Piff et al., 2025). Small, everyday nature, like watching a moth emerge, can also induce these emotions because vastness can be perceived in nature's complexity (Ng et al., 2023). Experiencing awe and wonder in nature has a profound psychological effect on how individuals perceive themselves in relation to the rest of the world , allowing them to feel the sense of oneness and a deepened sense of connectedness (Ng et al., 2023).

The practice of mindfulness is closely related to these feelings. Defined as a moment-to-moment, non-judgmental awareness that cultivates heightened sensitivity to both internal and external sensory perception, mindfulness empowers individuals to embrace their experiences openheartedly (Kabat-Zinn, 2015; Müller et al., 2023). Mindful engagement is the intentional act of maintaining awareness of ongoing experiences with curiosity, and without reactivity or judgment. Theoretical models of mindfulness emphasize three key mechanisms: perceptual sensitivity (heightened awareness of the external environment and sensory experience), decentering (de-identifying with one's subjective experience to observe cognitions as transitory events), and non-reactivity (observing thoughts and emotions with acceptance and without elaboration). By cultivating this state, practitioners can stimulate an investigation of the body, mind, and environment, extracting wisdom from the features they encounter (Macaulay et al., 2022). Mindfulness serves as an inner capability or tool that can enhance engagement with lived experience and create the conditions for more expansive awareness and connection (Lymeus, 2022).

Spirituality emerges from and builds upon these sensory and emotional experiences. Broadly defined as the motivation to align one's life with a higher order of existence, it is characterized by a sense of "oneness", a perceived unity between the self, others, non-human nature, and a larger whole which often transcends formal religious frameworks (Coomber & Harré, 2022; Diebels & Leary, 2019; Fuller, 2006; Müller et al., 2023). This sense of oneness is linked to shifts in perception that reduce the perceived boundaries of the individual self, allowing identity to expand to include the surrounding world. As a result, spirituality often involves a sense of sacredness and a search for meaning and purpose (Fuller, 2006).

Experiences of awe, wonder, mindfulness, and spirituality in nature are fundamentally grounded in direct sensory experience. As described by phenomenology, the senses are the initial access point through which humans encounter, interpret, and connect to their surroundings; the world can only be known directly and firsthand through the body's sensory awareness. This in turn gives rise to aesthetic experience, and it becomes possible to feel the emotions of awe and wonder that lead to spiritual connection (Abram, 1996; Kabat-Zinn, 2015; Sideris, 2024). Engaging in mindfulness is a way to cultivate the ability to become aware of sensory input at the point of contact (Kabat-Zinn, 2012). To put it in another way, through the feeling of wonder, sensory experience provides both grounding in the physical world and an opening beyond it by reshaping cognition, cultivating emotional and ethical connection, and expanding the understanding of reality to perceive the unseen orders and larger mysteries of the universe (Fuller, 2006; Piff et al., 2025). In this way, experiencing awe and wonder in nature is also related to the themes of interconnectedness and environmental ethics. These emotions diminish preoccupation with personal concerns and this reduction in self-focus increases ethical awareness, generosity, and a sense of connection with humanity and the larger world, leading to

empathy, compassion, and a recognition of the intrinsic value of other living things (Fuller, 2006; Piff et al., 2025; Sideris, 2024).

Summary

The understanding of sensory experience presented through these topics aligns with Rachel Carson's understanding of wonder as a fundamental way of knowing and relating to the world. For Carson, wonder emerges from direct, multisensory engagement with the natural environment and leads to a pursuit of both knowledge and self-inquiry; it is an experience that is at once emotional, intellectual, and spiritual. As demonstrated, concepts of aesthetics, phenomenology, awe, mindfulness, and spirituality similarly position the senses as the primary gateway through which individuals come to perceive meaning, develop connection, and expand their awareness beyond the self. Carson's work suggests that these sensory encounters are essential: they cultivate the humility, curiosity, and sense of belonging that underlie both ecological understanding and ethical responsibility. In this sense, designing for sensory experience is not only about enhancing perception, but about creating the conditions through which individuals may experience the kind of wonder Carson describes: a transformative mode of engagement that deepens connection to the natural world and reinforces the values that inspire care for it.

Design and Programming

When applying these concepts to landscape design to increase the possibility of recognizing nature as a source of wonder, it is useful to consider the point made by phenomenologist Maurice Merleau-Ponty; that individuals perceive, interpret, and emotionally respond to their environment through the body before the mind. Within landscape architecture,

this positions sensory engagement as a key approach for translating time spent in outdoor environments into meaningful human experiences. Historically, design theory has prioritized visual appeal over other sensory experiences, resulting in environments that often feel detached and incomplete. The prioritization of sight while diminishing the role of other senses limits the depth of human engagement because it neglects the full sensory experience through which people actually encounter space (Pallasmaa, 2024). Because meaningful environments engage all the senses (touch, sound, smell, and peripheral vision), designers should work to create immersive landscapes that engage the entire body and promote emotional connection and awareness (Pallasmaa, 2024). The use of natural materials reinforces this engagement, as their textures, scents, and acoustic qualities promote stronger physical and emotional connections to place (Pallasmaa, 2024). Through this approach, designers can place bodily perception at the center of environmental experience to create landscapes that feel life-enhancing.

While a shift toward multisensory design expands the experiential potential of landscapes, it also introduces challenges when integrating ecological function with aesthetic perception. People are more likely to value and protect environments they find visually appealing, but ecologically rich landscapes can look "messy" and violate cultural norms for neatness (Gobster et al., 2007; Nassauer, 1995). This tension is compounded by the complexity and abstraction of ecological processes, which are often difficult for the public to interpret visually, resulting in landscapes that may appear dull or unremarkable despite their environmental significance (Mozingo, 1997). For these environments to be appreciated and maintained by the public, it is helpful to incorporate a recognizable cultural language into a design to clearly communicate intentionality and stewardship. Examples of these "cues to care" include mowing strips along paths, using trimmed shrubs, and installing bird feeders (Gobster et

al., 2007; Nassauer, 1995). Similarly, the incorporation of familiar design conventions like strong visual contrasts, clear spatial organization, and repeated forms help to place ecological landscapes within accepted aesthetic frameworks, reinforcing their legitimacy and appeal (Mozingo, 1997). Furthermore, because aesthetic appeal can make ecological landscapes more culturally resonant, strategies that cultivate appreciation for them can act as a persuasive tool to inspire stewardship (Mozingo, 1997).

In addition to physical design strategies, aesthetic perception can be further shaped through knowledge and interpretation. While public preference often favors familiar, ornamental planting styles, these preferences are not fixed and can shift when individuals are provided with ecological context (Higgins & Russo, 2025). Communicating the functional role of vegetation, such as the importance of native plants in supporting biodiversity, has been shown to significantly increase appreciation for ecologically beneficial landscapes (Higgins & Russo, 2025). As a result, educational interventions, including signage and interpretive programming, can play a critical role in reshaping how people perceive and value ecological aesthetics, enabling landscapes that might otherwise be dismissed to be understood and appreciated (Gobster et al., 2007).

Aesthetic preference is also shaped by underlying psychological processes that influence how people interpret and respond to landscapes. The preference matrix provides a framework for understanding why certain environments are intuitively preferred. It suggests that landscape preference is rooted in two fundamental desires: understanding, or the ability to make sense of a setting, and exploration, or the impulse to seek new information. These operate through two types of input: immediate (readily perceived) and inferred (requiring imagination and anticipation). From this understanding, the matrix identifies four key predictors of preference:

coherence (order and visual clarity), complexity (richness and diversity of elements), legibility (ease of navigation), and mystery (the promise of further discovery) (Kaplan & Kaplan, 1989; van der Jagt et al., 2014). Landscapes that balance high coherence with moderate complexity are generally perceived as the most appealing, as they provide both immediate understanding and opportunities for exploration (van der Jagt et al., 2014). Additionally, elements of mystery, such as partially obscured views or paths that invite further discovery, enhance engagement by suggesting that more information can be revealed through movement within the landscape (van der Jagt et al., 2014).

These approaches highlight the importance of designing landscapes that integrate multisensory engagement, ecological function, cultural legibility, and psychological preference. Emphasizing multisensory engagement over purely visual aesthetics allows landscape design to support deeper connections between people and place (Pallasmaa, 2024). Additionally, addressing the perceptual gap between ecological health and aesthetic appeal through framing, education, and design structure ensures that these landscapes are both meaningful and widely accepted (Gobster et al., 2007; Higgins & Russo, 2025; Mozingo, 1997; Nassauer, 1995). Overall, multisensory aesthetic design provides a critical pathway for aligning human experience with ecological processes and supporting landscapes that are not only sustainable but also culturally valued.

Planting Design

Planting design plays a critical role in shaping how people perceive, experience, and value ecological landscapes. As demonstrated, aesthetics is fundamental to the success and public acceptance of sustainable landscapes. Planting design functions as a mediator between ecological processes and human perception and can influence emotional connection,

environmental awareness, and long-term stewardship (Cai, 2020). The increasing popularity of naturalistic planting styles demonstrates that public aesthetic preferences can evolve toward more ecological landscapes when these environments are designed with intentional visual and experiential qualities (Cai, 2020).

Because plants can engage sight, sound, smell, and touch simultaneously, planting design is a key strategy for creating immersive and meaningful landscape experiences that cultivate deeper connection to the environment (Cai, 2020). Visual experience remains the dominant driver of aesthetic response, with flower color, composition, and structure playing particularly influential roles (Hoyle, 2026; Hoyle et al., 2017). Design recommendations include ensuring that naturalistic herbaceous plantings have a flower cover of at least 27 percent, as research shows this threshold elicits excitement and heightened attention and significantly increases the public's perception of the landscape's attractiveness and biodiversity (Hoyle et al., 2017). In contrast, more subdued, predominantly green plantings support calmness and mental restoration, illustrating how aesthetic strategies can be used to evoke different emotional states (Hoyle, 2026; Hoyle et al., 2017).

Seasonal dynamics further enhance visual engagement, as designers are encouraged to create continuous sequences of bloom through carefully coordinated species combinations of contrasting plants that flower simultaneously and transition across seasons (Hitchmough, 2026). Extending visual interest into winter by retaining seed heads and dried grasses reinforces an appreciation for ecological processes and seasonal change, while also contributing structural and textural richness (Cai, 2020; Hitchmough, 2026).

Spatial structure and visual organization are essential for making complex ecological plantings legible and appealing. Strategies such as layering, repetition, and the use of dominant

structural species help establish coherence and visual order (Dunnett, 2026; West, 2026). The principle of "uniformity on a large scale, diversity on a small scale" allows designers to balance biodiversity with clarity, creating plantings that are both ecologically rich and visually understandable (West, 2026). Similarly, the use of repetition and grouped plantings generates unity and reinforces a sense of intentional design (Dunnett, 2026; Hitchmough, 2026). Strong visual contrasts, such as the juxtaposition of bold foliage, flowering accents, or light and dark canopy structures, further enhance memorability and aesthetic impact within planting compositions (Hoyle et al., 2017; Sjöman et al., 2026).

As discussed, planting design must reconcile ecological complexity with cultural expectations of beauty and care. In addition to cues to care, active management plays a key role in maintaining this balance, as selective editing of vegetation helps sustain positive aesthetic perceptions over time (Hitchmough, 2026). Management intensity should be calibrated to context, with urban environments requiring higher levels of visible care to meet public expectations (Hitchmough, 2026). Additionally, designers may strategically incorporate non-native species that do not pose a threat of becoming invasive to extend flowering periods or introduce dramatic visual effects when native flora alone cannot achieve desired aesthetic outcomes (Dunnett & Hitchmough, 2026; Hitchmough, 2026).

Despite the dominance of visual qualities in design discourse, there are recommendations that include auditory and olfactory experiences. Vegetation contributes to soundscapes by facilitating natural sounds like rustling leaves and bird activity, which can enhance relaxation and attentiveness within landscapes (Hoyle, 2026). Similarly, scent plays a powerful role in shaping emotional responses and memory, with fragrant plantings capable of evoking nostalgia and strengthening personal connections to place (Cai, 2020; Hoyle, 2026). These sensory

dimensions often operate subtly, yet they are essential in creating immersive environments that engage users beyond purely visual appreciation.

Tactile and physical engagement further expand the experiential potential of planting design by encouraging direct interaction with vegetation. Ecological landscapes can support these direct experiences through opportunities for movement, play, and exploration, particularly in environments like urban woodlands (Sjöman et al., 2026). Designing for physical engagement requires careful plant selection, prioritizing durable, flexible species that can withstand human contact while avoiding those that pose safety risks, such as toxic or thorny plants (Sjöman et al., 2026). Spatial configurations like woodland clearings, edge conditions, and layered vegetation zones, can create diverse "rooms" that invite exploration and foster a sense of discovery (Sjöman et al., 2026). These recommendations expand the role of planting design beyond a visual medium to create environments that are physically and sensorially engaging. Multisensory planting design is not simply about increasing sensory input, but about carefully orchestrating ecological processes, visual structure, and human perception to create landscapes that are legible, engaging, and emotionally resonant.

Mindfulness

While sensory engagement provides the foundation for experiencing wonder, designing for mindfulness helps enhance awareness of these sensory encounters. Because mindfulness involves intentional, nonjudgmental attention to present experience, people are able to more fully perceive both external sensory stimuli and internal cognitive states and shift their attention away from distraction and toward direct engagement with the environment (Macaulay et al., 2022). This process is particularly valuable in urban or busy settings, where distractions might otherwise limit the potential to engage with the senses (Macaulay et al., 2022). By enhancing

awareness of sensory input, mindfulness transforms familiar and everyday landscapes into opportunities for reflection, presence, and connection.

However, while both built and natural environments can be intentionally designed to integrate mindfulness within everyday spaces to promote mental well-being, inclusivity, and environmental awareness, the physical environment is often underutilized for this purpose (Altay & Porter, 2025). Thoughtfully designed landscapes can promote stress reduction, encourage sensory engagement, and reflect cultural or spiritual meaning, while also supporting sustainable behaviors and ecological responsibility (Altay & Porter, 2025). Shared public spaces can be structured to support continuous, everyday mindful engagement through exposure to ecological processes and sensory engaging environments (Lymeus, 2022). Making ecological systems visible and legible within the landscape reinforces awareness of natural cycles and interconnected systems, allowing mindfulness to emerge through direct experience rather than abstraction (Lymeus, 2022). Inclusive and participatory design processes are also essential, ensuring that these environments respond to the cognitive, emotional, and social needs of diverse populations, particularly in urban contexts where access to restorative environments may be limited (Altay & Porter, 2025).

Mindfulness in landscape architecture can be supported through both intentional programming and carefully designed environments, and the effectiveness of these practices is closely tied to the ecological and spatial qualities of the landscape itself. Research suggests that site characteristics such as biodiversity, terrain, microclimate, and the presence of water in the form of streams, waterfalls, and lakes are often more influential than specific programmed activities in cultivating a mindful state because they provide better sensory stimuli and stronger opportunities for immersion (Notaro et al., 2025). Additional landscape characteristics that

contribute to mindful engagement include a strong sense of place, tranquil conditions with minimal noise, visual disturbance, and social interruption, and accessibility that allows a wide range of users to participate (Gobster et al., 2023).

Design strategies for mindfulness emphasize creating environments that naturally encourage awareness, presence, and connection. Environments that promote visual depth, tranquility, and engagement with natural elements have been shown to activate neurological responses associated with relaxation and attention restoration. Layered views that incorporate both near and distant focal points create immersive visual experiences that encourage contemplation, while vegetation and spatial organization can be used to buffer noise and reduce visual disturbance, enhancing a sense of calm. Subtle manipulations of topography, including undulating terrain and naturalistic landforms, contribute to a sense of immersion and spatial variation, further supporting contemplative experience by introducing gentle complexity into the landscape. Distinct features, such as solitary trees or focal elements, can provide spatial anchors that enhance legibility and meaning, while diverse, naturalistic plantings that change seasonally enhance sensory engagement and reinforce awareness of temporal cycles. Providing comfortable and strategically placed seating supports moments of stillness and reflection, allowing individuals to disengage from external stressors and focus on present experience (Olszewska-Guizzo et al., 2022).

