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Hidden Landscapes: Environmental History of North America

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Introduction

This book begins from a simple claim with complicated consequences: landscapes are archives. The forests, rivers, coasts, and plains of North America store the residues of decisions about power, property, and belonging as surely as they store carbon, nutrients, and water. Much of that history is hidden in plain sight—in the straightened line of a canalized river, in a treeless prairie that once moved with bison, in a thinned forest where cultural fire was outlawed, and in the invisible drift of chemicals passing from farm fields to aquifers. *Hidden Landscapes* asks how these places came to be, and how their pasts shape the possibilities for a sustainable future.

Environmental history is, at heart, a study of relationships—between people and other species, between economies and ecologies, between ideas and infrastructures. The chapters that follow track these relationships across scales: from Indigenous stewardship that wove fire and reciprocity into ecological rhythms, to colonial regimes that extracted furs, timber, and minerals for distant markets; from nineteenth-century industrial cities struggling with sewage and disease, to twentieth-century conservation that protected “wilderness” while displacing those who had long cared for it. By connecting ecological change to cultural values and economic systems, the book shows that modern ecosystems are not only natural assemblages but also political and moral ones.

To speak of North America is to speak of many homelands and many sovereignties. Long before European arrival, diverse Indigenous nations cultivated mosaics of abundance through selective burning, agroforestry, fisheries management, and seasonal migration. These practices were carried by stories, ceremonies, and laws that treated land as a relative, not an inert resource. Colonization sought to replace these relations with property boundaries, extractive logics, and racial hierarchies. The resulting transformations—epidemics that reshaped demographics, livestock that remade prairies, plows and fences that re-engineered soils—altered the continent’s living systems and the meanings people attached to them.

Industrialization deepened these changes. Railroads stitched mountains to markets; mines sank shafts into the substrata of Indigenous and working-class communities; rivers were dammed into stairways of power and promise; and cities rechanneled waste, water, and labor to fuel growth. The twentieth century added new layers: chemical fertilizers and pesticides boosted yields while spreading risks; suburbs proliferated with lawns that demanded water and weedkillers; and conservation carved out national parks that preserved scenic beauty while obscuring histories of removal. These are the hidden infrastructures of everyday life—pipelines beneath streets, levees along deltas, supply chains that begin in boreal forests and end in big-

box stores.

Yet the story is not only one of loss and domination. Resistance and repair run through it. Environmental justice movements insisted that clean air and safe water are civil rights, not privileges; Indigenous nations reclaimed stewardship through co-management, treaty enforcement, and restoration; scientists and citizens together mapped toxins, tracked species declines, and reimagined rivers and coasts as living systems rather than engineering problems. Such efforts expose how environmental harm is unevenly distributed—and how solutions must be as attentive to equity as to ecology.

Climate change now casts these histories into sharper relief. Wildfire seasons lengthen where fire was once cultural practice; storms grow stronger along coasts armored by levees and drained of wetlands; drought and heat stress prairie soils already compacted by a century of plowing; and forests, simplified by logging and pests, struggle to adapt. Understanding why risk accumulates where it does—why certain communities bear the brunt, why certain species falter, why certain infrastructures fail—requires the long view this book provides. The past does not dictate the future, but it does set the stage on which adaptation and transformation will unfold.

Hidden Landscapes moves across four interlocking terrains—forests, rivers, coasts, and plains—to show how resource extraction and cultural narratives co-produced the modern environments we inhabit. Each chapter pairs a place-based story with broader patterns, linking beaver to empire, dams to dreams of progress, lawns to oil, and plastics to planetary cycles. Together these cases illuminate a central argument: sustainable futures depend on recovering practices of reciprocity, redesigning economies to fit ecological limits, and centering those whose knowledge and lives have been marginalized in the making of “modern” ecosystems.

If there is a guiding ethic here, it is humility—toward the complexity of living systems and the plurality of ways to care for them. By reading landscapes as archives, we can see how choices became structures, how structures became habits, and how habits might be unlearned. The chapters ahead offer both cautionary tales and working principles: invest in living infrastructure, honor Indigenous stewardship, repair soils and waters as common goods, and design for variability rather than control. These are not just environmental strategies; they are democratic ones. In learning to live with change, we may yet uncover the hidden possibilities within the landscapes we share.

CHAPTER ONE: Deep Time Climates and the Making of North American Biomes

Before human hands shaped a single field or diverted a single stream, unimaginable forces sculpted the North American continent. These were the grand acts of plate tectonics, volcanic eruptions, and, perhaps most dramatically, the relentless advance and retreat of massive ice sheets. This deep-time drama, spanning billions of years, laid the very foundation for the diverse biomes we see today, setting the stage for all subsequent environmental history. Understanding this ancient past isn't merely academic; it reveals the profound plasticity of landscapes and the enduring power of natural systems, a power that even our modern technologies still contend with.

North America boasts some of the planet's oldest rocks, its interior having remained stable for an immense stretch of time. About 1.8 billion years ago, various continental fragments fused to create the robust crust underlying the Canadian Shield and the northern interior platform. Another pivotal moment occurred roughly 600 million years ago when ancestral North America began to fragment, forming the continental margins where subsequent mountain ranges would rise, ultimately giving the continent its current size and shape.

The slow dance of tectonic plates has been a constant choreographer. Around 500 million years ago, tectonic forces began pushing fragments of other landmasses towards the future eastern North America. These continental slivers, carried along like parts on an assembly line, repeatedly crashed into the nascent continent, building up its margin. This crumpling and thrusting gave birth to the Appalachian Mountains, once as imposing as the Himalayas are today. Later, about 200 million years ago, the supercontinent Pangaea began to split apart, a geological divorce that ultimately formed the Atlantic Ocean and nudged eastern North America towards its present global position.

