

Planning for Street Trees and Human–Nature Relations: Lessons from 600 Years of Street Tree Planting in Paris

Lucie Laurian¹

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Abstract

Planting rectilinear regularly spaced and low-diversity rows of trees along sidewalks is the dominant streetscaping practice in Western cities. Street trees provide shade, pleasant pedestrian environments, and ecological benefits. I interrogate the origin of this surprisingly stable practice by exploring the last 600 years of street tree planting in Paris. Paris' iconic tree-lined boulevards have influenced streetscapes worldwide. This model of royal and imperial origins stems from, and reproduces, a complex mode of human–nature relations involving biophilia, the use of orderly nature as a symbolic commodity and, more recently, ecological stewardship.

Keywords

street trees, Paris, history, urban forestry, arboriculture, human–nature relations, ecology

This article traces the history of street tree planting in Paris since its very beginning in the mid-1300s. The purpose of this inquiry is to explore how the planting of street trees has intentionally brought nature onto sidewalks and transformed the urban streetscape in Paris, a model replicated throughout the West. This investigation also illuminates the evolution of city–nature relationships over time. Street trees—as opposed to trees in parks, gardens, and woodlands—are understudied in planning history. Yet they are essential components of experienced cityscapes and urban green infrastructure.¹ While parks are planned as separate and distinct escapes from the urban life, street trees bring nature to urban populations at a very fine geographic scale where people live, work, and trade and thus embed nature in daily life experience. Most urban trees can live 80–100 years, putting them at the intersection of century-scale cultural shifts and faster-changing trends in city–nature relations.

Street trees are nature on the sidewalk. They provide numerous social, economic, and ecological benefits that impact human well-being and public health, water and air quality, and promote a sense of place and time. These benefits include mitigating the urban heat island effect,² flooding,³ and air

¹ School of Urban and Regional Planning, The University of Iowa, Iowa City, IA, USA

Corresponding Author:

Lucie Laurian, School of Urban and Regional Planning, The University of Iowa, 345 Jessup Hall, Iowa City, IA 52240, USA.
Email: lucie-laurian@uiowa.edu

pollution;⁴ wind-breaking, shading, and cooling;⁵ climate change mitigation via carbon sequestration and storage;⁶ public health;⁷ and economic, symbolic, and aesthetic values.⁸ These benefits operate at many scales, for cities, neighborhoods, streetscapes, blocks, and homes.

Street tree planning falls under the disciplinary purview of urban forestry and arboriculture. As fields, neither urban forestry nor arboriculture focuses on comprehensive urban planning, and they occupy only a minor place in planning thought and urban policies. Yet, in practice, they are important subfields of urban design, healthy cities, and sustainability planning. The presence of trees on streets is also built into many planning ideals, from the Garden City to the modernist “towers in the park” and more recently to the regenerative city models. In addition, investigating urban forestry and arboriculture practices can shed light on the treatment, exploitation, protection, resilience, and benefits of urban nature over time; on the underlying rationale for urban green infrastructure programs; and on the current state of affairs, while also potentially challenging the status quo in human–nature relationships.

I focus on trees in Paris’ streetscapes because of its influential status. A highly constrained urban environment of Roman and Medieval origins with strong Renaissance and Baroque influences, Paris provided the model for urban development in other European and American cities (London, Vienna, Berlin, Washington, DC), especially with regard to architecture, urban layout, infrastructure, and streetscaping. Paris also benefits from over 700 years of archival records of royal and municipal urban forestry decrees and practices, which allow for a longitudinal examination of the human–nature relations in this dense urban metropolis.

In addition to parks and gardens, Paris implemented large-scale tree planting programs—“alignment” trees—starting in the fourteenth century, that is, long before Haussmann’s well-known nineteenth-century infrastructure works. I explore how evolving rationales and management principles underlie and trigger changes in the natural features of urban streetscapes and identify continuities, discontinuities, paradigm shifts, and path dependencies in the treatment of street-level nature.