Trail design and spatial sequencing play an important role in shaping mindful experiences. Qualities such as gentle slopes, stable surfaces, and sufficient width allow users to focus on sensory engagement, while curvilinear alignments introduce a sense of mystery and encourage exploration. Well-designed trails incorporate a sequence of spatial experiences, moving between expansive and enclosed areas to sustain attention and support quiet reflection.

These environments should include both private spaces for solitary reflection and larger areas for group activities, accommodating different modes of mindful engagement. Large, mature trees and biodiverse understories provide sensory stimuli through texture, color, scent, and sound, while access to water features enhance the experience through cooling effects, auditory masking of urban noise, and opportunities for direct, tactile interaction. Users should feel invited to touch, observe, and interact with natural elements in a respectful and sustainable way, reinforcing a participatory relationship with the environment. Built features such as seating, shelters, and gateways should remain unobtrusive and be constructed from natural materials that integrate seamlessly into the landscape (Gobster et al., 2023).

Programming and interpretive strategies play a critical role in guiding attention and supporting mindful engagement. Practices such as open monitoring, which emphasize nonjudgmental awareness of present-moment sensory experience, can be introduced through guided sessions or subtle interpretive prompts, allowing users to develop skills for attention and self-regulation even in less ideal environments (Macaulay et al., 2022). A particularly effective form of programming is guided forest therapy, or *shinrin-yoku*, in which trained facilitators lead participants through a sequence of sensory-based "invitations" that encourage slow movement and attentive awareness of the surrounding environment (Gobster et al., 2023). Because user preferences vary, it is important to provide both structured, guided experiences and opportunities for independent, self-directed engagement (Notaro et al., 2025).

For self-guided experiences, minimal interpretive strategies like signage or audio cues that direct attention to sounds, textures, or patterns in nature have been shown to prompt reflection and sensory engagement without overwhelming users with information (Harries et al.; (Gobster et al., 2023). Educational interventions, including signage, guided experiences, and

community programming, can further help users recognize ecological processes, deepen sensory awareness, and increase appreciation for ecologically complex landscapes to promote a more attentive and participatory relationship with the environment (Gobster et al., 2023; Higgins & Russo, 2025; Ng et al., 2023).

These strategies demonstrate that mindfulness in landscape design is not simply about providing access to nature, but about shaping environments and offering programs that guide attention, support sensory awareness, and foster immersive, reflective experiences. By aligning ecological integrity, spatial design, and programming, landscapes can function as environments for learning how to be present and cultivating the awareness and connection that support both individual well-being and broader ecological consciousness.

Human-Nature Connectedness

The concept of human beings being "connected to nature" is necessary to explore in the context of interpreting Rachel Carson's work for application to human experience of outdoor environments. It is relevant to her overall message, but particularly so for the themes of moral responsibility and nature as a source of wonder. As has been discussed, the idea of nature itself is not easily definable and similarly, neither is what it means to say that a person feels connected to it. However, the phrase is often used in landscape architecture as though it is universally understood. Importantly, contrary to what Rachel Carson believed, the notion of using landscape design to facilitate a connection to nature inherently implies that human experience is generally separate from whatever nature is considered to be; if humans were widely felt to be part of nature already, there would be no need to establish connection.

Human–nature connectedness is complex concept, reflecting the many ways individuals define nature, understand their relationship to it, and position themselves within broader ecological systems (Restall & Conrad, 2015). The term encompasses a range of related constructs, including nature connectedness, nature relatedness, emotional affinity, and inclusion of nature in the self, all of which describe a sense of belonging to the natural world (Beery et al., 2024; Nisbet et al., 2009; Restall & Conrad, 2015). Across the literature, "connecting to nature" is understood as more than simply being present in a green space; it describes a multidimensional relationship that may include material, experiential, cognitive, emotional, philosophical, and ethical dimensions (Barragan-Jason et al., 2022; Hatty et al., 2022; Riechers et al., 2022; Schultz, 2002).

Different frameworks emphasize different aspects of this relationship. Many definitions focus on cognitive and identity-based dimensions, defining connectedness as the extent to which individuals incorporate nature into their self-concept (Barragan-Jason et al., 2022; Baur et al., 2020; Schultz, 2002). Others, such as the biophilia hypothesis, suggest that this connection is an innate evolutionary tendency shaped by human dependence on natural systems (Wilson, 1984). In contrast, relational perspectives describe connection as a reciprocal experience characterized by affinity, belonging, and responsiveness to nature as an autonomous entity rather than a passive resource (Furness, 2021; Müller et al., 2023). These perspectives are closely aligned with Indigenous worldviews, which place human well-being within broader ecological relationships and emphasize interconnectedness between self, community, and environment. Within this framework, nature is not a backdrop, but an active, living system, and connection to nature is inseparable from connection to others and to a broader sense of purpose (Watts et al., 2022).

Across these interpretations, human–nature connectedness is widely understood as a dynamic construct that includes cognitive, emotional, and behavioral dimensions and fluctuates over time based on ongoing interaction and engagement (Furness, 2021; Nisbet et al., 2009). People may develop this connection through a range of experiences, including direct contact, sensory experience, emotional attachment, reflection, learning, care, and a sense of identity and belonging (Keniger et al., 2013). This relationship is shaped not only by the physical characteristics of the environment, but also by how individuals perceive nature, how frequently they encounter it, and whether those encounters are passive, incidental, or intentionally sought out (Keniger et al., 2013). Human–nature connectedness can also be understood not as a singular feeling, but as a reciprocal relationship in which individuals come to understand themselves as part of the natural world rather than separate from it (Barragan-Jason et al., 2022; Schultz, 2002). Individuals who engage with nature in direct, experiential ways tend to report stronger connections than those who relate to it primarily through abstract or intellectual understanding (Hatty et al., 2022).

This multidimensional understanding helps explain why nature experiences vary widely in both form and intensity. Human-nature interactions occur across a gradient of settings, from indoor plants, nature imagery, window views to parks, schoolyards, agricultural lands, urban greenways, and relatively unmanaged wilderness. These interactions also differ in mode: some are indirect, such as viewing trees from a window; some are incidental, such as passing street trees on the way to class or work; and others are intentional, such as hiking, gardening, birdwatching, ecological restoration, or participating in outdoor education. Together, these distinctions suggest that connecting to nature is not limited to remote or spectacular landscapes, but can emerge through everyday contact, repeated sensory experience, opportunities for

discovery, and moments of emotional or intellectual engagement, particularly when individuals are encouraged to notice, understand, and care for the living systems around them (Keniger et al., 2013).

Benefits

A substantial body of research demonstrates that connection to nature provides wide-ranging benefits for human well-being, public health, and environmental outcomes (Jorgensen & Gobster, 2010; Keniger et al., 2013). These benefits are studied across a range of environments often described using interchangeable terms such as “nature,” “green space,” “urban green infrastructure,” and “natural environments,” reflecting both ecological variation and disciplinary differences in how nature is conceptualized (Keniger et al., 2013; Nordh et al., 2013). Physical and psychological engagement with nature has been shown to improve cognitive functioning, mental and physical health, social relationships, and pro-environmental behavior (Barragan-Jason et al., 2022).

Psychological benefits are among the most consistently documented, with exposure to natural environments improving mood, increasing self-esteem, and reducing stress, anxiety, and depression across diverse populations (Bratman et al., 2012; Cox et al., 2017; Keniger et al., 2013). In urban contexts, regular exposure to nature acts as a buffer against mental illness, reducing rates of depression, anxiety, and stress (Cox et al., 2017). These benefits extend to clinical populations; effects are evident even among individuals with Major Depressive Disorder, where interaction with nature helps interrupt cycles of negative rumination and supports emotional regulation (Berman et al., 2012). For children and adolescents, access to nature is particularly critical, contributing to improved emotional well-being, reduced stress, and healthier

developmental outcomes (Zhang et al., 2020). Among college students, nature exposure has also been shown to reduce stress, support cognitive recovery, and improve academic performance, particularly in environments that provide restorative experiences and opportunities for reflection (Rakow, 2019; Terrell et al., 2025).

Nature also plays a critical role in cognitive restoration and creativity. Attention Restoration Theory explains that the demands of modern life deplete directed attention, while natural environments allow this capacity to recover. This restorative process enhances focus, supports creative problem-solving, and contributes to long-term psychological resilience (Kaplan, 1995). The calming yet stimulating states evoked by natural surroundings can widen attention, allowing the mind to wander and inspiring flexible cognition and creativity (Vella-Brodrick et al., 2024). Furthermore, these cognitive and restorative benefits are significantly amplified when individuals intentionally direct their attention toward natural features and engage mindfully with their sensory experiences (Harries et al., 2025).

These psychological benefits are closely linked to physiological responses. Stress Reduction Theory suggests that exposure to nature produces rapid, unconscious reductions in stress, including lowered heart rate, blood pressure, cortisol levels, and muscle tension (Bratman et al., 2012) In urban settings, green spaces further support public health by encouraging physical activity, reducing exposure to pollution and heat, and lowering mortality rates associated with chronic disease (Keniger et al., 2013; Nordh et al., 2013).

Human-nature connectedness also contributes to pro-environmental behavior and social cohesion. Strong connections to nature are consistently linked to greater engagement in environmentally responsible actions (Barragan-Jason et al., 2022; Mackay & Schmitt, 2019; Schultz, 2002). Because of this strong correlation, building human-nature connectedness can

actively be used to foster sustainable behaviors (Barragan-Jason et al., 2022; Klaniecki et al., 2018). People with direct, experiential relationships with nature are significantly more likely to participate in environmental volunteering, community gardening, citizen science, conservation participation, and sustainable lifestyle choices (Hatty et al., 2022; Mackay & Schmitt, 2019; Wood et al., 2018). Additionally, nature connectedness strengthens social ties by increasing prosocial behavior, enhancing place attachment, and reducing social isolation, underscoring its value not only for individuals but for communities and ecosystems alike (Christens et al., 2025). Overall, this research suggests that fostering connection to nature should be understood as a strategy to both promote public health and inspire environmental stewardship.

Extinction of Experience

Despite these benefits, modern societies are increasingly experiencing what has been termed the "extinction of experience," a phenomenon describing the progressive loss of direct, everyday meaningful contact with nature (Soga & Gaston, 2016). This disconnection is driven by urbanization, technological lifestyles, sedentary routines, and the simplification of landscapes, resulting in both reduced opportunities and less desire for outdoor engagement (Barragan-Jason et al., 2022; Cox et al., 2017; Riechers et al., 2022; Soga & Gaston, 2016). The consequences of this loss of connection are substantial. As individuals become physically and psychologically distanced from natural environments, their emotional affinity toward nature declines, reducing access to the psychological and physical benefits associated with nature contact. At the societal level, it contributes to a dangerous feedback loop: as people lose emotional connection to nature, they value it less, become less likely to protect it, and become more tolerant of environmentally

destructive practices, normalizing a worldview in which nature is external, passive, and expendable (Barragan-Jason et al., 2022; Fleming & Shwartz, 2023; Soga & Gaston, 2016). Landscape simplification intensifies this process by reducing ecological complexity and eroding the many dimensions through which people connect to nature, including cultural identity, social cohesion, shared meaning, and informal ecological knowledge (Riechers et al., 2022). When this disconnection becomes severe, it can produce frustration, discomfort, diminished agency, and even conflict among community groups, especially where rapid environmental change destabilizes existing place relationships (Riechers et al., 2022). Addressing the extinction of experience therefore requires not only increasing access to nature but also enhancing the quality and depth of interactions through intentional design and programming (Colléony et al., 2019; Hatty et al., 2022).

Design and Programming

Landscape design offers a powerful tool for restoring human–nature connectedness by creating environments that support sensory engagement, ecological complexity, and emotional resonance (Fleming & Shwartz, 2023; Fuller et al., 2007). General design recommendations emphasize prioritizing biodiversity, structural diversity, and "wildness," as more complex and ecologically rich environments produce stronger psychological and emotional benefits (Fuller et al., 2007; Lengieza et al., 2025). Minimizing visible human infrastructure and integrating built elements harmoniously with natural systems helps reinforce perceptions of naturalness and immersion (Hung & Chang, 2022; Vanhöfen et al., 2025). Designing for multisensory engagement through varied textures, sounds, water features, and opportunities for tactile interaction enhances connection by engaging the body as the primary medium of experience,

aligning with phenomenological perspectives on perception (Fleming & Shwartz, 2023; Spiller, 2024). Visual composition also plays a key role, with landscapes that balance coherence and complexity while incorporating mystery, movement, and archetypal elements supporting both aesthetic appreciation and cognitive restoration (Kaplan & Kaplan, 1989; Olszewska-Guizzo et al., 2023).

More specialized applications further demonstrate how design can support public health, mental health, and therapeutic outcomes. Designing for mental health involves creating biodiverse, layered environments with moderate complexity, accessible pathways, and opportunities for both exploration and refuge (Hoyle, 2026; Wood et al., 2018). For children, design strategies include natural play environments with loose materials, varied terrain, and opportunities for exploration and interaction with living systems, which support both development and long-term environmental attitudes (To & Grierson, 2024). For college students, integrating nature into daily environments through campus landscapes, views, and accessible green spaces supports stress reduction, cognitive recovery, and overall well-being (Rakow, 2019).

Programming is equally critical in fostering meaningful connections to nature, as it shapes how people engage with and interpret their environments (Ng et al., 2023). Mindfulness practices, such as guided observation and sensory awareness activities, significantly enhance connectedness by directing attention to present-moment experiences (Barragan-Jason et al., 2022; Wood et al., 2018). Hands-on stewardship and ecological restoration programs foster a sense of ownership, belonging, and responsibility by engaging participants directly in caring for landscapes (Furness, 2021). Wildlife encounters, community gardening, and participatory activities further strengthen these relationships by creating shared experiences that connect

individuals to both ecological systems and social networks (Beery et al., 2023; Wood et al., 2018).

Storytelling

Rachel Carson's work demonstrates the power of storytelling as a way of engaging emotion and communicating ecological knowledge, as she translated complex scientific information into narratives that shaped how people understood and valued the natural world (Cafaro, 2013; DeMarco, 2017). In this sense, storytelling is not simply a stylistic device, but a fundamental way of influencing perception and meaning. In general, storytelling is recognized as a primary way humans organize knowledge, interpret experience, and construct understanding, making it particularly effective for communicating complex and abstract environmental ideas (Bietti et al., 2019; Hughes & Moscardo, 2024; Maslen, 2022).

Narratives are typically structured as sequences of events connected through cause-and-effect relationships, unfolding over time and involving specific characters within a defined context (Dahlstrom, 2014; Hughes & Moscardo, 2024). Stories, in particular, emphasize emotional engagement, transformation, and resolution, making them memorable and meaningful (Hughes & Moscardo, 2024; Labov, 2010). While these structural elements contribute to coherence, storytelling is ultimately an interpretive process that gives form to ideas and allows individuals to make sense of complex realities (Bietti et al., 2019; Jackson, 2009). When it comes to communicating ecological information, stories are especially effective for communicating ecological relationships that may be difficult to observe or fully understand (Dahlstrom, 2014).

Storytelling also plays a critical role in shaping how people perceive and relate to landscapes. By combining scientific information with emotional meaning, narratives make ecological processes more accessible, relatable, and memorable, strengthening connections between people and the natural world (Bayer & Hettinger, 2019; Dahlstrom, 2014; Hughes & Moscardo, 2024). Research shows that storytelling can significantly enhance landscape perception and preference, particularly when stories are directly tied to physical features and explain how landscapes function (Hughes & Moscardo, 2024). Stories grounded in scientific knowledge or Indigenous perspectives are especially effective because they provide meaningful frameworks for understanding ecological relationships and cultural connections to place (Christensen et al., 2018; Hughes & Moscardo, 2024).

