A FOREST JOURNEY

THE STORY OF WOOD AND CIVILIZATION

JOHN PERLIN

ALSO BY JOHN PERLIN

A Golden Thread: Twenty-Five Hundred Years of Solar Architecture and Technology (with Ken Butt

From Space to Earth: The Story of Solar Electricity

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I would like everyone to know that this book has been printed on Forest Stewardship Counci certified paper.

I dedicate the second edition to the memory of the late John Baldwin, whose yeoman work for

better world will always remain.

ACKNOWLEDGMENTS TO THE PREVIOUS EDITION

Almost a decade ago, I co-authored a book, *A Golden Thread*, that covered the use of solar energ throughout history. In the course of this research I found that reliance on the sun for house and wat heating occurred when people began to run short of wood. I soon discovered that wood was th principal fuel and building material of almost every society from the Bronze Age through th nineteenth century. Therefore, its abundance or scarcity must have shaped, in large part, I surmise the culture, demographics, economy, internal and external politics, and technology of societies th existed during this time span. Having also discovered there existed no systematic or comprehensiv study of the role forests have played in times past, I decided to write *A Forest Journey*.

To thoroughly cover a story that spans a period of five thousand years and five continents require the help of many people. I would like to thank the following individuals, who generously provided m with assistance in seeing the project through.

I thank Lieselotte Werner Fajardo for her translations of French, German, and Portuguese materia without which my book could never have been written. Lieselotte spent countless hours renderin these documents into a very readable English. No matter the workload, which at times was very heav Lieselotte always made time.

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I would also like to extend my appreciation to Lester Brown, President of World watch Institute, fo

writing the foreword.

Portions of this book have appeared in *Coevolution Quarterly* (now *Whole Earth Review*) and special issue of *Greek, Roman and Byzantine Studies*. For the reader wishing to examine my evidence or to do further research, I have provided an extensive list of notes at the end of the book.

John Perlin
August 1988

AUTHOR'S FOREWORD

LAST OCTOBER, out of the blue, I received the news that The Countryman Press, a division of W. W Norton, wanted to do a new edition of my book A *Forest Journey: The Story of Wood and Civilizatio* I felt greatly honored that such a distinguished publishing house, with so many marvelous new boo to choose from, would want to do a new edition of a book written 16 years ago. I also felt a little sa too, that my book has more relevance than ever. Since the publication of *A Forest Journey*, almost o million square miles of forest land, an equivalent to nearly one-third of the area of the United State has been deforested. (M. Dudley & S. Stolton/The World Bank/WWF Alliance for Fore Conservation and Sustainable Use [August, 2003], *Running Pure*, p. 19.)

As Lester Brown explained in his foreword to the previous edition, *A Forest Journey* takes woo "the principal building material and fuel of past societies … [and shows how it] served past societi and demonstrat[es] its influence on their behavior." Two-fifths of *A Forest Journey* looks at the wel documented succession of ancient and medieval Near Eastern and Mediterranean civilizations. quarter of the book is devoted to England and nearly a third to the United States, with brief excursio to Brazil and the West Indies. Each story is linked to the previous one, resulting in a satisfyin narrative with a beginning, middle, and end.

Though the book moves westward as the story develops, this in no way implies that humanity's us of trees and their demise throughout time have been confined solely to Western societies. Scientis studying pollen records, for example, have discovered that today's treeless Easter Island once ha forests. Its decline, the researchers concluded, was probably due to deforestation by humans and cou have caused the cultural collapse that occurred before Europeans set foot on the island (M. R. Flenl & Sarah M. King [January 5, 1984], "Late Quaternary Pollen Records from Easter Island," *Natur* Vol. 207, p. 47).