This article builds on and adds to Lawrence,⁹ who identified a relatively stable role of trees as intentional symbols of nature and living things in urban systems, and Radkau’s work on the complex relations between nature, leisure, relaxation, and power.¹⁰ I adopt a broader analytical perspective, structuring the analysis around a four-pronged theoretical understanding of human–nature relations encompassing human–nature coevolution, biophilia, nature commodification, and environmental stewardship. The analysis of the changing practices and rationales for tree planting is both chronological and thematic. It is based on a historical review of Paris’ tree planting practices and policies and builds on archival sources from the Paris Historical Library and the Archives of the Paris Police, secondary historical sources, and primary research on current-day practices.

This article first presents a framework for interpreting the place of street trees in the urban landscape based on theoretical models of relationships between humans and nature. Next, I present the historical context of the development of Paris’ urban forestry policies and practices over seven centuries. I then discuss the connections between these practices and prevailing views of cities, nature, urban form, aesthetics, and sanitation priorities over the centuries and identify the human–nature frameworks at play.

Theoretical Framework and Methodology

From a detailed review of when, where, and why street trees were planted in Paris over the centuries, I will identify the evolution of the relationship between humans and nature in a highly modified and urbanized landscape. The review is structured around four ways of theorizing human–nature relations: in terms of commodification, biophilia, coevolution, and stewardship.¹¹

First, human–nature interactions can be analyzed in terms of the commodification of nature by humans. Socioeconomic interpretations of human–nature relationships tend to focus on the conflicts between the market forces under industrialization and capitalism, the exploitation of nature based on its exchange value, and the need to protect ecological resources and processes (e.g., the Tragedy of the Commons¹²). The quantification and trading of ecosystem services (e.g., watershed services) is the most recent and complex form of nature commodification.

In this perspective, urban street trees are commodified nature, that is, exploited and controlled nature. Trees are planted to support human well-being and pleasure (firewood, shade, beautification, or ecosystem services) rather than for their own sake, which would be conceived as their ability to live, thrive, and reproduce as living beings. The fact that street trees cannot reproduce (saplings are eliminated) does not necessarily mean that they are commodified. Once planted, they could be cared for and valued for their own good and health.

Second, human–nature relations can be understood in terms of biophilia or love of nature. Evolutionary psychology focuses on psychological adaptation to social and ecological changes over the course of humanity's history and explores how the human mind and mental capacities emerge from our evolution as a species.¹³ Biophilia binds us to other species and may be at the very core of the essence of humanity.¹⁴ Innate, cross-cultural (although culturally differentiated) love of nature appears in human appreciation for landscapes and spectacular animal species, from whole ecosystems to colorful flowers, from birds and butterflies to house pets. An unmet human need for contact with nature has recently been identified as “nature deficit disorder.”¹⁵

The biophilia hypothesis generates various ways to describe changes in human–nature connections. For instance, Extinction of Experience focuses on humans' decreasing experience of nature, especially in cities.¹⁶ Deep Ecology argues for the consideration of the inherent worth of nonhuman living beings.¹⁷ Connectedness to Nature explores the extent to which people feel connected to nature,¹⁸ and Inclusion of Nature in Self explores the extent to which we include nature in our self-images.¹⁹

Most relevant here, the biophilia hypothesis proposes that humans are inherently attached to nature and intuitively prefer natural environments.²⁰ Contact with nature improves cognitive functions and health,²¹ and humans have strong preferences for large trees and savanna-type landscapes, that is, large widely spaced trees that support visibility, as opposed to thick forests or bushes. In this perspective, urban decision makers plant trees along streets out of an inherently human taste for nature and have inherent preferences for well-spaced large trees rather than bushes or flowerbeds. In addition, appreciation for nature and love of nature is intrinsically linked to our aesthetic experiences or what we find to be beautiful. The importance of aesthetics may date back thousands of years in the human psyche, but it has only recently entered the vocabulary of ecological management. The fields of landscape architecture and, more recently forestry, have begun to include aesthetics—designing beautiful landscapes and streetscapes—as a guiding principle alongside ecological integrity.²²