Design and Programming

In landscape architecture, these ideas position storytelling as both a conceptual framework and a design approach. The landscape can be understood as a narrative medium in which designers structure experiences that unfold over time, allowing users to interpret meaning through movement and interaction (Modan & Shuman, 2010; Scarfo, 2022). This approach involves translating narratives into spatial sequences, where pathways, views, and transitions guide perception and create a sense of progression through the landscape (Hughes & Moscardo, 2024; Scarfo, 2022). Designing for sequential discovery through curving paths, layered vegetation, and framed views encourages exploration and sustains engagement, allowing the landscape to be experienced as an unfolding story (Hughes & Moscardo, 2024).

A key aspect of this translation is making ecological processes visible and understandable. When features such as hydrology, plant succession, or habitat structure are

revealed through design, users are better able to interpret and connect with the landscape (Hughes & Moscardo, 2024). Visual qualities such as coherence, complexity, legibility, and mystery further shape how these narratives are perceived, suggesting that aesthetic and experiential considerations must be integrated with narrative intent (Hughes & Moscardo, 2024). Symbolism and metaphor can also be embedded within physical elements to communicate abstract ideas, while spatial organization and movement can reinforce emotional and narrative experiences (Alon-Mozes, 2006; Herrington, 2017).

Programming plays an essential role in activating storytelling within landscapes by transforming narrative into lived experience. Guided walks, stewardship activities, and educational programs provide opportunities for experiential learning and engagement with ecological narratives (Gobster, 2025; Hughes & Moscardo, 2024). Creative and participatory approaches, such as drawing, writing, or performance, further deepen this engagement by allowing individuals to interpret and express their experiences within the landscape (Coren & Wang, 2024; Modan & Shuman, 2010). Digital tools, including interactive media and mapping platforms, expand these possibilities by linking stories to specific locations and making narrative structures more accessible (Coren & Wang, 2024).

Interpretive signage functions as a key interface between storytelling and landscape experience, guiding how users understand and interpret their surroundings. Signage can communicate ecological processes, cultural histories, and environmental values, while also serving as a cue to care that signals intentional design and helps users recognize ecological function (Hughes & Moscardo, 2024; Nassauer, 1995). When combined with other narrative strategies, signage reinforces the legibility and meaning of the landscape.

Community engagement is another critical dimension of storytelling in design. Participatory approaches, such as oral histories and community mapping, allow designers to incorporate local knowledge and lived experience, revealing cultural, emotional, and historical dimensions of place (Bulkens et al., 2015; Cleckley, 2024; Coren & Wang, 2024). These processes help ensure that narratives reflect diverse perspectives while fostering shared understanding and long-term stewardship (Bayer & Hettinger, 2019).

These approaches demonstrate that storytelling functions as both a way of understanding the world and a method for shaping how landscapes are experienced. By translating ecological knowledge into spatial, sensory, and participatory experiences, storytelling allows landscape design to communicate complex environmental relationships in ways that are accessible, engaging, and meaningful (Hughes & Moscardo, 2024). Through organizing space as a sequence, revealing ecological processes, and supporting participation through programming and interpretation, landscapes can communicate ideas beyond just information and allow people to understand, relate to, and remember what they experience. This approach reflects Rachel Carson's method of conveying scientific knowledge through narrative, making ecological relationships more immediate and meaningful. Rather than presenting ecology as abstract, storytelling allows it to be encountered directly through experience, shaping perception and encouraging a deeper connection to the natural world that supports awareness, care, and responsibility.

Indigenous Worldviews and Traditional Ecological Knowledge

It is important to note that there is considerable overlap between the themes identified in Rachel Carson's work and many Indigenous worldviews. Additionally, Traditional Ecological

Knowledge (TEK) is increasingly considered to be a key resource for understanding human-environment relationships and guiding sustainable land practices because these knowledge systems offer relational, ethical, and place-based alternatives to dominant Western paradigms, with significant implications for landscape architecture, land use planning, and ecological restoration.

Similarities to the Rachel Carson Themes

At the core of Indigenous worldviews is a deeply relational understanding of the natural world that recognizes that all life is fundamentally interconnected, forming a web that shapes identity, ethics, and understanding of nature. Often described as "kincentric ecology," this perspective positions nature as sentient and communicative, where plants, animals, rivers, and geological landforms possess agency, intelligence, and personhood, sharing common ancestry with humans as members of an extended ecological family (Abram, 1996; Gauthier et al., 2025; Kimmerer, 2013; Salmón, 2000). This perspective rejects the notion of human separateness or superiority, instead positioning humans as intrinsically integrated within both the physical and spiritual dimensions of nature (Gauthier et al., 2025; Salmón, 2000). Non-human beings are treated as relatives and teachers rather than objects and humans are often understood as the "younger brothers of Creation," dependent on and instructed by older, more knowledgeable life forms (Kimmerer, 2013).

Concepts such as the Lakota phrase *mitakuye oyasin* ("all my relations") and the Rarámuri practice of *iwígara* express this total physical and spiritual interconnectedness, emphasizing that humans are inseparable from the land and the broader community of life (Salmón, 2000; Tayac & Thrasher, 2008). Because human existence depends on this web of

relationships, well-being is inseparable from ecological health; harming the environment ultimately harms oneself (Armstrong, 2018; Cajete, 2018). This interdependence generates an ethic of reciprocity, requiring humans to actively sustain the systems that sustain them, and extends into land-use practices that recognize land not as property, but as a living relative (Kimmerer, 2013; McGregor, 2018; Napawan et al., 2023; Rahman, 2025; Whyte, 2018).

Flowing directly from this interconnected worldview is an ethical responsibility based on relational accountability, where obligations arise from kinship with the land and nonhuman beings (McGregor, 2018; Salmón, 2000). Indigenous philosophies emphasize that humans are wholly dependent on the gifts of the earth and therefore required to act as caretakers, recognizing that every action affects the balance of a living system (Gauthier et al., 2025; Forbes, 2008 as cited in Jacobs, 2022; Salmón, 2000; Suzuki et al., 2022). Practices such as the "Honorable Harvest" and the "Original Compact" guide how resources are taken, emphasizing respect, restraint, and reciprocity, prescribing that individuals take only what is needed, minimize harm, and give back in return (Kimmerer, 2013; Martinez, 2018). This system of gift economics reinforces sustainability in part by framing natural resources as relational gifts rather than commodities (Adamson, 2008 as cited in Jacobs, 2022).

In indigenous cultures, time is understood as cyclical and regenerative, which informs long-term ethical frameworks such as the Seventh Generation principle, which requires consideration of how decisions will impact descendants seven generations into the future (Abram, 1996; Yunkaporta, 2019 as cited in Jacobs, 2022; Trosper, 1995 as cited in Nelson & Shilling, 2018; Whyte, 2018). In this way, Indigenous moral systems prioritize the long-term sustainability of ecological and cultural health, while framing land as a community to which humans owe care, gratitude, and protection (Adamson, 2008 as cited in Jacobs, 2022; Napawan

et al. 2023). Together, these elements create a holistic worldview that integrates ecology, spirituality, ethics, and governance.

Indigenous worldviews also emphasize the role of sensory perception in communicating with the living animate world (Abram, 1996). Through direct sensory engagement, seeing, listening, touching, and moving within the environment, Indigenous peoples understand their place in the universe through reciprocal and participatory sensations (Abram, 1996; Langdon as cited in Jacobs, 2022).This embodied way of knowing forms the basis of Indigenous knowledge systems, as ecological understanding emerges through continuous observation, lived experience and direct sensory participation with the natural world that requires a deep openness to sensation, perception, and imagination. Practical wisdom in Indigenous communities is cultivated through practices like night walking, where individuals navigate in the dark relying exclusively on listening, touch, and balance (Cajete, 2018).

Additionally, direct sensory contact with the earth also promotes deep spiritual and emotional bonds; the continual close sensory observation of plants, animals, landscapes, and changes in wind and humidity contributes to the deep sense of kinship with all nature (Cajete, 2018). Indigenous children are taught to build their worldview through direct sensory contact; they are actively encouraged to touch the ground, taste, and explore the natural environment, feeling the wind on their faces so they can "know" nature (Jacobs, 2022). Such engagement reveals nature as a field of visible and invisible forces imbued with mystery and meaning, encountered through imagination, ceremony, and everyday interaction (Jacobs, 2022). Scholars argue that modern disconnection from sensory experience diminishes this relationship, reducing nature to abstraction, while re-engaging the senses is essential for restoring ecological awareness and respectful relationships with nature (Abram, 1996; Kimmerer, 2013; Suzuki, 2022). Lakota

elder, Lame Deer, warned that modern humans "have forgotten the secret knowledge of their bodies, their senses, their dreams," leading to a profound alienation from the earth (Suzuki, 2022).

Storytelling in Indigenous cultures serves as a central way through which Indigenous worldviews are expressed, maintained, and transmitted. Stories operate as systems of knowledge that map physical landscapes and encode ecological understanding, ethical guidance, and cultural memory. Ecological knowledge, such as plant use, animal behavior, and environmental patterns, is integrated within narrative forms that allow listeners to internalize information through vicarious imagination and sustain relationships with the natural world (Abram, 1996; Cajete, 2018). As a portable method of intergenerational knowledge transfer, storytelling preserves long-term ecological understanding and communicates adaptive strategies, including responses to environmental change (Armstrong, 2018; Whyte, 2018).

Storytelling also serves as a moral framework that guides human behavior. Rather than relying on abstract principles, Indigenous ethics are conveyed through narratives that emphasize relationships and responsibilities, gently instilling values and avoiding the need for authoritarian coercion (Jacobs, 2022, McGregor, 2018). Creation stories, such as the Haudenosaunee story of Skywoman and the Anishinaabe tales of Nanabozho, communicate how to care for the land and reinforce practices of reciprocity, restraint and gratitude by positioning humans as humble students learning from the earth's other beings (Cajete, 2018; Kimmerer, 2013). Additionally, creation stories often tell of animals who acted as creators, helpers, and providers, reinforcing spiritual kinship with the natural world (Hogan, 2018). The continuous retelling of these stories reinforces a communal knowledge system where humans were understood to be just one equal member of the wider natural world and helps communities express their deep connections within

nature, while the community itself acts as a collection of individual stories unfolding alongside the life and processes of the natural world (Cajete, 2018; Nelson & Shilling, 2018).

A defining characteristic of Indigenous storytelling is its inseparability from the land. Stories are embedded within specific landscapes, which function as living mnemonic systems that store and activate cultural knowledge (Abram, 1996). For example, in Aboriginal Australian cultures, dreamtime stories or songlines function as auditory route maps; by chanting the verses of an Ancestor's journey, an individual can successfully navigate harsh desert terrains and locate vital water sources. Place-based stories also reinforce moral behavior by linking ethical lessons to physical locations. Western Apache elders direct brief *'agodzaahi* ("that which has happened") tales that are tied to precise geographic locations at people whose behavior needs correcting; the physical place where the story occurred serves as a permanent, visible reminder to live according to cultural values (Abram, 1996).

Traditional Ecological Knowledge

Traditional Ecological Knowledge (TEK) represents the applied expression of these interconnected worldviews. TEK is defined as "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with the environment" (Berkes, 2021 as cited by Rahman, 2025). TEK represents a holistic way of living and encompasses astronomy, farming, plant medicine, animal husbandry, and geology, as well as spirituality, philosophy, and community (Cajete, 2018). Additionally, TEK is not just a collection of information; it is a dynamic, evolving system that supports Indigenous governance, resilience, and climate adaptation (Whyte, 2018). TEK also encompasses the ethical obligation

between humans and the environment and ensures that ecological understanding is always paired with responsibility, reciprocity, and long-term care (Kimmerer, 2013, 2018).

In practice, applying TEK to environmental challenges yields significant ecological benefits. TEK and Western Scientific Ecological Knowledge (SEK) are sometimes falsely viewed as incompatible, but they are actually complementary (Souther et al., 2023). TEK contributes holistic, long-term, place-based insights into ecosystem dynamics, while SEK offers analytical and experimental tools. This knowledge mutualism enhances ecological understanding and supports more effective environmental management (Kimmerer, 2018). Additionally, including local indigenous communities not only provides projects with invaluable knowledge regarding resource conservation and ecological functions but also strengthens local stewardship and resilience (Khosravi Mashizi & Escobedo, 2025)

Applications in Landscape Architecture and Land Use Planning

The integration of Indigenous worldviews and TEK is reshaping landscape architecture and land use planning by introducing relational, culturally grounded approaches to design. These approaches move beyond viewing land as a resource, and instead emphasize cultural meaning, ecological processes, and long-term stewardship rooted in interconnectedness and reciprocity. For example, the design of the National Museum of the American Indian landscape in Washington D.C. incorporates the Diné concept of *hózhó*, a philosophy centered on balance, harmony, and beauty. The design integrates alignment with the four directions, native plant communities, and symbolic spatial organization, demonstrating how Indigenous values can inform both form and function (Tayac &Thrasher, 2008). Similarly, projects such as the Budj Bim Cultural Landscape in Australia illustrate how collaboration with Indigenous communities

can shape architectural and infrastructural decisions, ensuring that design respects ecological processes and traditional land management practices (McMahon, 2024).

Scholars also emphasize the importance of decolonizing planning language and frameworks. Replacing adversarial climate adaptation terms like “resist” with relational concepts like “reciprocate” and “repair” can fundamentally shift design intentions and outcomes (Napawan et al., 2023). Māori planning frameworks based on *whenua* (land) and *kaitiakitanga* (guardianship) further demonstrate how Indigenous values can guide resilient and community-centered land use strategies (Rahman, 2025; Wolfgramm et al., 2018).

Indigenous knowledge systems are reshaping ecological restoration by emphasizing the inseparability of ecological health and cultural practice. Historically, Indigenous peoples have actively maintained and enhanced biodiversity, demonstrating that human intervention can stabilize and enrich ecosystems rather than simply deplete them. These approaches recognize that restoring ecosystems also requires restoring the relationships, responsibilities, and knowledge systems that sustain them. In this view, ecological restoration becomes an active partnership in which humans take on caregiving roles and responsibilities (Kimmerer 2013; Martinez 2018).

A key example of this perspective is Robin Wall Kimmerer’s concept of “re-story-ation,” which integrates ecological restoration with storytelling. She argues that “restoring land without restoring relationship is an empty exercise,” emphasizing that healing the land is inseparable from renewing human relationships with it. According to Kimmerer, these relationships with the land cannot be repaired until people hear its stories. As a result, physical repairs to an ecosystem, like removing contaminants or reestablishing natural hydrology, are insufficient without also reconnecting people to the landscape and restoring their cultural and spiritual relationship to the

earth. This process requires a shift in worldview to engage the land not as a commodity to be bought, sold, and exploited or as a broken machine, but as a community of respected non-human persons to whom humans have a deep moral responsibility. In this way, a mutual healing can take place; humans can restore the land, and the land, in turn, restores them (Kimmerer, 2013).

Case studies illustrate the effectiveness of TEK-informed restoration. The Karuk Tribe's use of prescribed low-intensity burning, combined with Western forestry techniques, has been shown to reduce wildfire risk while enhancing biodiversity and restoring culturally significant species (Martinez, 2018; Senos et al., 2006). Similarly, the redesign of U.S. Highway 93 through the Flathead Reservation demonstrates how TEK can inform infrastructure design. Tribal elders and wildlife managers collaborated with landscape architects and engineers to treat the road as a visitor. Guided by TEK, they designed nearly fifty wildlife crossings and restored multiple native plant communities to repair the ecological connectivity that the original highway had severed, transforming the road into a more ecologically integrated system (Senos et al., 2006).