Hiram Bingham, the discoverer of Machu Picchu, surmised that the absence of trees in th temperate valleys of the Peruvian Highlands was not due to the altitude, as he had observed primev forests growing at much higher altitudes in more inaccessible areas. He therefore concluded that th lack of trees was undoubtedly due, as in China, to the very long period of human occupation an necessity for fuel (Hiram Bingham [1963], *Lost City of the Incas: The Story of Machu Picchu and I Builders*, p. 6). Pre-colonial Africa abounded in great cities that definitely taxed surrounding forest for agriculture to feed their citizens, for cooking, and for specialized crafts such as ceramics an metallurgy, which urbanites require. The Bassar region in central Togo, for instance, had about 40,00 people. Domestic necessities alone required annually about 32 million tons of charcoal, whic translates into 320 million tons of wood. Iron production in the vicinity consumed another 48,00 tons. As a consequence, late nineteenth- and early twentieth-century photographs of the area reve surroundings barren of almost all vegetation. No wonder that, by the end of the 1800s, those in th charcoal business had to travel three days to find wood suitable for their trade! No wonder areas clo to Bassar have names such as Lama (those of the forest); Lan (forests); Landa (in the forest); an Lawnoh (edge of the forest), but there is not a tree in sight! (Candice Lee Goucher [1984], *The Iro*

Industry of Bassar, Togo, Chapter Three, "The Changing Ecology of the Bassar Region." Ph.D. Thesi
University of California, Los Angeles.)

Despite all the damage humans have done to the woods, we also have a great affinity for them. O association with trees goes back to our primordial roots. The forest nourished our ancestors, givi them everything they needed to survive. They used wood sticks to make their fires. From timber th constructed their villages, their means of travel—canoes, boats, and carts—and fed their livesto with oak mast. "The many benefits received by [our ancient ancestors]," writes the eminent Victoria scholar Sir James Frazier, "naturally led them to worship" trees. The ancients venerated trees wi such a vengeance that an old Germanic penalty for arbitrarily peeling the bark from a tree, accordi to Frazier, stipulated that "the culprit's navel was to be cut out and nailed to the part of the tree whic he had peeled, and driven around and around the tree till all his guts were wound about its trunk" (Frazier [1926], *The Golden Bough*, Vol. II, p. 9).

While I'm not advocating such extreme punishment for those destroying our forests, I do belie we should stop our war against them because they do so many good things for the world. Retaining o forests can help keep global warming at bay, protect the integrity of many of our streams and river and continue to provide food and shelter for a majority of the world's land animals. It is my hope th A *Forest Journey* will make clear the imperative humanity faces, because losing our forests would n merely be the end of nature, it could mean the end of us.

John Perlin
Santa Barbara, California
June 2005

FOREWORD

THE destruction of the world's forests is one of the major concerns of our age. Each year the world los some 37 million acres of forests. According to United Nations' estimates, almost 40 percent Central America's forests were destroyed between 1950 and 1980. During the same period, Africa lo 23 percent of its forests and the Himalayan watershed 40 percent.

The problems associated with deforestation include depletion of firewood supplies (still the prima source of energy for 2 billion people, or three-quarters of the population of the developing worl severe flooding, accelerated loss of soil, encroaching deserts, and declining soil productivity. In mar parts of the developing world these problems have assumed disastrous proportions. Fuelwoo shortages plague fifty-seven developing countries, adversely affecting more than a billion peopl Torrents from monsoons pouring down deforested Himalayan slopes kill thousands in India an Bangladesh every year. Denuded Nepal's biggest export is its soil, which falls into rivers at a alarming rate and ends up in the Indian Ocean. Many scientists suspect that the spread of the Saha Desert and the resulting famine in countries of western Africa have been brought about, at lea partially, by deforestation. A further consequence of rapid deforestation can be seen in Haiti, where continual decrease in the amount of arable land has resulted in smaller harvests even as the populatio grows—no doubt a prescription for disaster.

The worst has yet to come. If the current rate of deforestation continues unabated, much of th world's remaining tropical forests will disappear by the year 2000, and with them, many of the earth plants and animals. The loss of these forests will create an energy crisis for 2 billion human beings who will lack sufficient quantities of wood with which to cook their meals and heat their dwellings. their desperate search for fuel, they will destroy more distant forests, thereby accelerating erosio climatological changes, and desertification, and possibly bringing about widespread famine.