Third, the notion of coevolution builds on Darwin's Theory of Evolution and evolutionary biology. Darwin wrote about “coadaptions of organic beings to each other.”²³ This theory proposes that human evolution derives from the history of humanity and our collective and multigenerational adaptation to nature's dynamics. It highlights the coevolution of humans and nature through adaptation mechanisms in biophysical, biotic, and cultural systems.²⁴ Coevolution focuses on adaption mechanisms as life forms are affected by genetic mutations, long-term environmental changes, and interactions between species.²⁵ This framework explores codependencies, symbiosis and persistent states of disequilibrium. These thermostat-type regulations vary in form from cooperation to Malthusian regulations, and vary in scale from atmospheric and planetary scales to microchemical processes.

In this framework, humans and nature (for this article, urban residents and street trees) coevolve in cities. While in a dense city like Paris, nature is largely controlled by human influences, it is

always present in the form of flora and fauna in private and public parks, under and above ground, and in trees and on roofs. Nature is also present in the Seine River and in the form of floods, harsh winters, rats, flees, and contagious diseases. Human, animal, and plant life have long adapted to highly modified environments and to urban density (e.g., rat populations, wild lilac and poppies, bee populations thriving from warmer climate). In this framework, humans and street trees are coevolving in the city. Humans select and plant trees and have come to expect trees on sidewalks, to the point that tree-less streets have become unappealing. While street tree monocultures are not resilient and can be decimated by diseases and pest (Dutch elm disease, emerald ash borer, horse-chestnut leaf miner, sycamore lace bug, sooty bark disease, etc.), some tree species do well in cities, such as ginkgoes and chestnuts.

Fourth, humans can relate to nature from an environmentalist or stewardship perspective. Environmentalism focuses on humanity's impacts on the natural environment. It critiques humans' exploitation of nature via agricultural production and engineering, and human-induced species extinction.²⁶ It calls for the protection of nature and natural processes. This implies a stewardship role for humans and a moral obligation to protect and conserve the natural environment, for example, through habitat management and ecological restoration.²⁷ In recent approaches, environmentalism focuses on the regeneration of natural systems and ecosynchronicity, that is, the (re)connection of humans and natural cycles. For instance, the One Health approach proposes that human health and the health of the animals, plants, and ecosystems around us are interconnected and interdependent.²⁸

In this framework, humans seek to regenerate natural features, support ecological functions and human health, address climate change, and mitigate the negative impacts of urban life and industrialization. For instance, the sanitation movement of the nineteenth century planted trees to act as the city's lungs and to bring fresh air to the people. In the twenty-first century, we plant trees to infiltrate rainwater, reduce urban heat island effects, and provide bird and insect habitat.

These four frameworks of human–nature relations—commodification, biophilia, coevolution, and stewardship—can help explain the underlying, implicit, and possibly changing rationales for street tree planting over time. They could be at play exclusively, alternatively, or simultaneously. The goal of this historical review is to explore how these, and potentially other rationales, might explain a highly cultural yet widely diffused and taken-for-granted practice of lining city streets with trees.

Method

As I present the history of Paris street tree planting over the centuries, I track narratives, discourses, and meanings for each era and intervention as they are revealed by primary archival sources (ordnances, works of contemporary writers, maps, engravings) and secondary sources, mainly histories of Paris.²⁹ French documents were read in the original language, and I translated selected quotes. The terms used to discuss and plan for Paris street trees have changed over time, from simply “arbres” to “arbres d'alignement” referring to those aligned along sidewalks to arboriculture in general, to specific tree essences and documented “arbres remarquables,” and to more recently urban forest and “patrimoine arboré” or tree heritage.³⁰

I seek to identify which of the four conceptual models (or combinations thereof) best explain why Paris leaders plant trees in each era of the city's historical development. Paris leaders include kings and nobility when the public sphere was controlled by royal entities, emperors (Napoléon I and III) who devolved management authority to nominated prefects and, in the contemporary era, prefects, mayors, city councils, and municipal services.