TEK also contributes to early detection and adaptive management of ecological change. Indigenous communities, drawing on long-term observational knowledge, often identify environmental shifts before they are captured by scientific monitoring systems. For instance, Western Apache tribes alerted the US Forest Service to the decline of a cultural keystone species, the Emory oak. As a result, a collaborative restoration initiative was launched before the species reached an irreversible tipping point, highlighting the value of TEK in proactive ecosystem management (Souther et al., 2023). Additionally, traditional technologies such as rock dams and waffle gardens are increasingly used in arid land restoration for their effectiveness in soil stabilization and water retention (Souther et al., 2023).

Summary

These examples demonstrate that Indigenous worldviews and Traditional Ecological Knowledge offer a relational and practice-based framework for landscape design that integrates ecological function, cultural meaning, and long-term stewardship. By emphasizing reciprocity, interconnectedness, and the restoration of relationships between people and land, these approaches extend beyond conventional design methods to position landscapes as living systems shaped through ongoing care and participation. In doing so, they reinforce the idea that ecological restoration is not only a physical process, but also a cultural and ethical one, aligning closely with the themes identified in Rachel Carson's work. This perspective highlights the importance of designing landscapes that support both environmental health and meaningful human relationships with the natural world, providing a model for translating these values into practice.

Case Studies

One of the initial research questions for this thesis asks if there are existing landscapes that successfully embody Rachel Carson's legacy and what strategies are used to do so. Places that are named after Carson, usually incorporate some of what she is known for, such as conservation and nature, or are located in proximity to places she lived in Pennsylvania, Maryland, and Maine, but generally do not attempt to integrate her message in a comprehensive way. To answer this question, case studies that appeared to address each of the identified themes in some way despite not having an overt connection to Carson were used to supplement the literature review in the formation of design guidelines.

Strandskogen Arninge Ullna (The Arninge-Ullna Riparian Forest Park)

Stockholm, Sweden | Topia Landskapsarkitekter | 2014

This project demonstrates how minimal intervention and careful spatial design can reveal ecological relationships while maintaining the integrity of existing systems. Boardwalks weave through the riparian forest, allowing users to move through sensitive wetland environments without disrupting them. In doing so, the design makes the interconnected relationships between water, vegetation, wildlife, and people visible.

Figure 7: The Arninge-Ullna Riparian Forest Park (Image from https://topia.se/alla/strandskogen-arninge-ullna/)

The use of elevated pathways reflects a sense of moral responsibility, minimizing ecological disturbance while still providing access. Additionally, platforms and close visual connections to the landscape create immersive experiences that encourage attentiveness to

ecological processes such as seasonal change and hydrology. Storytelling is incorporated through interpretive signage that blends ecological information with poems by Tomas Tranströmer, which deepens emotional engagement and reinforces meaning.

This project illustrates how design can reveal ecological systems rather than dominate them, aligning closely with Carson's emphasis on understanding and respecting the complexity of the natural world.

Curtin University Indigenous Learning Circle

Australia | UDLA | 2018

The Curtin University Indigenous Learning Circle demonstrates how cultural knowledge, ecological systems, and social space can be integrated through landscape design. Organized around a central Yarning Circle, the project connects people, place, and ecology through native plantings and spatial relationships to surrounding trails and wetlands.

Figure 8: Curtin University Indigenous Learning Circle (Image from landezine.com)

Moral responsibility is expressed through the integration of Indigenous knowledge systems, which guide both the design process and the selection of native plant species. This approach reinforces stewardship as a cultural and ecological practice. The space is designed to be immersive and reflective, with its circular form, native vegetation, and material choices contributing to a sensory experience that supports contemplation and connection.

Storytelling is integrated directly in the landscape through planting design and spatial organization, which communicate Noongar cultural narratives. This project highlights the

importance of multiple perspectives and demonstrates how landscape can function as a medium for cultural and ecological storytelling.

Georgia Institute of Technology EcoCommons

Atlanta, USA | Nelson Byrd Woltz | 2021

The EcoCommons project illustrates how large-scale ecological restoration can be integrated into an active campus environment. The design reconnects hydrology, ecology, and social life through restored waterways, native planting systems, and a network of accessible public spaces.

Figure 9: Georgia Institute of Technology EcoCommons (Image from landezine.com)

Interconnectedness is expressed through the integration of ecological systems with campus circulation and gathering spaces, demonstrating how ecological function can be incorporated within everyday experience. The project reflects moral responsibility through its emphasis on restoring ecological processes, managing stormwater, and improving environmental resilience.

The design also creates a sense of wonder through immersive planting, varied topography, and water features that invite exploration and reflection. Storytelling is incorporated through the preservation and interpretation of site history, including commemorative spaces which connect ecological restoration with social and cultural narratives.

Summary

These case studies demonstrate that the themes identified in Rachel Carson's work are already present in contemporary landscape architecture. Across all three projects, several key strategies emerge. Each project emphasizes designing with existing ecological systems and allowing natural processes to guide form and function. Circulation and access are carefully structured to reveal ecological processes, enabling users to experience changing conditions and relationships within the landscape. Sensory experience is intentionally integrated to promote deeper connection and environmental awareness, engaging sight, sound, touch, and movement. In addition, cultural and ecological narratives are incorporated within the landscapes, communicating layered stories about place, history, and environmental relationships. Finally, these projects support long-term stewardship through both design and programming, encouraging ongoing engagement, care, and responsibility for the landscape.

Chapter 3: Design Guidelines

The next objective is to develop a set of design guidelines based on the research to provide a framework for designing landscapes that incorporate all aspects of Rachel Carson's message as it is understood through the identified themes. The guidelines reframe these themes as actions that can be applied through design. Because the themes themselves are interconnected, the research showed that many of them can be addressed through the same design strategies. For example, strategies that support ecological interconnectedness also support the responsibility to protect nature. Organizing the guidelines in this way helps clarify the intention behind each strategy even if many of them can be used to address multiple aspects of Carson's message at once.

Rachel Carson Design Guidelines

1. Support the Interconnectedness of All Life:

Design landscapes as dynamic, interconnected ecological and social systems.

- *Strengthen Connectivity*
    - Connect habitat patches through corridors and stepping-stones
    - Link site design to larger ecological networks
    - Integrate ecological function into the urban matrix
- *Support Biodiversity and Wildlife Habitat*
    - Design diverse, layered plant communities that support multiple species
    - Allow ecological processes like succession to occur
    - Maintain intact habitat areas and restore degraded ecosystems

- *Acknowledge Humans as Participants in Ecosystems*
    - Communicate that human well-being is inseparable from ecological health
    - Balance ecological restoration with areas for human activity
    - Create multifunctional landscapes instead of separating land uses

2. Acknowledge the Moral Responsibility to Protect Nature and Nonhuman Life:

Design landscapes that support ecological health, ethics, and stewardship.

- *Recognize the intrinsic value of nonhuman species*
    - Prioritize habitat connectivity and restoration
    - Minimize harmful maintenance practices like mowing
    - Acknowledge other life forms as fellow members of the community
- *Integrate ongoing care and management into the design of the landscape*
    - Evaluate conditions through ongoing observation, monitoring and data collection
    - Anticipate change by designing flexible systems that respond to environmental conditions
    - Create opportunities for public participation in stewardship, maintenance, and restoration
- *Plan for the Long-Term*
    - Prepare for change, uncertainty, and long-term ecological processes
    - Consider intergenerational impacts and long-term landscape performance
    - Source sustainable materials and use sustainable maintenance strategies

3. Promote Nature as a Source of Wonder:

Design landscapes that evoke wonder through multisensory engagement, aesthetic experience, and emotional connection.

- *Support sensory and ecological awareness*
    - Develop programming to promote mindful engagement and connection to nature experiences
    - Offer educational opportunities that enhance appreciation of ecology and nature
    - Include quiet spaces for stillness and reflection
- *Design for Multisensory and Emotional Engagement*
    - Create meaningful experience through diverse, multisensory interactions
    - Design spaces to move through and experience from within
    - Use planting design to maximize aesthetic experience
- *Design for exploration, discovery, and direct interaction with ecosystems*
    - Include design elements that create mystery and complexity
    - Provide access to aesthetically engaging features like water or big trees
    - Prioritize biodiversity to increase wildlife encounters

4. Integrate Storytelling as a Way to Engage and Communicate:

Design landscapes as narrative environments that communicate ecological knowledge, cultural meanings, and shared experiences.

- *Communicate meaning through both design and interpretation*
    - Organize movement through space as a story
    - Incorporate minimal but meaningful signage

    - Highlight spaces that reveal the landscape's history and ongoing work
- *Incorporate Multiple Perspectives*
    - Avoid a single dominant narrative; use storytelling to foster connection, empathy, and responsibility
    - Represent human and nonhuman narratives
    - Include indigenous and oral histories and local knowledge systems
- *Support Participatory Storytelling*
    - Include gathering spaces for storytelling, events, and education
    - Create opportunities for shared experiences, dialogue, and cultural expression
    - Develop storytelling programming for people who steward and interact with the land

Chapter 4: Methods

The methods for this thesis include the site inventory and analysis processes recommended by James A. LaGro in his book *Site Analysis: A Contextual Approach to Sustainable Land Planning and Site Design* (2013) and the landscape ecology principles outlined by Dramstad, Olson, and Forman in *Landscape Ecology Principles in Landscape Architecture and Land-Use Planning* to consider the implications of the broader regional context.

Site Context

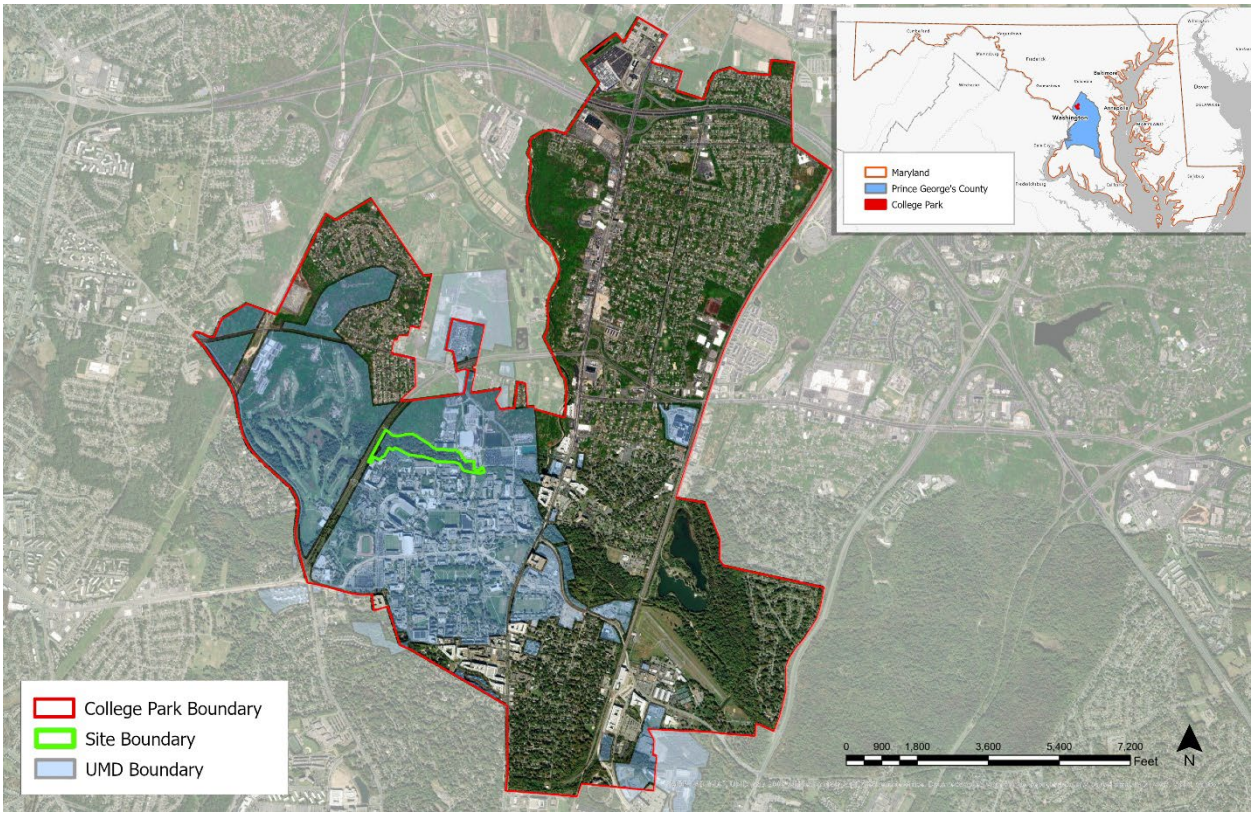

Figure 10: Site Context Map (Map created by the author)

The proposed site is a forest remnant with a stream known as Campus Creek on the University of Maryland campus located in College Park, Maryland within Prince George's County and about 7 miles northeast of Washington DC (Figure 10). The site is easily accessible

to the campus community as it is surrounded by student housing, recreational facilities, and academic buildings, including Oakland Hall, the Eppley Recreation Center, and the School of Public Health. Other nearby locations include another forest remnant known as the Wooded Hillock, the campus farm, the Xfinity Center, The Basketball Performance Center and the UMD Golf Course (Figure 12).

Figure 11: Campus Context Map (Map created by the author)

Circulation and Current Uses

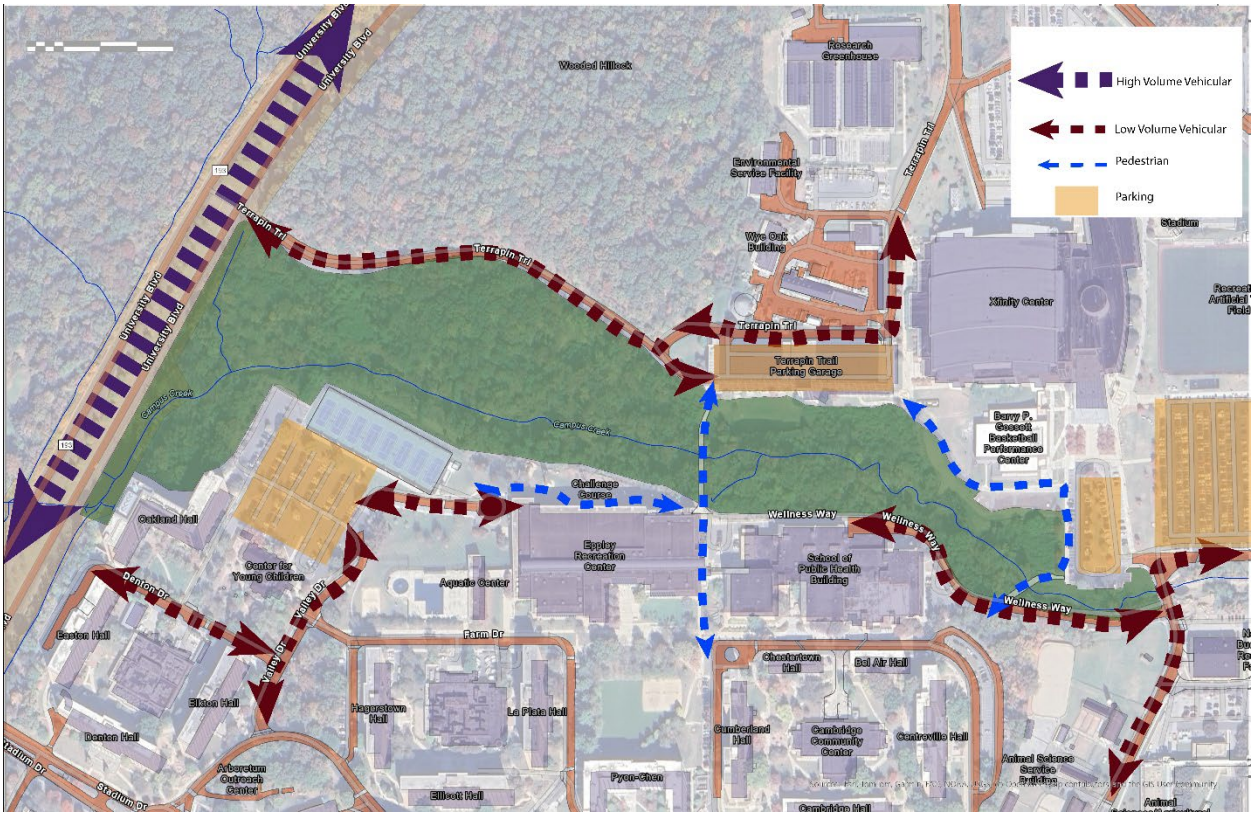

Figure 13: Circulation Map (Map created by author)


Figure 14: Pedestrian bridge from Terrapin Trail Parking Garage (Photo by the author)

Pedestrian circulation immediately in and around the site is currently limited to two pedestrian bridges and walkways around the recreation areas (Figure 13). The pedestrian bridge on the east side of the site connects to a parking lot, while the bridge in the middle of the site connects to a parking garage. Additionally, there is a paved asphalt access road along the northeast edge that is used by university facilities for small utility vehicles that can also be used

by pedestrians, however it is somewhat steeply sloped. Within the site, while there are no official trails, there are several signs of campus community use including the presence of many desire paths and informal gathering areas (Figures 15 & 16).