People living in the developed world face an equally catastrophic future if worldwide deforestatio continues. New research suggests that the loss of forests exacerbates the greenhouse effect, which caused by carbon dioxide, emitted by burning fossil fuels, building up in the atmosphere and retainin solar heat that would otherwise escape, resulting in global warming. Leaves of trees, on the oth hand, absorb carbon dioxide, removing it from the atmosphere. Adapting to such global climat changes will prove costly, especially for the mid-latitude regions of the Northern Hemisphere, whe it is predicted that drying trends will severely cut crop yields. Furthermore, the cure for dreade diseases such as AIDS and cancer may reside in some plant as yet undiscovered that grows in the ra forest—if destroyed, humankind will be forever denied such help.

The future state of the world's forests, especially our tropical forests, seems so bleak that on commentator rues, "There appears to be no way civilization and rain forest can share space; th former devastates the latter." *A Forest Journey* shows us that we can delete the word "rain" and th statement rings true whenever and wherever civilizations have risen and flourished.

Sadly, the present assault on our forests, as John Perlin chronicles so ably, is part of the same cyc begun thousands of years ago. Every Old World starts out as virgin land attractive to huma

settlement. Subsequent exploitation by humans wears out the land, forcing them to move on to the next "New World." This quest for new frontiers, which many have thought peculiar to the America experience, is but a repetition of an age-old process that has occurred again and again in the course time, beginning in Mesopotamia more than five thousand years ago and continuing today. But *Forest Journey* does not merely prophesy disaster. It also presents hope: that we can learn from pa mistakes and break out of the cycle of deforestation and land degradation that undermined earli civilizations.

A Forest Journey is more than just a chronicle of devastation. It describes the movement of Weste civilization in a most unique and fascinating manner. The book takes one resource, wood, the princip building material and fuel of past societies, as its starting point, showing how wood served pa societies and demonstrating its influence on their behavior.

Mr. Perlin shows, for example, that the urgent need to find new sources of wood has been a important cause—insufficiently noted—of large population movements throughout history. England attraction to North America during the seventeenth and eighteenth centuries was in great part due the paucity of its own timber supply and an awareness of the great store of trees in the New Worl Similarly motivated colonization movements had already occurred in more ancient times. One of th chief reasons the Romans colonized Gaul and Spain was to take advantage of the abundant forests th they could use to fuel mining operations and industries.

Scarcities of wood also have triggered major technological changes and advances. Insufficie quantities of fuel forced Late Bronze Age metallurgists on the island of Cyprus to develop man ingenious methods of conserving energy: for instance, they recycled scrap bronze to reduce the consumption of wood. Eventually, acute shortages of wood impelled these metalworkers to manuall remove iron from copper slag, resulting in an important human step, our entry into the Iron Ag Wood shortages in ancient Greece and Rome taught architects to exploit solar energy. Thousands o years later, the scarcity of timber forced the English to enter the fossil fuel era, substituting coal fo wood as the principal fuel.

Wood scarcities have forced governments to take an active role in the allocation and protection o this precious resource. Hammurabi, the great codifier of laws in Babylon, saw to it that governme officials regulated the felling of timber and the distribution of its end products so as to put a stop the profligate use of wood by his subjects. Authorities on woodless Delos in Hellenistic time monitored the sale of imported firewood and charcoal, believing that the distribution of such valuab sources of energy should not be controlled by a few powerful fuel merchants, who otherwise wou have had consumers at their mercy. To ensure the availability of sufficient quantities of firewood fo those living in Rome, the government commissioned an entire fleet of ships for the sole purpose gathering wood from the dense forests of France, Spain, and North Africa. The Venetian Senate of th fifteenth and sixteenth centuries passed a number of laws aimed at protecting its dwindling forests, did the English Parliament of the sixteenth and seventeenth centuries.