It is important to note that throughout its history, Paris has been largely under centralized control by kings, emperors, and presidents. Unlike any other city in France, the office of the Paris mayor and

the municipal council, created by the French Revolution in 1789, were eliminated for long periods from 1794 to 1848, from 1848 to 1870, and for about a century from 1871 to 1977. That is, the Revolution and Communes of 1789, 1848, and 1870 created the elected office of Mayor and municipal Council, and counterrevolutionary periods abolished Paris' political autonomy. Therefore, the urban policies and programs implemented through much of Paris history do not stem from changing local political contexts and mayorships, but instead from broader national and international-scale sociocultural changes in urban governance, priorities, and perspectives.

History: How Paris Became a Capital of Trees

Trees were absent from Greco-Roman urban public spaces. For centuries, trees remained in the private domain and still do in some world cities today. When trees were first introduced into urban public spaces, it was often as extensions of private gardens outside homes and palaces and to support public events, for example, parades, recreation, and promenade. This section reviews the history and rationales for the insertion of trees in the Parisian public domain. Readers should keep in mind that Paris developed as a dense preroman, roman, and medieval trade center. As it transitioned from a landscape of production in the industrial age to a landscape of consumption in the modern era, it has retained its residential functions, mixed use, and high density.

Early history: When Paris became capital (52BC-1300). After conquering and renaming the Celtic Gaulois village of the Parisii tribe "Lutecia" in 52 BC, the Romans expanded the city on the left bank of the Seine, with a forum, baths, theaters, arenas, roads, and an aqueduct. There is no evidence of any tree planting along roads in Roman times, and Roman planting practices generally favored locating fruit trees and bushes in villas' private gardens.³¹

The early Christian period that followed responded to a series of invasions and raids by Germanic tribes with public works projects focused on fortifications. Clovis, king of the Franks, defeated the Romans in 486, renamed the city "Paris," and made it his capital. The Vikings raided Paris repeatedly in the ninth century, shifting development toward the right bank marshes and triggering a renewed emphasis on defensive projects. The Cité Island was fortified under the leadership of Odo, Count of Paris, of the Robertian lineage. His resistance to Viking attacks paved the way for a new lineage of French kings. In 888, the French elected Odo as their King, and the Robertians' duchy (Francia) gave its name to the Kingdom of France. After 885, even though the city remained small in scale, its importance for the French leadership remained secure. Throughout this period, public projects focused on fortification, city walls, and securing bridges from river attacks. We find no evidence of trees in Parisian public spaces.

In the twelfth century, Paris was the capital of Capetian Kings (also of the Robertian lineage). Intensive trade on the Seine increased the city's wealth. Notre Dame was built, the Paris University was founded in 1215, and Philippe Auguste built new fortified city walls. Growth slowed down in the fourteenth century with the Great Plague of 1348, insurrections, and the Hundred Years' War. In 1358, Charles V made the Louvre the royal home and built new fortifications. As in previous centuries, public works projects emphasized fortifying the city, but the city could now afford a cathedral, a university, and palaces. Streets, however, were not the focus of attention and grew relatively organically with the erection of private buildings.

In the fourteenth century, Paris was about 625 acres, with about 200 city blocks, 75 streets/alleys, and 12 gates. For the first time in the Middle Ages, trees were planted in urban public spaces, such as churchyards, marketplaces, and near city walls to shade areas designated for markets, for social gatherings after mass, and for hangings. These trees were few in numbers. Paris' medieval streets were too narrow, with no building setbacks, to allow tree plantings. Sidewalks and streets were