Figure 19: Informal Gathering Spaces (Photos by the author)

There are low volume vehicular routes surrounding the site as well. Terrapin Trail runs along the northwest border to provide access to the Terrapin Trail Parking Garage, and Wellness Way, which is primarily used by UMD facilities staff, borders the southeast edge (Figure 13).

Despite indications of unofficial use, the area is primarily experienced as a space of transition as people travel across the pedestrian bridges to and from their cars. Because existing paths and circulation routes prioritize efficient connections between destinations, many people overlook the site's natural features. Additionally, engagement with the site is limited by the lack of visual and physical access to the creek and forest.

Figure 28: Desire Paths (Photos by the author)

Ecological Systems

Regional

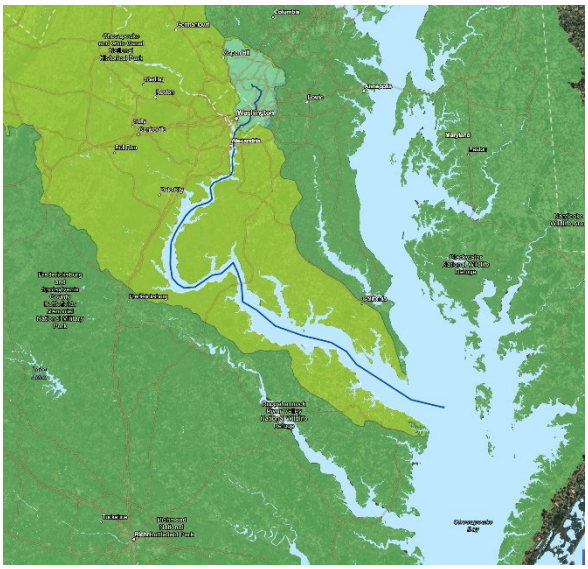

Figure 43: Regional Watersheds (Map created by the author)

At the regional scale, the site is situated within the Anacostia River watershed, a highly urbanized landscape, where the Anacostia River and its tributaries serve as primary corridors that facilitate the movement of water, species, nutrients, sediment, and pollution (Figure 17). As illustrated in Figure 18, the urban matrix is dominant, with the closest significant habitat patches located to the north and east of the site. Throughout the region, intact habitat cores primarily exist in the riparian buffers around the rivers and streams. These systems establish an underlying ecological framework that persists despite extensive urban development and high fragmentation with limited connectivity. Because elements of the built environment like roads, buildings, and infrastructure disrupt habitat continuity and constrain the movement of species, the overall resilience of the ecosystem is greatly reduced. Within this context, the project site represents a small but potentially significant stepping-stone with potential to contribute to the broader ecological connectivity. Its position along Campus Creek enhances this potential, as the creek is a first order

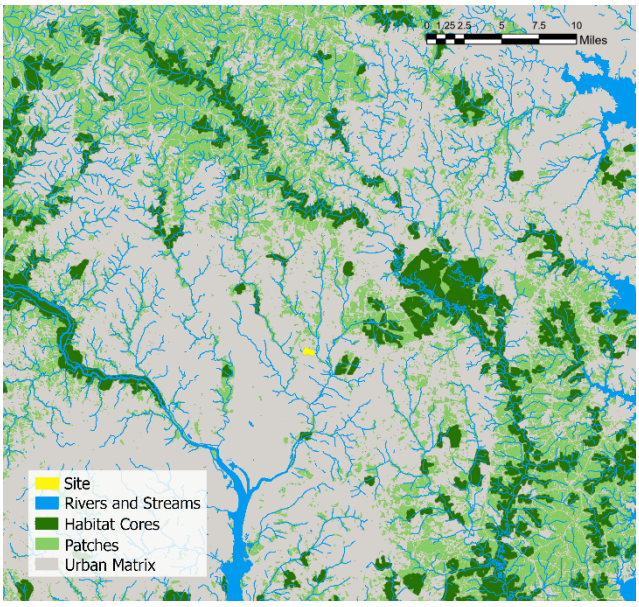

Figure 37: Patches, Corridors, Matrix (Map created by the author)

stream that flows into the Paint Branch Creek before connecting to the Anacostia River, the Potomac River, and finally to the Chesapeake Bay (Figure 17).

College Park lies within the Eastern Deciduous Forest eco-region and is located just east of the fall line, placing it more specifically in the Chesapeake Rolling Coastal Plain, which is described as a hilly upland characterized by incised streams and well-drained loamy soils with vegetation that primarily consists of Oak-Hickory-Pine forests (EPA). College Park's location within the migratory bird Atlantic flyway also underscores the importance of enhancing the site's ability to support biodiversity.

Site

Hydrology and Soil

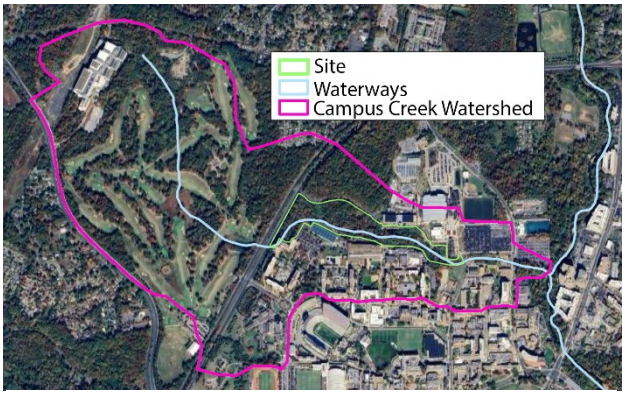

Figure 19: Campus Creek Watershed Map (Map created by the author)

Figure 52: Campus Creek Restoration (Photos from UMD.edu)

At the site scale, Campus Creek is the primary hydrological feature of the site. It originates to the west on the other side of Rte. 193 on the UMD Golf Course and is conveyed under the road into the site by a concrete channel. Stormwater drains into the creek from the UMD Golf Course, University Boulevard, and the surrounding impervious surfaces including parking lots, campus roads and tennis courts which results in fast-moving stormwater that causes creek bed scouring and bank erosion (Figure 20). Because these conditions severely degraded the stream over time, the university initiated a 2-phase restoration project with phase 1 being completed in 2019 and phase

2 expecting to be completed in 2026 (Figure 19). To stabilize the stream and improve stormwater management, the restoration project used a strategy called Regenerative Stream Conveyance (RSC) where descending step pools slow water flow to reduce sediment loss and pollutants. During this process, the creek was raised and the banks were stabilized to reconnect the stream to the floodplain during storm events (UMD).

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CcD	Christiana-Downer complex, 10 to 15 percent slopes	2.8	14.20%
CcE	Christiana-Downer complex, 15 to 25 percent slopes	4.5	23.10%
CdE	Christiana-Downer-Urban land complex, 15 to 25 percent slopes	0.3	1.30%
DuD	Downer-Hammonton-Urban land complex, 5 to 15 percent slopes	0.8	3.90%
Is	Issue silt loam, occasionally flooded	0.3	1.60%
SnB	Sassafras-Urban land complex, 0 to 5 percent slopes	0.2	0.80%
UrcD	Urban land-Christiana-Downer complex, 5 to 15 percent slopes	1.7	8.60%
ZS	Zekiah and Issue soils, frequently flooded	9.1	46.50%
		19.6	100

Table 3: Soil Classifications (websoilsurvey.nrcs.usda.gov)

The soil on the site is a mix of urban land complexes and Christiana-Downer complex (Table 1) and is primarily classified in hydrologic soil group D, which had slow infiltration rates and slow rates of water transmission (NOAA).

Vegetation and Wildlife

The site is subject to a Forest Conservation Act (FCA) easement due to the presence of Campus Creek, which qualifies as a regulated environmental feature and requires the protection of adjacent forested areas and riparian buffers. Riparian buffers are zones of vegetation along stream corridors that play a critical role in maintaining ecological health by filtering pollutants from runoff, stabilizing stream banks, reducing erosion, and providing habitat for diverse plant and animal species (USDA). A tree inventory was conducted in large areas of the site for both phases of the Campus Creek restoration project in accordance with the FCA to provide the required Forest Stand Delineation. As a result, there is documentation of what species of trees

are typically present on the site. The most commonly occurring trees are primarily native species including sweet gum (*Liquidambar styraciflua*), tulip poplar (*Liriodendron tulipifera*), black cherry (*Prunus serotina),* red maple *(Acer rubrum*), and black locust (*Robinia pseudoacacia*).

When it comes to the shrubs, vines, and herbaceous plant species, the presence of non-native invasive species is much more common. Large areas of the site are dominated by Japanese stiltgrass (*Microstegium vimineum*) (Figure 22), Amur honeysuckle (*Lonicera maackii*), wisteria (*Wisteria sp*.), porcelain berry (*Ampelopsis brevipedunculata*), wineberry (*Rubus phoenicolasius*), and many others. However, there are some populations of native species as well including New York fern (*Thelypteris noveboracensis*), trout lily (*Erythronium americanum*) (Figure 21), skunk cabbage (*Symplocarpus foetidus*), and deer tongue (*Dichanthelium clandestinum*). The campus creek restoration project also included the installation of native species in the riparian buffer, however it is hard to observe many persisting from the first phase of the project.

Figure 21: Stilt grass and vines (Photo by the author)

Figure 22: Yellow trout lilies (Photo by the author)

According to the citizen science website iNaturalist, the most commonly observed mammal species are those that are prevalent throughout urbanized areas like white-tailed deer, gray squirrels, and groundhogs. However, there was a river otter (Figure 23) observed in

February 2025, and there was a beaver dam in the creek for a time before university facilities removed it in the summer of 2025. Geese, ducks, and herons have been observed on the site, as well as turtles, snakes, skinks, and toads. In the water, a few species of fish have been observed, including the invasive northern snakehead.

Figure 61: River otter eating snakehead in Campus Creek (Photo from iNaturalist.com)

Connectivity and Fragmentation

The site's level of connectivity with the surrounding patches is affected by the adjacent roads that disrupt ecological continuity and limit the movement of species. To the north, Terrapin Trail disconnects it from the Wooded Hillock when otherwise the two forest remnants would form a larger contiguous patch. Similarly, Rte. 193 creates a barrier to terrestrial species who attempt to enter the site from the UMD golf course. Even more significantly, the high vehicular traffic of Rte. 1 cuts off access to the adjacent patches to east (Figure 24). Despite these challenges, the site retains some connectivity through Campus Creek which is routed under these roads in culverts and concrete channels.

Figure 69: Terrestrial Barriers Map (Map created by the author)

Topography and Slope

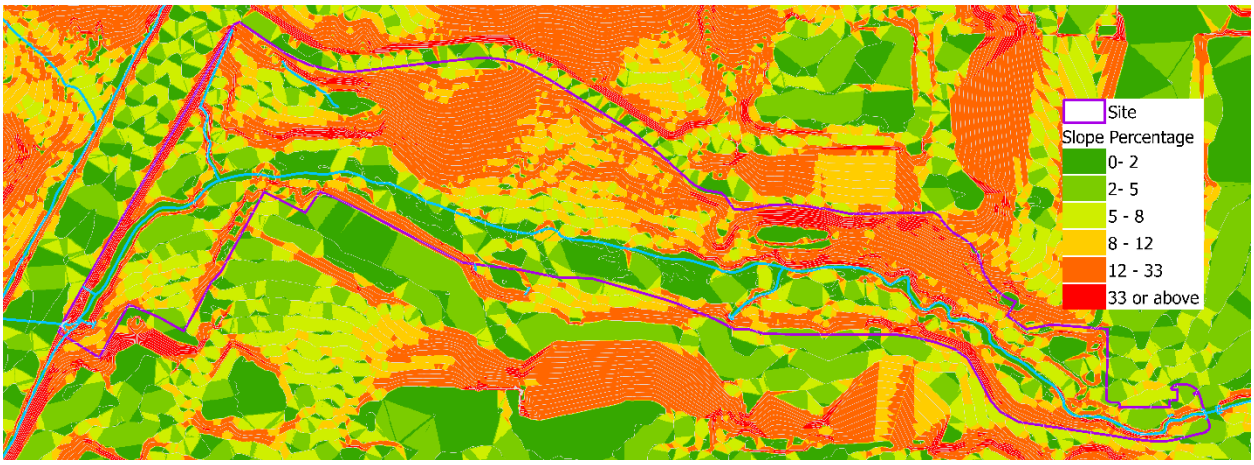

Figure 78: Slope Map (Map created by the author)

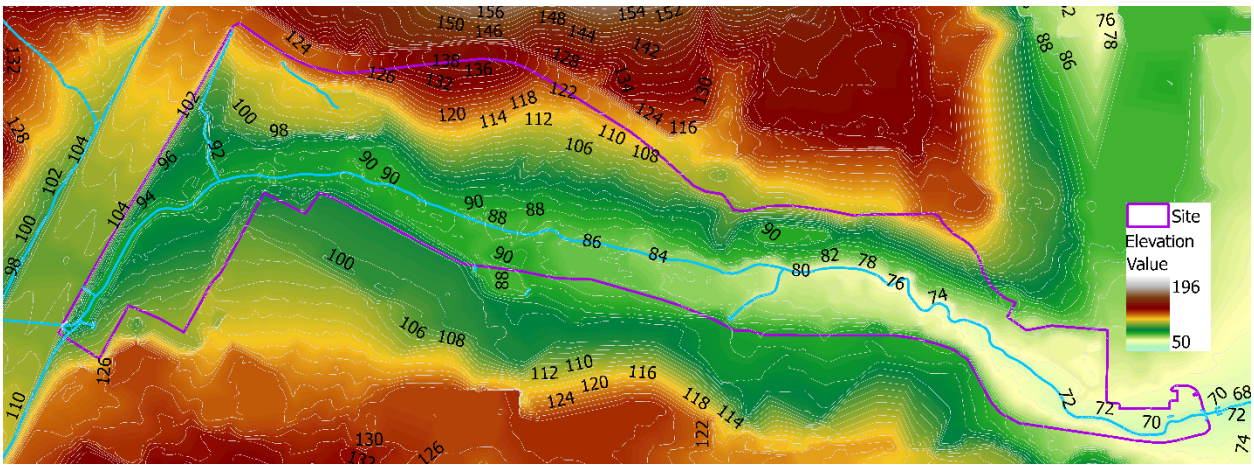

Figure 87: Topography Map (Map created by the author)

The site's topography slopes downward from the surrounding developed campus areas toward Campus Creek, creating a shallow valley that directs stormwater flow, with higher elevations along Terrapin Trail and University Boulevard. Campus Creek occupies the lowest and most continuous elevation across the site (Figure 26). The steepest slopes occur along the edge of University Boulevard and create a topographic boundary between the developed roadway and the creek corridor, while flatter areas are concentrated along the creek (Figure 25). The surrounding slopes create a physical and perceptual separation between primary campus circulation routes and the site's ecological features.