Before 1900 B.C. Crete was merely another island in the Aegean, until its rich forests attracte traders from the deforested area of Mesopotamia. The commerce in wood between Crete and the Ne East injected such wealth into the economy that Crete was transformed swiftly into one of the region most powerful states. Likewise, Macedonia, an insignificant backwater country on the fringes of th Greek world, became the immensely rich and influential power of the Mediterranean after the Greek had exhausted their own supplies of wood and had come to depend on Macedonia's forests for fuel an building material. The Macedonians soon translated their wealth into political and military powe resulting in the conquest of nearly the entire known world by their king, Alexander the Grea

Millennia later America's untouched forests laid the foundation for its allure as the land o opportunity.

Conversely, lack of wood has brought about the economic and social decline of civilizations whe alternative wood sources could not be found. Once the Classical Greek states lost their hold o accessible supplies of timber, they became subservient to wood-rich Macedonia. England, by contras forestalled decline by developing its coal resources.

The causes and objectives of many wars and revolutions become clearer when we take the presen or absence of wood supplies into account. The Athenian Empire and the Peloponnesian League foug for possession of northern Greece and Sicily's forests. Conflict over rights to timber between th American colonists and Great Britain helped lead to revolution. England reserved America's be stands of trees for its navy while the Americans wanted the freedom to cut down whatever woods the wished. Without its wood resources, America's bid for independence would surely have failed. All o America's ships were built locally and there was an abundance of charcoal to produce iron fo weaponry.

Ecologically concerned voices are loudest and most heeded when important resources such as woo appear to be on the verge of depletion. Plato vividly warned the Athenians in the *Critias* of th consequences of deforestation. Cato taught the Romans the best ways to husband their scarce woo supplies. Many years later, John Evelyn campaigned to save the few remaining forests in Stua England, writing his famous conservation tract, *Sylva.* The destruction of America's great easter forests served as the stimulus for the development of American ecological concern.

Deforestation throughout history has left soil at the mercy of the erosive forces of nature. Former productive lands turned into sterile, drought-plagued regions. Famine ensued, bringing down powerf and prosperous societies. Stripped of its forest cover, the magnificent civilization of Knosso declined. Such a change in vegetation and soil conditions assured that this region would never aga support the population or enjoy times as prosperous as it had in its "Golden Age" when Cretan pow held sway over much of the eastern Mediterranean. The loss of soil on deforested hillsides also caus a sharp decline in agricultural production in the great Mycenaean Kingdoms of Bronze Age Greec resulting in reduced crop yields, impoverishment, and depopulation of the area. Rome, too, came depend on others for food when its farmlands were cleared of the tree cover that had nourished the so for ages.

Throughout *A Forest Journey* we see a similar process repeated time and time again. Blessed b easy access to forests and rich soil, a society develops materially and people grow confident th nature will always provide for their needs. Prosperity and population invariably increase for a tim The faster an area develops demographically and economically, the greater are its demands on th remaining forest and agricultural lands. To ensure the continued flow of adequate amounts of woo and food, societies rely on colonization, diplomacy, and military ventures. Ultimately, however, th attempt to maintain high economic and population growth over time, in the face of dwindlin resources, results in decline. Substitute wood for oil in today's world and the parallel becom sobering.

These are just glimpses of what's in store for the reader of *A Forest Journey.* Each page is reple with valuable information on the important role that wood played through the ages—its influence o the development and decline of societies through judicious use or depletion of this valuable resourc The book is a treasure trove of knowledge. In my opinion, *A Forest Journey* is destined to become classic and stand alongside such important works as George P. Marsh's *Man and Nature* and Ken Bu and John Perlin's *A Golden Thread.* What's more, *A Forest Journey* makes great reading.