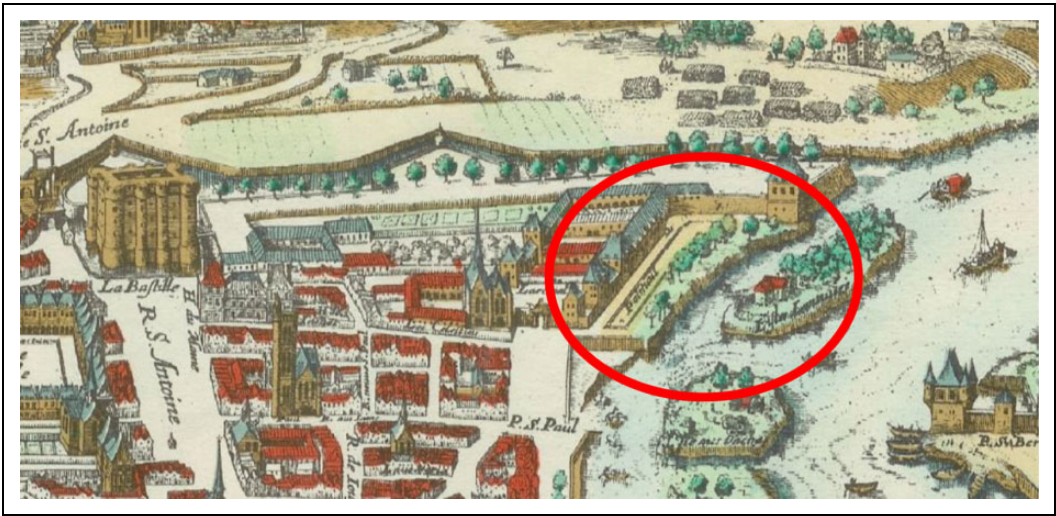


Figure 1. Quai des Ormes (Plan Merian). Plan Merian: https://commons.wikimedia.org/wiki/File:Plan_de_M%C3%A9rian.jpg.

combined, for a typical street width of about ten to fifteen feet (three to four meter). In addition, building overhangs and cantilevers (“encorbelments”) darkened the streets.³²

Trees enter Paris in the fourteenth century. The first reference to large-scale street tree planting in the city is an order by Charles V (1338–1380) to have a row of elms (“ormes”) planted near his Paris palace, the Hôtel Saint-Pol (Saint-Paul). This Hôtel Saint-Pol, located just outside the city’s eastern fortifications, remained the Royal residence under Charles VI (1368–1422). The row of elms was planted on the then called “Port des Barrés,” which became “Quai des Ormes” to take later its current name, the Quai des Célestins, due to the proximity to the Convent des Célestins (see Figure 1). The 1730 “Comte des Œuvres Royales” reports on this project.³³

There is no indication of any further tree planting in Paris between the fourteenth and the fifteenth centuries. In 1522, Henri II, King of France from 1547 to 1559 ordered, through “lettres patentes royales” the planting of elms along French roads and streets to secure timber supplies “for the needs of all and for the needs of artillery.”³⁴ Timber was lacking in the country, and this order was intended to increase supplies for heating/cooking and to support military operations (to build supports for canons and other heavy equipment). Similarly, Henri III passed an edict in 1583 ordering the planting of elms, walnuts, and other trees along roadways. This time, the goal was not timber production but rather to protect roadways from incremental encroachment and damage by rogue farmland expansion.

Within the city, tree planting became increasingly common during the second half of the sixteenth century and in the beginning of the seventeenth century.³⁵ These were the times of New World explorations, increasing trade and urban wealth accumulation, and a growing interest in leisure activities for the nobility and merchant classes. Henri IV, King of France from 1589 to 1610, had tree-lined alleys planted at his Palace of Fontainebleau, with rows of pines, elms, and fruit trees.³⁶ In Paris, Henri IV and the Duke of Sully launched the first major efforts to beautify the capital. The wealthy urbanites of the time were interested in pall-mall (palmail or palemail), an early version of croquet. Tree-lined malls (“mails”) dedicated to the sport were created.³⁷ They would become the model for the tree-lined streets that are the foundation of Paris trees’ layout. The first such tree planting projects were implemented at the city’s periphery. To the immediate North of the