Analysis – Applying the Design Guidelines

Support the Interconnectedness of All Life

The site has elements of both fragmentation and connectivity. Regionally, the site is within the Anacostia River watershed where Campus Creek and the connecting waterways function as ecological corridors that connect to larger habitat patches despite the dominance of the urban matrix. However, this interconnectedness is significantly constrained by physical fragmentation. Infrastructure such as Route 193, Route 1, and Terrapin Trail disrupt terrestrial movement and isolate the site from adjacent forest patches, including the Wooded Hillock and the UMD Golf Course. While the creek maintains hydrological continuity through culverts and channels, ecological connectivity remains partial and uneven, particularly for terrestrial species. The site's characterization as a forest patch provides important ecological value within the developed campus; it supports habitat for local wildlife, contributes to microclimate regulation, and offers a visual and experiential contrast to surrounding built conditions. However, due to fragmentation, its ecological integrity is limited.

The site's topography reinforces fragmentation in some parts of the site, both ecologically and from the campus community. The steep slopes can create barriers for the movement of some species, particularly along University Boulevard, and the valley created by the sloping terrain results in the site being a disconnected, transitional place that most people pass over via the pedestrian bridges with minimal engagement.

However, these conditions also reveal opportunities. The creek corridor and remnant forest provide the site with potential to become a significant stepping-stone within the regional ecological network, calling for restoration strategies that enhance biodiversity, strengthen habitat

continuity, and support more resilient ecological systems. Additionally, the opportunity to connect the site to campus through the addition of trails and seating is highlighted.

Acknowledge the Moral Responsibility to Protect Nature and Nonhuman Life

The site reflects a complex relationship between environmental stewardship and ecological degradation. On one hand, the presence of a Forest Conservation Act (FCA) easement and the implementation of the Campus Creek restoration project demonstrate institutional efforts to protect and rehabilitate ecological systems. The use of regenerative stream conveyance and the reestablishment of floodplain connectivity indicate a commitment to improving hydrological function and ecological resilience.

On the other hand, the site continues to exhibit signs of environmental stress and neglect. The dominance of invasive plant species, ongoing impacts from stormwater runoff, and previous degradation of the creek reflect broader patterns of human impact on the landscape. These conditions highlight a disconnect between the existence of regulatory protection and the ongoing work of ecological care.

Additionally, the site's current use patterns do not actively promote stewardship. While informal use is evident through desire paths and gathering areas, there is little infrastructure or programming that encourages users to engage in the care or understanding of the landscape. Instead, the site is largely treated as peripheral space within the campus environment.

These conditions suggest that responsibility is present in a regulatory and institutional sense but is not fully realized at the level of everyday human interaction. This discrepancy presents an opportunity for design and programming initiatives to make stewardship visible, participatory, and experiential, while establishing systems of monitoring and maintenance.

Promote Nature as a Source of Wonder

The site has a strong potential to be a place where people in the campus community can come to strengthen their connections to nature, but this potential is not fully realized in its current condition. The presence of a creek, varied topography, and forest vegetation provides the physical foundation for sensory engagement, immersive experience, and encounters with wildlife. The topographical transition from the higher, developed areas of campus into the enclosed creek valley offers a natural sequence that could support experiences of mystery of discovery.

However, this experiential potential is currently limited by accessibility and visibility. Again, the creek and forest are largely disconnected from primary circulation routes, and many users pass through the area without engaging with its natural features. The limited physical access to the creek and forest reduces opportunities for direct sensory interaction with water, vegetation, and habitat.

Topography further contributes to this condition by creating separation. While the valley structure has the potential to create enclosed, intimate spaces, the steep slopes surrounding the creek limit entry and discourage exploration. As a result, the landscape is often perceived as background rather than as an experiential environment.

Despite these limitations, the site's existing qualities offer a strong capacity to support mindfulness, reflection and moments of wonder. Design interventions that enhance accessibility, reveal ecological processes, and improve aesthetic appeal can transform the site into a space where people can experience the benefits of a relationship with nature.

Integrate Storytelling as a Way to Engage and Communicate

The site contains multiple layers of narrative that are currently present but largely invisible. Ecologically, the site tells the story of a degraded urban stream undergoing restoration, reflecting broader environmental challenges related to stormwater, urbanization, and ecological resilience. Regionally, it is part of a larger watershed system that connects local processes to distant ecological outcomes, including the health of the Chesapeake Bay.

At the human scale, the site also reflects patterns of informal use, movement, and occupation, as evidenced by desire paths and gathering areas. These traces suggest an existing, though unstructured, relationship between the campus community and the landscape.

However, these narratives are not currently legible or intentionally communicated. There is little to indicate the ecological significance of the creek, the purpose of the restoration efforts, or the broader connections between the site and regional systems. As a result, the landscape does not actively engage users in understanding or interpreting its processes.

This absence of legible narrative represents a missed opportunity. By structuring movement through the landscape and incorporating storytelling into interpretative elements and programming, the site can become both a resource for communicating ecological knowledge and a place for the community to share experience and cultural meaning.

Chapter 5: Design Plan

Design Goals

These design goals interpret the developed design guidelines to respond directly to the specific ecological, spatial, and social conditions of the Campus Creek site to establish a framework for the proposed interventions and programming.

1. Restore and Strengthen Ecological Systems:

Reestablish the site as a functioning ecological system by restoring native plant communities, enhancing habitat diversity, improving the water quality of Campus Creek, and supporting long-term resilience through invasive species removal, understory restoration, and strategic planting.

2. Balance Public Access with Ecological Protection:

Provide meaningful access to the landscape while protecting sensitive ecological areas by guiding movement through designed trails, boardwalks, and designated use zones that minimize disturbance to the riparian corridor and restored habitats.

3. Create Immersive and Multisensory Experiences of Nature:

Transform the site from a space of transition into a space of engagement by designing for sensory experience, aesthetic appeal, and spatial immersion through planting, screening, topographic sequencing, and places to reflect.

4. Foster Environmental Stewardship Through Participation and Care:

Establish the site as a living system of ongoing stewardship by integrating restoration, maintenance, and monitoring into student-led programs that make ecological care visible, participatory, and continuous.

5. Communicate Ecological Knowledge Through Experience and Programming:

Use the landscape as an educational and narrative medium by integrating opportunities for learning, reflection, and interpretation through programming, subtle signage, and structured activities that connect users to ecological processes and Rachel Carson's message.

Design Program

The design for the Campus Creek site proposes a landscape that integrates ecological restoration, public access, and educational programming to translate Rachel Carson's environmental message into a lived spatial experience. The site is organized around a primary east–west circulation route that follows the alignment of Campus Creek, establishing the creek corridor as the central organizing feature of the design. This main path is complemented by a network of secondary trails, seating areas, and access points that encourage movement through the landscape while supporting moments of pause, observation, and engagement.

The design balances two primary priorities: the restoration and protection of ecological systems, and the creation of meaningful opportunities for human interaction with those systems. A significant portion of the site is dedicated to habitat restoration, while other areas are intentionally designed for public use, education, and gathering. Together, these elements position the site as both an ecological resource and a space for experiential learning and reflection.

Circulation

The primary circulation system consists of a continuous trail that runs along the creek corridor, transitioning between natural surface paths and boardwalk structures depending on site conditions. The boardwalk is introduced in areas where soils are frequently saturated or where access must be carefully managed to protect the riparian buffer. This approach allows users to move through sensitive environments without compromising ecological function. Additional seating platforms along the boardwalk provide flexible spaces that can support small classes, informal discussions, or moments of rest.

Secondary spur trails extend from the main path to create a series of smaller destinations, including seating areas, creek access points, and elevated viewpoints. These trails are often aligned with existing desire paths, reinforcing patterns of movement that are already present on the site and formalizing them into a cohesive circulation network.

The circulation system is designed not only for movement, but also to structure experience. Changes in material, elevation, and proximity to the creek create a sequence of spatial conditions that guide users from more open, campus-adjacent areas into increasingly immersive and enclosed environments within the creek valley.

Ecological Restoration and Planting Strategy

Ecological restoration is a central component of the design. Across the site, invasive plant species are removed and replaced with native plant communities selected to support biodiversity, improve habitat quality, and increase ecological resilience. Planting strategies prioritize species that provide food and shelter for birds and wildlife while also being capable of thriving in urban soil conditions.

A designated restoration area is located north of the creek and west of the central existing pedestrian bridge, where interventions focus on rebuilding forest structure and reestablishing understory vegetation. A deer exclosure is proposed within this area to protect regenerating plant communities and support long-term forest health.

Additional planting strategies respond to site-specific hydrological conditions. Wetland plantings are introduced in low-lying areas near stormwater outfalls and retention ponds, where soils remain saturated and existing vegetation is dominated by invasive species. These plantings improve stormwater filtration, support habitat diversity, and enhance the visual quality of the site. Additionally, a 50ft riparian buffer is designated on both sides of the creek and planted with appropriate species.

In more publicly accessible areas, planting design also incorporates species with seasonal interest, fragrance, and edible components to enrich sensory experience and encourage engagement with the landscape.

Public Access and Experience

The design creates a gradient of accessibility across the site, allowing users to engage with the landscape in multiple ways while protecting ecologically sensitive areas. The main trail provides continuous access along the creek, while boardwalk sections enable users to experience wetland and riparian environments without causing disturbance.

Direct interaction with the creek is supported through designated access points, including areas with boulders placed within the stream corridor to allow users to sit near the water. These interventions create opportunities for informal gathering, observation, and reflection.

Seating areas are distributed throughout the site and vary in scale and character. Smaller seating areas are located in more secluded locations for individual use, while larger group seating areas are positioned near key spots along the trail. Many of these locations are informed by existing patterns of use, such as areas where informal seating or gathering is evident by the existence of tables and chairs brought on to the site.

Screen plantings are used strategically throughout the site to buffer views and noise from adjacent roads, parking areas, and athletic facilities. By reducing the visual and auditory presence of surrounding infrastructure, these plantings help create a more immersive and contemplative environment.

Outdoor Classroom and Educational Space

An outdoor classroom is proposed as a central feature of the design, providing a dedicated space for structured learning and group activities. Located on higher ground north of the creek, the classroom offers a vantage point overlooking the landscape while remaining connected to the broader circulation system.

The classroom is accessible from multiple routes, including an accessible ramp that connects to the parking garage and passes through a meadow area. This sequence reinforces the transition from built campus environments into the ecological landscape.

Programming and Stewardship

The design is supported by a robust programming framework that positions the site as a space for ongoing stewardship, education, and community engagement. A student-led ecological restoration program is proposed to support the long-term maintenance and monitoring of the site. Through partnerships with academic departments like Landscape Architecture and

Environmental Science and local organizations, students and community members participate in activities such as invasive species removal, planting, ecological monitoring, and data collection.

Additional programming focuses on fostering connections between people and nature through experiential and educational activities. These include mindfulness practices such as forest bathing, creative activities such as sketching and journaling, and educational workshops on topics like ecology, botany, and traditional ecological knowledge. The site also supports programming for children and community members, creating opportunities for environmental education across age groups. These programs draw inspiration from Rachel Carson's emphasis on cultivating a sense of wonder through direct engagement with the natural world and present opportunities to partner with nearby campus neighbors like the School of Public Health and the Center for Young Children.

Discreet interpretive signage is incorporated along the trail to support storytelling and learning. Rather than overwhelming users with information, signage is designed to prompt observation, highlight ecological processes, and introduce key ideas through brief text, quotations, and poems.

Summary

These design interventions and programming strategies establish the Campus Creek site as a multifunctional landscape that integrates ecological restoration, public engagement, and education. The design creates a landscape where ecological processes are restored and made visible and experiential. By structuring movement, access, and programming around the creek corridor, the site becomes a space where visitors can develop a deeper understanding of and connection to the natural world. The design program is guided by the developed design

guidelines to translate Rachel Carson's message into a physical environment that supports both ecological function and human experience, demonstrating how landscape architecture can be a medium to interpret her work.

Materials

The material strategy for the Campus Creek design prioritizes the use of natural, locally sourced, and minimally processed materials to reinforce sensory experience, ecological integration, and a strong connection to place. The design relies on materials that are consistent with the existing forest environment and that support both ecological function and sensory experience.

A key component of this approach is the use of materials already present on site. The forest contains a significant amount of fallen trees and woody debris, which are repurposed as functional and spatial elements within the design. Logs are used to define the edges of natural surface trails, helping to guide movement while maintaining a soft and informal character. Sections of tree trunks are incorporated as seating elements, creating informal gathering opportunities that feel like a natural part of the landscape. Where appropriate, benches and tables are constructed from salvaged wood, allowing site materials to be reused in ways that extend their ecological and experiential value.

Figure 96: Onsite Woody Debris (Photo by the author)

Natural surface trails are maintained with organic mulch derived from campus landscape waste collected by university facilities staff. This approach reduces the need for imported materials

while contributing to soil health and reinforcing a closed-loop material system. The use of mulch also enhances the sensory qualities of the site, introducing texture underfoot, absorbing sound, and releasing natural scents that contribute to an immersive experience.

In areas requiring greater durability or accessibility, like boardwalks and elevated pathways, wood is also the primary material. Boardwalk structures are constructed from rot-resistant wood species or sustainably sourced lumber, selected for durability in wet conditions while maintaining a natural appearance. The boardwalk system is designed to minimize ground disturbance and protect sensitive riparian and wetland areas while allowing users to move through these environments.

Stone is introduced selectively within the creek corridor and at key access points. Boulders placed within and along the stream provide opportunities for seating, gathering, and direct interaction with the water. These stones are ideally sourced locally to ensure visual compatibility with the existing geology and to reduce the environmental impact associated with transportation. In addition to their functional role, the boulders contribute to the tactile and acoustic qualities of the site, interacting with water flow to produce sound and movement.

Planting areas also contribute to the material palette of the site. Meadow plantings replace turf areas, while wetland plantings are introduced in low-lying, saturated zones. Plantings along the trails prioritize sensory experiences and are chosen for fragrance, texture, and edible parts. These living materials reinforce seasonal variation, texture, color, and habitat value, becoming a dynamic component of the overall material strategy.

Additional constructed elements, including the outdoor classroom and seating platforms, continue this material approach through the use of wood and other natural finishes. These structures are designed to be simple, durable, and visually integrated with the surrounding

landscape. Where possible, connections and construction methods are minimized in visual prominence to maintain a sense of lightness and continuity with the forest environment.

Overall, the material strategy supports the broader goals of the design by reducing reliance on external resources, reusing materials found on site, and enhancing the sensory and experiential qualities of the landscape. Through texture, scent, sound, and visual continuity, materials play a critical role in fostering deeper physical and emotional connections between users and the natural environment.

Plant Communities

The planting design for this project is structured around distinct zones that respond to site conditions and design goals. Across all planting areas, species selection prioritizes native plants adapted to the Mid-Atlantic Piedmont region, supporting biodiversity, ecological function, and multisensory engagement. Native plant communities are used to restore ecological processes and to create immersive experiences that promote awareness, stewardship, and connection to nature.

Planting strategies emphasize structural diversity across canopy, understory, shrub, and herbaceous layers to strengthen habitat value and resilience. This layered approach increases biodiversity, improves water quality, and enhances ecological stability, particularly in riparian and restoration zones. Additionally, planting compositions are designed to perform multiple functions simultaneously including screening, habitat creation, and sensory engagement.

<u>Screen Plantings (Visual and Sound Buffer)</u>

Screen plantings are located along site edges adjacent to roads and high-activity areas to reduce noise, filter views, and create a sense of enclosure. These plantings consist of a layered mix of evergreen and deciduous trees and shrubs to ensure year-round screening and ecological

resilience. Mixed-species plantings are more adaptable to environmental stressors and reduce vulnerability to pests and disease. In addition to their functional role, these plantings contribute to sensory experience through seasonal variation, texture, and fragrance.