Lester R. Brov
President, Worldwatch Institu

The wretched and the poor look for water and find none,
Their tongues are parched with thirst;
But I the Lord will give them an answer,
I, the God of Israel, will not forsake them.
I will open rivers among the sand-dunes
And wells in the valleys;
I will turn the desert into pools.
And the dry land into springs of water;
I will plant cedars in the wastes,
And acacia and myrtle on the barren heath
Side by side with fir and box …

Isaiah 41:17–2

A FOREST JOURNEY

INTRODUCTION

Civilizations and Forests

ANCIENT writers observed that forests always recede as civilizations develop and grow. The gre Roman poet Ovid wrote, for instance, that during the “Golden Age,” before civilization began, “eve the pine tree stood on its own hills"; but when the Iron Age succeeded it, “the mountain oak, the pi were felled.” This occurred for a simple reason: trees have been the principal fuel and buildi material of almost every society for over five thousand years, from the Bronze Age until the middle the nineteenth century. To this day trees still fulfill these roles for the majority of people who inhab our planet. Without vast supplies of wood felled from forests, the great civilizations of Sume Assyria, Egypt, China, Knossos, Mycenae, Classical Greece and Rome, Western Europe, and Nor America would never have emerged. Wood, in fact, is the unsung hero of the technological revolutio that has brought us from a stone and bone culture to our present age.

Conversely, when a society declines, forests tend to regenerate. The prophet Isaiah saw this occ after the death of an ambitious Assyrian king. “The cypress, the cedars of Lebanon rejoice,” he wrot “they say, now that you have been laid low, no one comes up to fell us.”

Wood as Society’s Principal Fuel and Building Material

It may seem bold to assert wood’s crucial place in the evolution of civilization. But conside throughout the ages trees have provided the material to make fire, the heat of which has allowed o species to reshape the earth for its use. With heat from wood fires, relatively cold climates becam habitable; inedible grains were changed into a major source of food; clay could be converted in pottery, serving as useful containers to store goods; people could extract metal from ston revolutionizing the implements used in agriculture, crafts, and warfare; and builders could mal durable construction materials such as brick, cement, lime, plaster, and tile for housing and storag facilities. Charcoal and wood also provided the heat necessary to evaporate brine from seawater make salt; to melt potash and sand into glass; to bake grains into bread; and to boil mixtures in useful products such as dyes and soap.

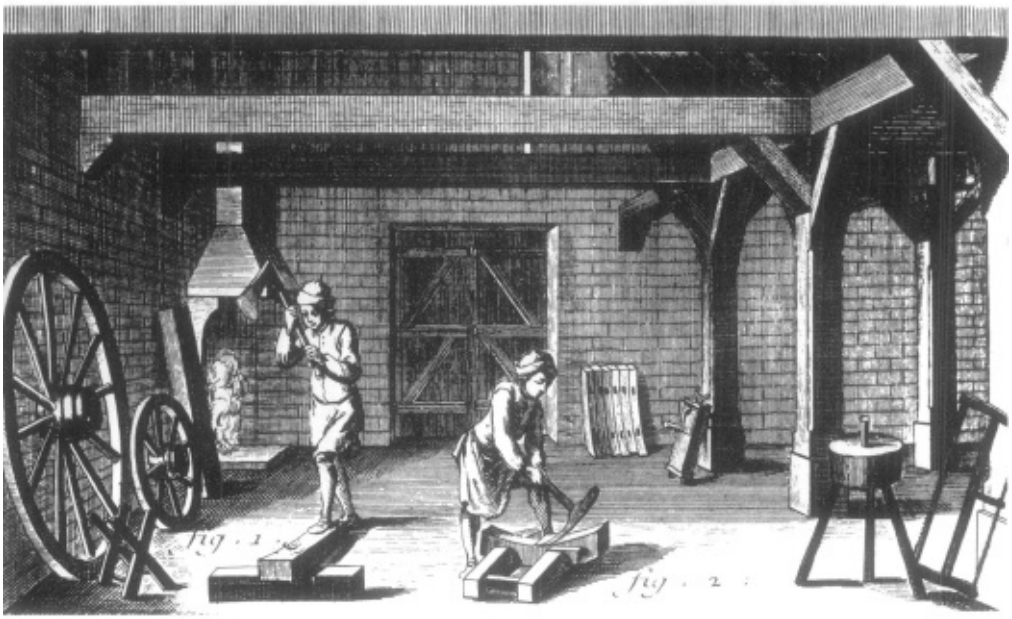
A fifteenth-century woodcut depicts three people carrying pieces of wood home from the forest with which to cook and heat their houses.