Meanwhile, the western edge of the continent was a geological beehive of activity. As the Atlantic widened, it propelled the North American plate westward over the Pacific Ocean floor, a process that began roughly 180 million years ago. This westward drift involved the subduction of the Pacific Plate beneath the North American Plate, leading to intense geological upheaval, including widespread volcanism and the accretion of exotic island chains and sedimentary rocks onto the continent's leading edge. This ongoing tectonic turmoil shaped the youngest mountain ranges, the Cordilleras, which include the familiar Rockies and the Sierra Nevada.

But mountains are not eternal; they are perpetually sculpted by the patient hand of

erosion. The mighty Appalachian Mountains, for instance, have been steadily worn down over millions of years, their ancient cores now exposed in places. This ceaseless process of uplift and erosion dictates where sediments accumulate, forming the basis for future soils and influencing river courses. Even today, beneath the center of North America, parts of the ancient continental foundation appear to be slowly "dripping away" into the deeper mantle, a process called cratonic thinning, revealing that the continent is still very much a work in progress.

While plate tectonics orchestrated the grand continental architecture, climate has been the master painter, applying the broad strokes of biomes across the vast canvas of North America. Throughout Earth's long history, the climate has swung between "icehouse" periods, characterized by glaciers, and "greenhouse" periods, with little to no permanent ice. We are currently in an icehouse period known as the Late Cenozoic Ice Age, which commenced 34 million years ago. Within this larger ice age, the Quaternary glaciation, starting 2.58 million years ago, has seen repeated cycles of cold glacial periods and warmer interglacials.

The most recent and profoundly impactful of these climatic shifts for North America was the Last Glacial Period. From about 26,000 to 13,300 years ago, colossal ice sheets, some 3 to 4 kilometers thick, extended as far south as the 45th parallel north. Imagine a wall of ice eight times the height of the Empire State Building, slowly grinding across the land. This massive ice sheet, known as the Laurentide Ice Sheet, fundamentally reshaped the continent.

The evidence of this glacial rampage is still plainly visible. The Great Lakes, for instance, are gargantuan basins carved out and deepened by the sheer force of these ice sheets. Minnesota and Wisconsin alone contain thousands of lakes gouged out by glaciers and subsequently filled with meltwaters. Beyond the iconic lakes, glaciers left behind a suite of distinctive landforms: elongated hills called drumlins, winding ridges of sediment known as eskers, and vast deposits of till and moraines. They decapitated mountains, redirected rivers, and flattened expansive plains. The mighty Mississippi River itself was diverted from its ancient course in central Illinois by an ice dam, creating a massive glacial lake that eventually overflowed and cut the river's current channel 80 miles to the west.

The impact of the ice ages extended far beyond the immediate reach of the glaciers. Periglacial processes, involving repeated freezing and thawing, affected landscapes as far south as Texas and Arkansas, even in areas not directly covered by ice. These cold temperatures weathered bedrock, making it more porous and turning solid rock into sediment, a process that continues to influence modern landscapes and subsurface water pathways.

As the glaciers advanced, they dramatically altered plant and animal life. Huge swathes of vegetation in the Northern Hemisphere disappeared beneath the ice,

forcing species to adapt to rapidly changing climatic conditions or face extinction. The fossil record tells tales of woolly mammoths, American mastodons, and saber-toothed cats roaming these colder landscapes.

The climate wasn't a static force during these glacial periods either; it fluctuated, in part due to changes in atmospheric carbon dioxide. When glaciers expanded, vast amounts of water were locked up as ice on land, leading to a dramatic drop in global sea levels—as much as 120 meters during the Last Glacial Maximum. This exposed large areas of land, most famously the Beringia land bridge, which connected Asia and North America.

The retreat of the glaciers at the end of the Last Glacial Period, around 11,700 years ago, ushered in the current warm interglacial period known as the Holocene. This transition was not a smooth, linear warming. The Younger Dryas, a relatively abrupt return to colder conditions between 12,800 and 11,700 years ago, serves as a powerful reminder of the climate's inherent variability and potential for rapid shifts.

The climate of the Holocene, while generally warmer, has still experienced smaller oscillations, such as the Medieval Climate Anomaly and the cooler Little Ice Age, both of which profoundly influenced North American environments and the human societies within them. These natural climate variations, driven by factors like changes in Earth's orbit, solar energy output, ocean currents, and even volcanic activity, have consistently molded the distribution of biomes across the continent.

The interaction of these deep-time geological and climatic forces created the distinct ecological regions of North America. The immense weight of the ice sheets deformed Earth's crust, and as they melted, the land slowly rebounded, a process known as isostatic rebound, which continues today in some areas. This interplay of uplift, subsidence, erosion, and deposition sculpted the varied topography—from the rugged mountains of the west to the vast, glaciated plains of the Midwest and the ancient, worn-down Appalachians in the east.

These foundational geological features, combined with prevailing climate patterns, determine everything from soil composition and hydrology to temperature regimes and precipitation. These, in turn, dictate which plant and animal communities can thrive, forming the complex tapestry of North American biomes. The boreal forests of the north, the temperate deciduous forests of the east, the grasslands of the Great Plains, and the deserts of the southwest are all direct descendants of this deep-time climate and geological history. They are landscapes that have been repeatedly remade and reimagined over millennia, long before any human laid eyes upon them. Their intricate structure, their inherent resilience, and their vulnerabilities are all products of this ancient and ongoing story.

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