Example Plant List:

Canopy Trees

- Eastern Red Cedar (*Juniperus virginiana*) – evergreen screening, wildlife habitat
- American Holly (*Ilex opaca*) – evergreen structure, winter interest
- Tulip Poplar (*Liriodendron tulipifera*) – fast-growing canopy

Understory Trees

- Eastern Redbud (*Cercis canadensis*) – spring flowering, edible flowers
- Serviceberry (*Amelanchier canadensis*) – berries, seasonal interest

Shrubs

- Wax Myrtle (*Morella pensylvanica*) – semi-evergreen screening
- Arrowwood Viburnum (*Viburnum dentatum*) – dense structure, wildlife value
- Inkberry Holly (*Ilex glabra*) – evergreen massing

Wetland Plantings (Stormwater and Filtration)

Wetland planting areas are designed to manage stormwater, improve water quality, and support habitat for amphibians, birds, and pollinators. Species are selected based on their tolerance to saturated soils and fluctuating water levels, with an emphasis on plants that enhance filtration and nutrient uptake. Wetland vegetation plays a critical role in slowing water flow and trapping sediments.

Example Plant List:

Trees

- Red Maple (*Acer rubrum*)
- River Birch (*Betula nigra*)
- Bald Cypress (*Taxodium distichum*)

Shrubs

- Buttonbush (*Cephalanthus occidentalis*)
- Winterberry (*Ilex verticillata*)
- Silky Dogwood (*Cornus amomum*)
- *Herbaceous / Emergent*
- Soft Rush (*Juncus effusus*)
- Blue Flag Iris (*Iris versicolor*)
- Pickerelweed (*Pontederia cordata*)

Woodland Plantings (Habitat and Sensory Experience)

Woodland planting areas are designed to support biodiversity while creating immersive, sensory engaging environments for site visitors. These areas incorporate native species that provide visual interest, fragrance, edible elements, and seasonal change that contribute to both ecological function and human engagement, reinforcing connections between people and landscape processes.

Example Plant List:

Canopy Trees

- White Oak (*Quercus alba*) – keystone species
- American Beech (*Fagus grandifolia*)

Understory Trees

- Pawpaw (*Asimina triloba*) – edible fruit
- Serviceberry (*Amelanchier laevis*) - edible fruit

Shrubs

- Spicebush (*Lindera benzoin*) – aromatic leaves
- Witch Hazel (*Hamamelis virginiana*) – winter bloom
- Elderberry (*Sambucus canadensis*) – edible, habitat

Ground Layer

- Wild Ginger (*Asarum canadense*) – texture
- Christmas Fern (*Polystichum acrostichoides*) - evergreen
- Virginia Bluebells (*Mertensia virginica*) - spring bloom

Meadow Plantings (Pollinators and Aesthetic Immersion)

Meadow areas are designed as highly biodiverse, low-maintenance systems that provide habitat for pollinators while engaging the senses through color, movement, texture, and sound. Native meadow species are well adapted to local conditions and support a wide range of insects and birds.

Example Plant List:

Forbs

- Butterfly Weed (*Asclepias tuberosa*) - pollinators, visual interest
- New England Aster (*Symphyotrichum novae-angliae*) - fall bloom
- Wild Bergamot (*Monarda fistulosa*) - fragrance
- Mountain Mint (*Pycnanthemum spp*.) – fragrance

- Blazing Star (*Liatris spicata*) – texture, pollinators

Grasses

- Little Bluestem (*Schizachyrium scoparium*) - multiseasonal interest
- Switchgrass (*Panicum virgatum*) - pollinators, winter habitat

Deer Exclosure (Understory Restoration Zone)

Within the deer exclosure, planting focuses on restoring the forest understory through dense, layered plantings of native shrubs and herbaceous species. This approach increases biodiversity and allows suppressed vegetation to reestablish. Successful understory restoration requires clustering species, removing invasive plants, and prioritizing shade-tolerant native species that support wildlife.

Example Plant List:

Shrubs / Small Trees

- Spicebush (*Lindera benzoin*)
- Pawpaw (Asimina triloba)
- Mapleleaf viburnum (*Viburnum acerifolium*)
- Black chokeberry (*Aronia melanocarpa*)

Ground Layer

- Pennsylvania Sedge (*Carex pensylvanica*)
- Golden groundsel (*Packera aurea*)
- Mayapple (*Podophyllum peltatum*)
- Ferns (Christmas Fern *Polystichum acrostichoides*, Lady Fern *Athyrium filix-femina*)

Riparian Buffer (Stream Corridor)

The riparian buffer is designed to stabilize streambanks, filter runoff, and enhance aquatic and terrestrial habitat. Plant selection responds to moisture gradients, with flood-tolerant species closest to the stream and more adaptable species farther upslope. Trees with strong root systems stabilize banks, while layered vegetation improves water quality and habitat complexity.

Example Plant List:

Trees

- Sycamore (*Platanus occidentalis*)
- River Birch (*Betula nigra*)
- Black Willow (*Salix nigra*)

Shrubs

- Buttonbush (*Cephalanthus occidentalis*)
- Red-osier Dogwood (*Cornus sericea*)
- Elderberry (*Sambucus canadensis*)

Understory / Ground

- Soft Rush (*Juncus effusus*)
- Sedges (*Carex spp*.)
- Blue Flag Iris (*Iris versicolor*)

Concept Site Plan

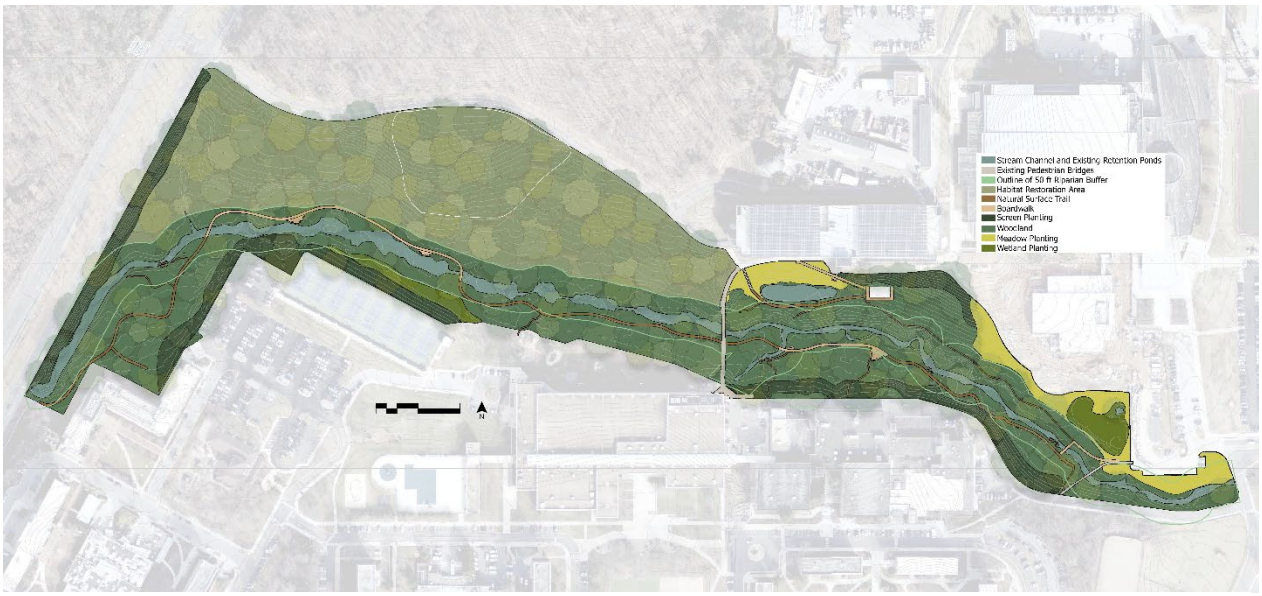

Figure 28: Site Plan with Legend (Created by the author)

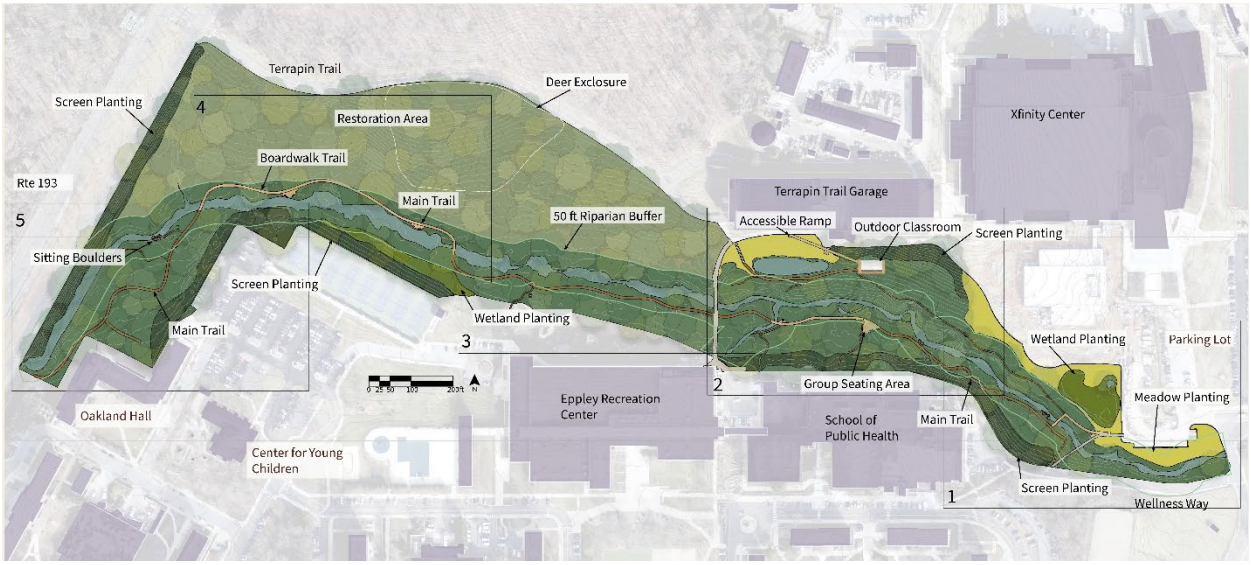

Figure 29: Site Plan with Call-outs (Created by the author)

Area 1: Eastern Entrance

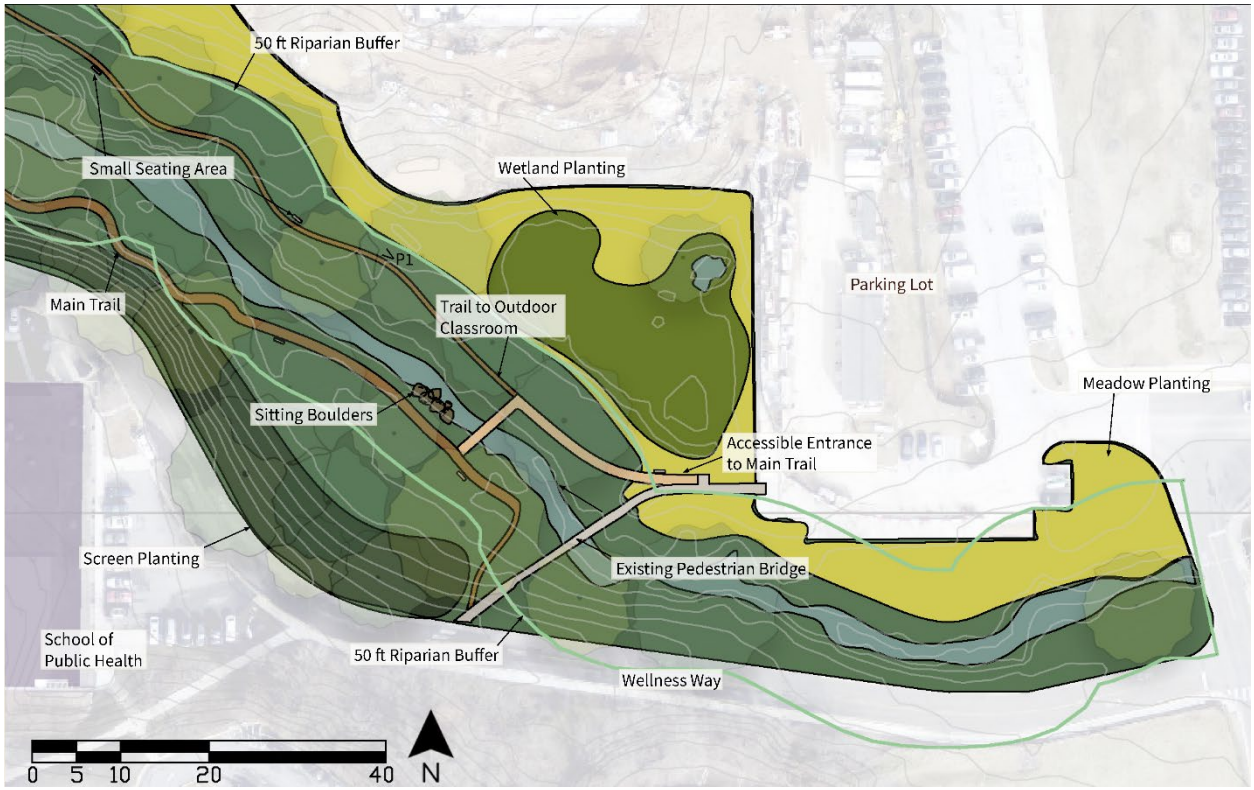

Figure 111: Site Plan of Area 1 (Created by the author)

Perspective 1: View Looking West from Trail North of the Creek

Figure 31: Perspective 1 (Created by the author)

Figure 32: Existing Conditions (Photo by the author)

Area 2: Activity Zone

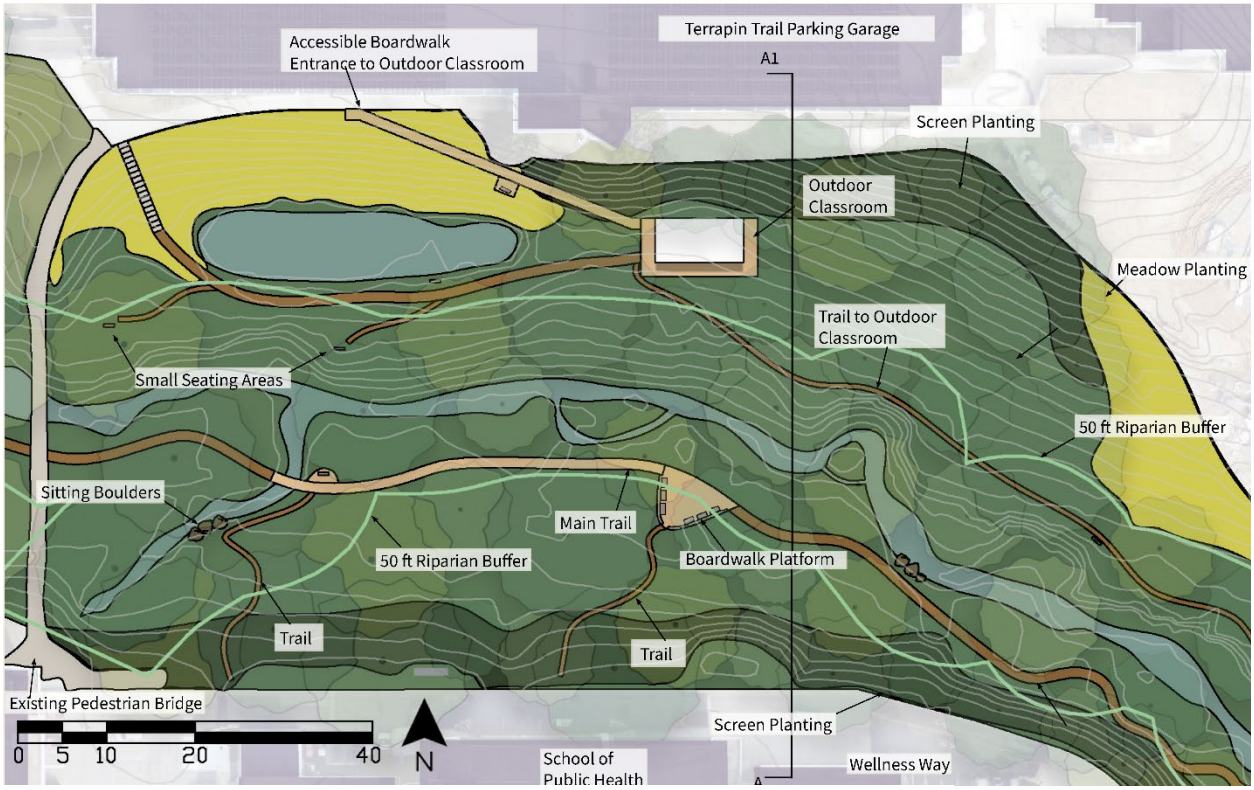

Figure 136: Site Plan of Area 2 (Created by the author)