A fifteenth-century woodcut shows a metallurgist smelting metal over a wood fire. (History & Special Collections Division, Louise D Darling Biomedical Library, University of California, Los Angeles)

Transportation would have been unthinkable without wood. Until the nineteenth century every shi from the Bronze Age coaster to the frigate, was built with timber. (Alternative materials fo shipbuilding such as bladders and reeds proved too fragile to bear the weight of much cargo.) Eve cart, chariot, and wagon was also made primarily of wood. Early steamboats and railroad locomotiv in the United States used wood as their fuel. Wooden ships were tied up to piers and wharves mad from wood; carts, chariots, and wagons made of wood crossed wooden bridges; and railroad ties,

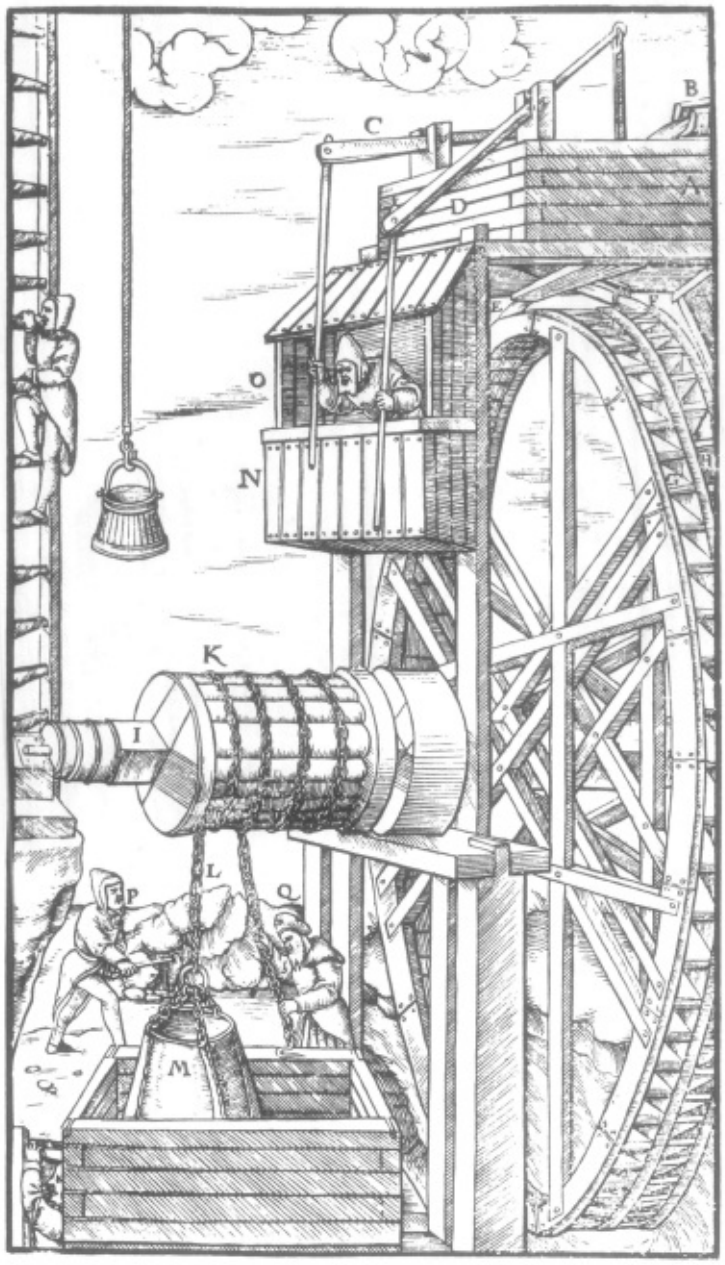
course, were wooden.

Wood was also used for the beams that propped up mine shafts and formed supports for every typ of building. Water wheels and windmills—the major means of mechanical power before electricit was harnessed—were built of wood. The peasant could not farm without wooden tool handles or woo plows; the soldier could not throw his spear or shoot his arrows without their wooden shafts, or ho his gun without its wooden stock. What would the archer have done lacking wood for his bow; th brewer and vintner, without wood for their barrels and casks; or the woolen industry, without wood fo its looms?



Land carriage required wheels. They were made in the wheelwrights' shop where workers, as in this illustration, prepare the rim from pieces of wood. (University of California, Santa Barbara, Library Special Collections)

Wood was the foundation upon which early societies were built.



A wooden water-wheel helps these workmen to remove water from a mine. (Burndy Library)

Wood Appreciated

Those living in past civilizations recognized their debt to wood. Plato, according to Diogenes Laertiu wrote that all arts and crafts are derived from mining and forestry. Lucretius, a famous Roma philosopher, believed that wood made mining, and civilization, possible. Great fires, he wrot "devoured the high forests … and thoroughly heated the earth," smelting metal from rocks embedde in it. When people saw these metals lying on top of the ground, "the thought then came to them Lucretius continued, "that these pieces could be made liquid by heat and cast into the form and shap of anything, and then by hammering, could be drawn into the form of blades as sharp and thin as on pleased, so they might equip themselves with tools …" Tools, in turn, Lucretius remarked, mad forestry and carpentry possible, enabling humans "to cut forests, hew timber, smooth, and eve fashion it with auger, chisel and gouge." In this fashion, according to Lucretius, civilization emerged

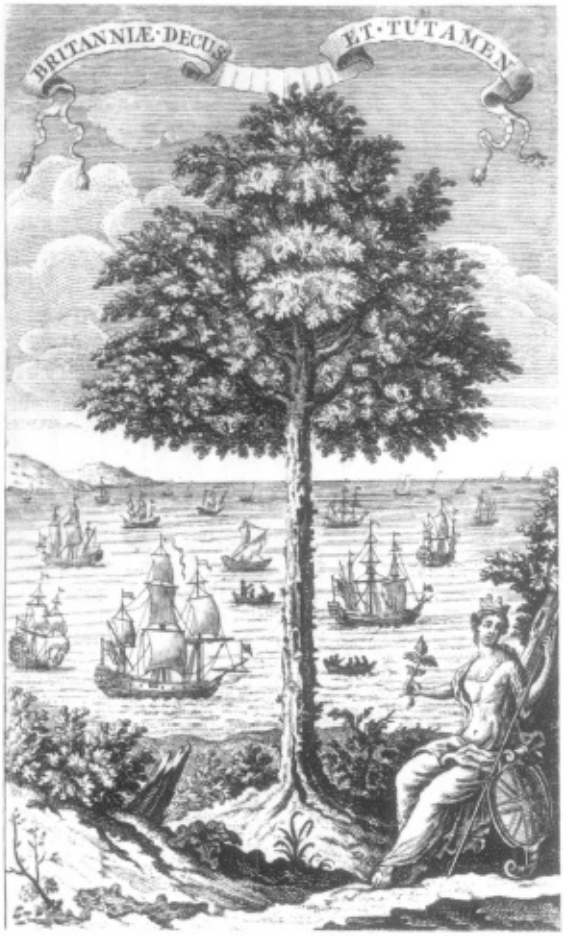
Pliny, the great Roman natural historian, concurred with Lucretius that wood was "indispensable f carrying on life." The famous statesman Cicero explained the importance of wood to Roma civilization: "We cut up trees to cook our food … for building … to keep out the heat and cold . [and] also to build ships, which sail in all directions to bring us all the needs of life."