Section A-A1

Figure 145: Section A-A1 (Created by the

Area 3: Central Zone

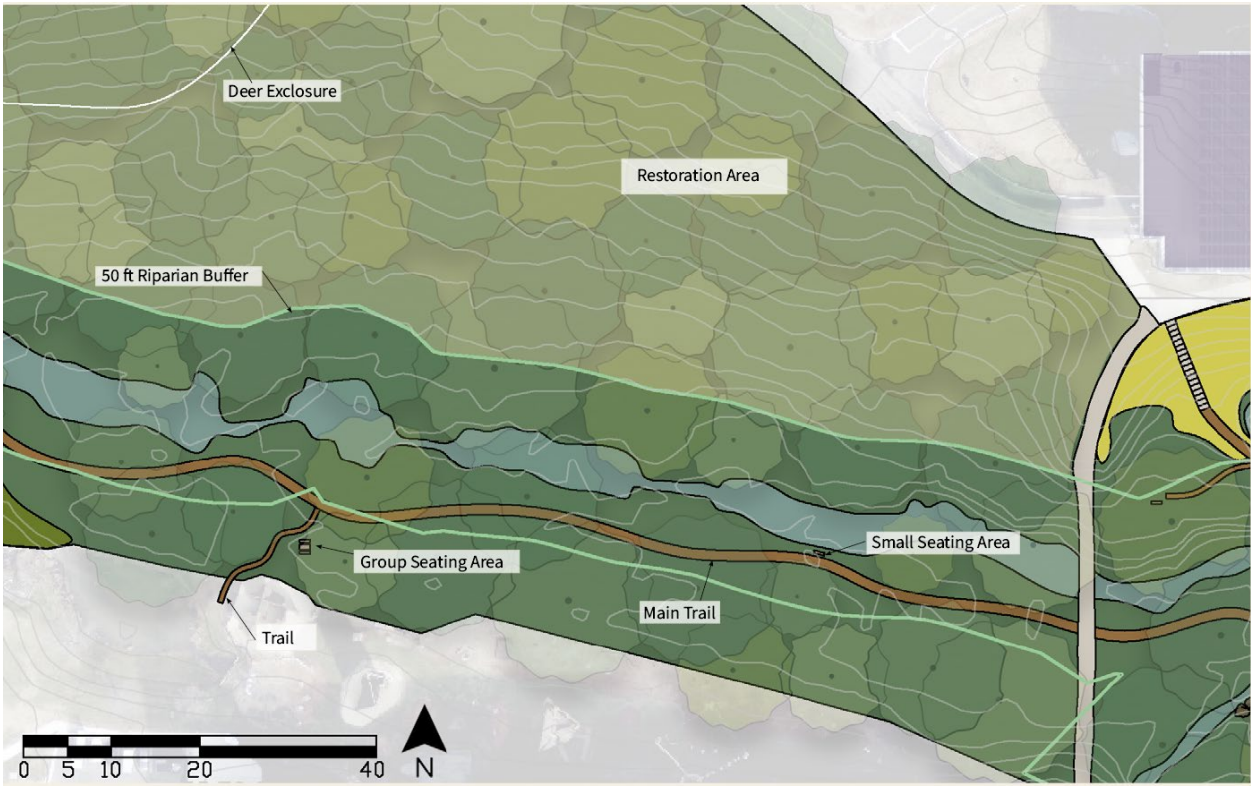

Figure 154: Site Plan of Area 3 (Created by the author)

Area 4: The Beaver's Lair

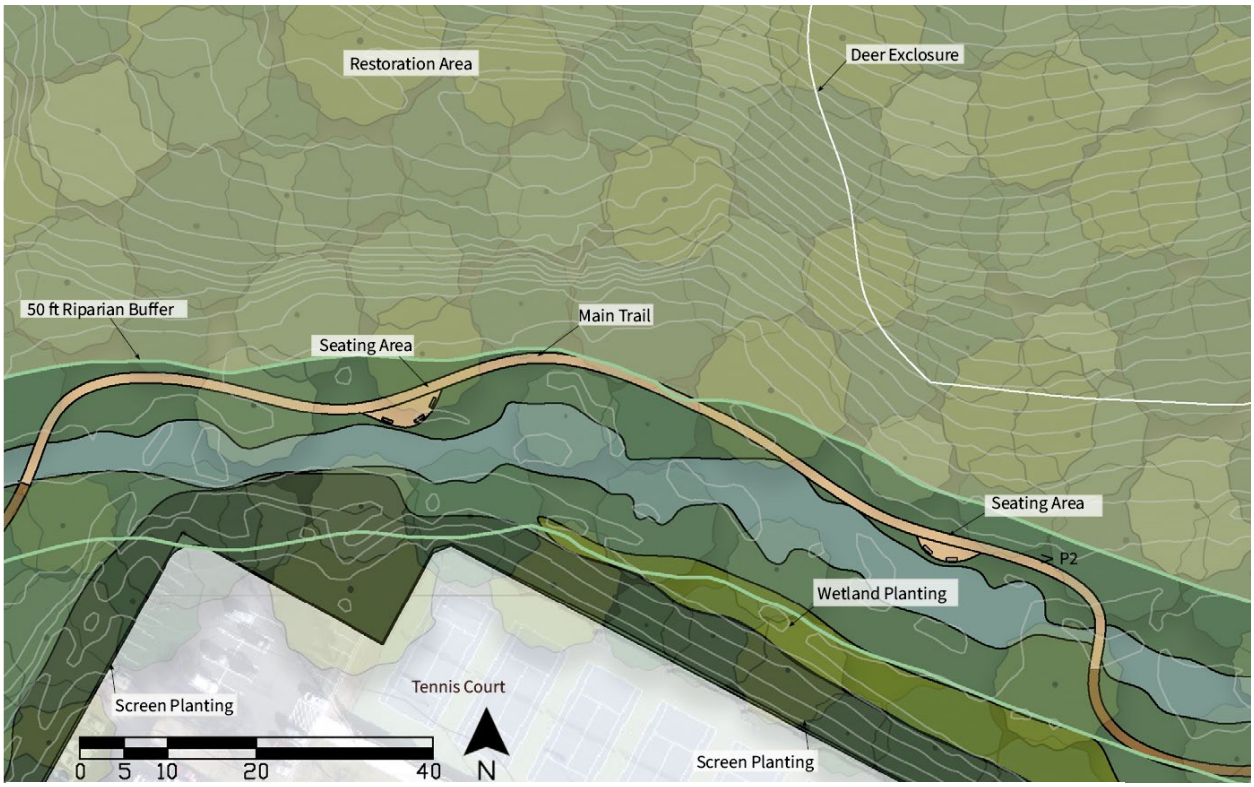

Figure 163: Site Plan of Area 4 (Created by the author)

Perspective 2: View Looking West from the Main Trail

Figure 181: Perspective 2 (Created by the author)

Figure 172: Existing Conditions (Photo by the author)

Area 5: Western Edge

Figure 190: Site Plan of Area 5 (Created by the author)

Section B-B1

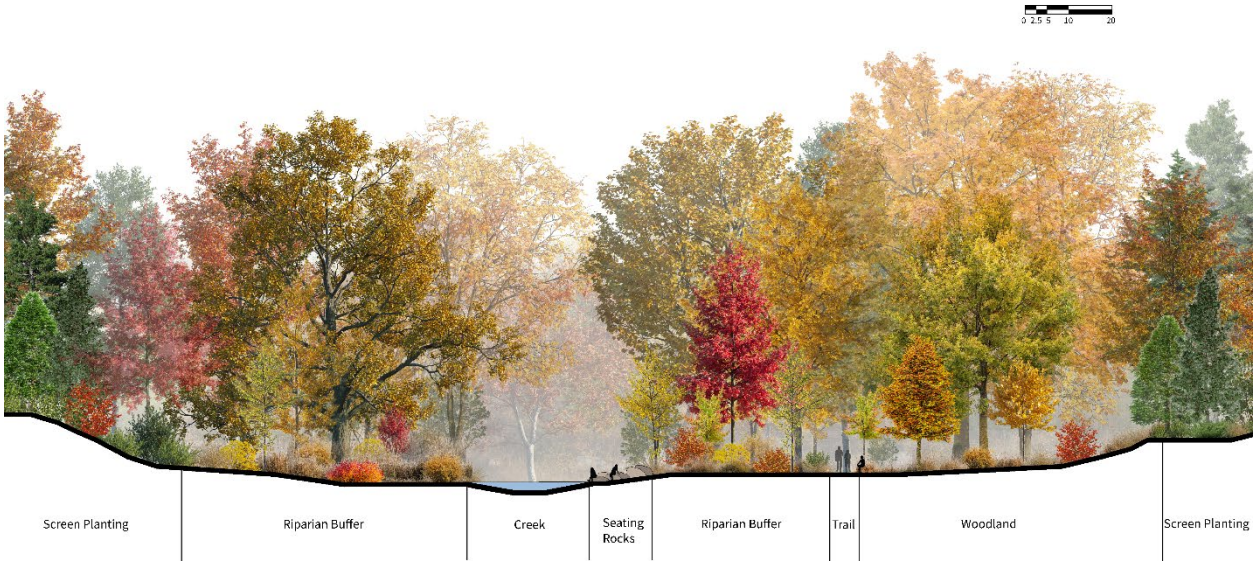

Figure 40: Section B-B1 (Created by the author)

Perspective 3: View Looking South at Group Seating Area

Figure 199: Perspective 3 (Created by the author)

Figure 208: Existing Conditions (Photo by the author)

Chapter 6: Conclusion

Limitations of Project Scope

Because the main focus of this project was the development of the design guidelines, and the site design primarily serves as a way to demonstrate how those guidelines might be applied to a specific site, less emphasis was placed on several components that would be necessary if the project were to be fully implemented.

First, this project does not reflect a comprehensive understanding of the University of Maryland's existing or future plans for the site. While some preliminary investigation was conducted to gain a general sense of campus conditions and priorities, fully aligning the design with institutional planning frameworks was beyond the scope of this project. Ultimately, engaging deeply with these constraints did not feel essential to expressing the primary intention of the thesis, which is to explore how Rachel Carson's themes can be translated into landscape design.

Another important element that was not addressed in the site design is community engagement as part of the design process. While the design guidelines emphasize the importance of participation, stewardship, and multiple perspectives, direct engagement with students, faculty, and other campus stakeholders was not incorporated. This type of engagement would be critical in determining which programmatic elements to prioritize, how the space is used, and how it is maintained over time. However, it was not feasible within the time and resource constraints of this project.

In addition, the design does not include detailed technical documentation that would be required for implementation. Elements such as grading plans, stormwater calculations, planting

specifications at a construction level, and ADA compliance verification were considered conceptually but not resolved in detail. Similarly, while material strategies and planting approaches were proposed, they have not been tested against cost estimates, phasing strategies, or long-term maintenance requirements.

Ecological performance is also addressed at a conceptual level rather than through quantitative analysis. While the design is informed by principles of landscape ecology, restoration, and stormwater management, it does not include modeling or measurable projections related to water quality improvement, habitat performance, or carbon sequestration. These types of evaluations would be necessary to fully assess the effectiveness of the design.

The project also does not fully address long-term management and maintenance beyond general strategies. While stewardship is a central theme of the thesis, the operational realities of maintaining native plantings, managing invasive species, and sustaining community involvement over time would require more detailed planning and institutional support.

Finally, the application of the design guidelines is limited to a single site. While this allows for a focused exploration of how Rachel Carson's themes can be translated into landscape design, it does not test how the guidelines might perform across different site types, scales, or cultural contexts. Future work could explore how these guidelines adapt to a broader range of conditions.

Project Reflection and Evaluation of Objectives

This project set out to explore whether the themes and values of Rachel Carson's work could be translated into landscape design in a way that cultivates ecological awareness, strengthens connections to nature, and encourages a sense of responsibility for the protection of

the natural world. This intention was grounded in the understanding that Carson's writing was effective not only because of the scientific information it conveyed, but because of the way it engaged people emotionally and ethically. As environmental degradation continues to occur as a result of human activity, landscape architects have an opportunity to shape social and ecological consciousness through designed environments that educate, inspire, and reconnect people to the natural world.

The research questions guiding this project asked whether landscape architects can draw from Carson's work to design meaningful environmental experiences, what core values and principles can be extracted from her writing, and how design can be used to inspire care and responsibility for the environment. These questions were addressed through a multi-step process that included identifying key themes in Carson's work, researching interdisciplinary concepts related to those themes, developing a set of landscape design guidelines, and applying those guidelines to a site design.

The first objective of identifying key themes in Rachel Carson's work was successfully achieved by finding four central ideas that are present throughout her written works: the interconnectedness of all life, moral responsibility to protect nature and non-human life, nature as a source of wonder, and storytelling as a means of engaging emotions and communicating ecological knowledge. These themes provided a clear conceptual framework that grounded the entire project.

The second objective of researching interdisciplinary concepts to inform how these themes can be translated into design was addressed through the literature review. Concepts from landscape ecology, environmental ethics, phenomenology, sensory experience, human–nature connectedness, and storytelling were investigated to establish a bridge between Carson's ideas

and spatial design strategies. This step was critical in moving from abstract values to actionable design thinking.

The development of design guidelines represents the core contribution of this thesis. The guidelines translate Carson's message into specific, design-relevant strategies organized around the four themes. They incorporate ecological performance, sensory engagement, stewardship, and narrative as integrated components of landscape design. In doing so, the guidelines demonstrate that Carson's work can be interpreted not only as a framework for shaping physical environments.

The application of these guidelines to the site design further demonstrates their effectiveness. The proposed design integrates ecological restoration, sensory elements, accessible pathways, and opportunities for education and engagement in a way that reflects each of the identified themes. For example, the restoration of the riparian buffer and enhancement of habitat connectivity directly address the interconnectedness of life, while opportunities to interact with the stream and the incorporation of immersive pathways supports the experience of wonder. Ecological restoration and stewardship programming reflect the theme of moral responsibility, and the gathering areas and interpretive signage support storytelling into the landscape.

Through this process, the project successfully shows how landscape architecture can function as a medium for communicating ecological knowledge and shaping environmental values. While the design itself is conceptual, it demonstrates that the guidelines can be meaningfully applied to a real site and can inform a cohesive and intentional design approach.

In addition to addressing the research questions, the project meets its design goals by creating a landscape that is ecologically functional, experientially engaging, and socially meaningful. The design supports biodiversity, improves environmental performance, and creates

opportunities for daily interaction with nature. Additionally, it encourages reflection, learning, and a deeper awareness of the relationships between people and the natural world.

Overall, this thesis demonstrates that Rachel Carson's legacy can be translated into landscape design through a process of interpretation, research, and application. By moving from literature to guidelines to design, the project provides a replicable framework for landscape architects seeking to create spaces that not only function ecologically, but also inspire a sense of connection, responsibility, and care for the environment.

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