Those living in later times also stated the importance of wood for their societies. Ibn Khaldu writing in the fourteenth century A.D., discussed the crucial role wood played in the world of Islar "God made all created things useful for man," he wrote in *The Muqaddimah*, his major work, "so as supply his necessities and needs. Trees belong among these things. They have innumerable uses everybody. Wood gives humanity its fuel to make fires," which, according to Ibn Khaldun, it "needs survive. Bedouins use wood for tent poles and pegs, for camel litters for their women, and for th lances, bows, and arrows they use for weapons," while "sedentary people use wood for the roofs their houses, for the locks for their doors, and chairs to sit on." Working in wood was so crucial for th medieval Moslem world that, Ibn Khaldun concluded, the carpenter "is necessary to civilization."

The Venetians acknowledged their debt to wood for the development of their nation. As a stat whose wealth was based on sea power, Venice regarded its forests as "the very sinews of the republic

The English of the sixteenth and seventeenth centuries also recognized the crucial role of wood their lives. Gabriel Plattes, writing in 1639, observed that all "tools and instruments … [are] made wood and iron." But upon weighing the relative importance of the two materials, he chose wood ov iron because without wood fuel "no iron can be provided." Likewise, the English realized their debt wood with respect to trade and navigation. It was so apparent that a naval official, John Hollan wrote, "of timber … I need not tell my reader the necessity and usefulness of this material." Howeve risking redundancy, the naval official, citing the significance of timber, then wrote, "as the Navy hat no being without ships, so no ships without timber."

In one of the seminal works on pioneer society in the Ohio valley, *Statistics of the West* (1836 James Hall showed how settlers in the nineteenth century relied almost entirely on wood for all the needs.



The artist of this eighteenth-century illustration has placed a tree in the center to emphasize its crucial role in the well-being of British society. Over the tree a Latin inscription reads "Britain's Glory and Protection." This statement rang true since from timbe ships like those depicted in the background were built the battleships and oceangoing vessels which served as the means for England's supremacy as a military and trading power. Britannia (right foreground), who symbolized Great Britain, holds a seedlin the key to England's future. (William Andrews Clark Memorial Library, University of California, Los Angeles)

Not only did the American pioneers rely on wood in traditional ways, such as in building houses ar bridges and for fuel and fencing, they also substituted wooden pins for iron nails, curbed wells wi hollow logs, had their doors "swinging on wooden hinges" and "fastened with a wooden latch," ar used wood to build their chimneys. Because Americans so frequently substituted wood for "stone, iro and even leather," America, Hall remarked, could indeed be called "a wooden country."

Language also shows the importance wood played in the lives of our ancestors. The Sumerians, wh established the first urban society over four thousand years ago in the Fertile Crescent, used th cuneiform sign "giš," the determinator for kinds of woods and objects made of wood, in words th signified "plan [of a building]," "model," and "archetype." "Architecton," which in Classical Gree came to mean "chief builder" and from which we derive the word *architect*, literally means "leadi wood worker." Wood was such a ubiquitous item in antiquity that it entered everyday speech. Th phrase "carrying a load of timber to the forest" was the Roman way of expressing redundant action. was the equivalent to an English idiom still in use today—"carrying coals to Newcastle"—whic developed when coal replaced wood as the principal fuel for England. The word *wood* for the Gree and the Romans—*hulae* and *materia*—was synonymous with "primary matter." This suggests th people living in Classical times regarded wood as the basic material from which they made almo everything. *Legno,* which means "wood" in Italian, could also mean "ship" in the days when timb

was used for shipbuilding since “wood” and “ship” then were synonymous. Woods were so common
ancient Ireland that the old names of the letters in the Irish alphabet were tree names: *ailm,* meanin
“elm"; *beith*, “birch"; *coll*, “hazel"; *dair*, “oak"; and so on.

John Evelyn, a leading citizen of seventeenth-century England, summed up the significance of woo
to past societies with the observation that “all arts and artisans (i.e., the material culture) must fail an
cease if there were no timber and wood …” Evelyn did not exaggerate when he stated that the Englan
of his day would be better off “without gold than without timber.”

Wood, indeed, was our ancestors’ chief resource.