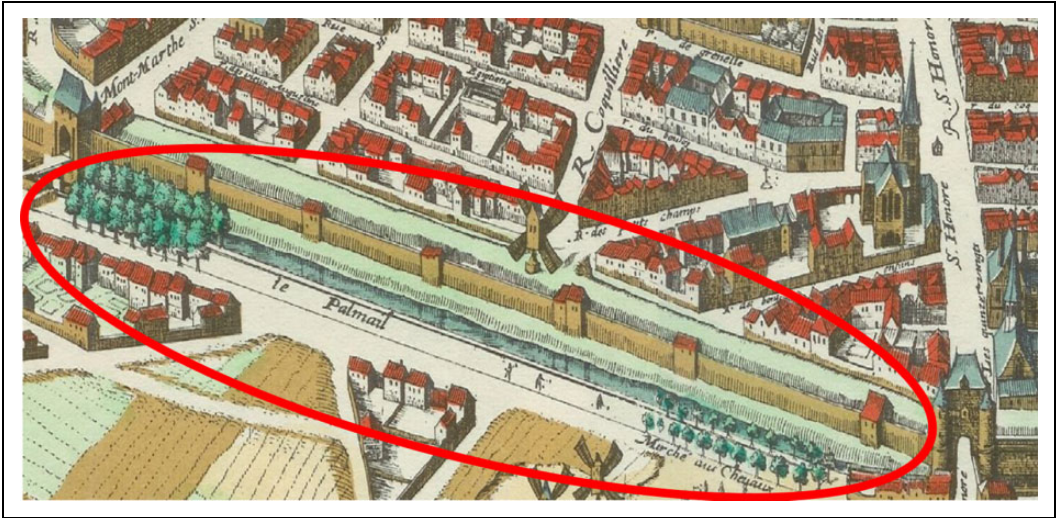


Figure 2. Mail du Louvre (Plan Merian). Plan Merian: https://commons.wikimedia.org/wiki/File:Plan_de_M%C3%A9rian.jpg.

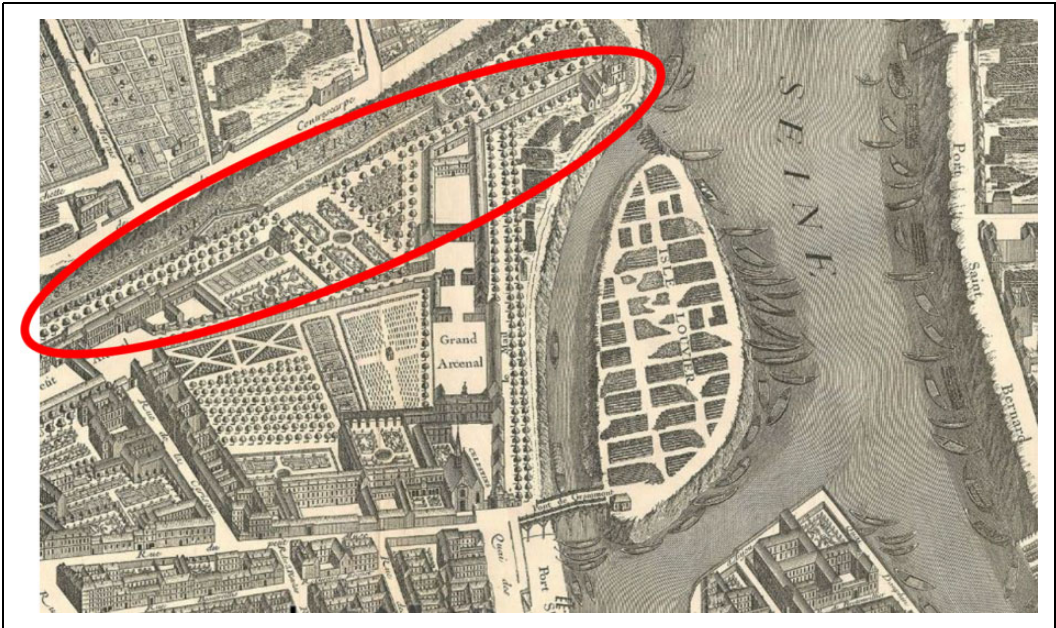


Figure 3. Mail de l'Arsenal (Plan Turgot). Plan Turgot: <http://www.geographicus.com/P/AntiqueMap/Paris-turgot-1900>.

Louvre, a mail was planted in 1597 just outside the city walls near the horse market, now rue du Mail (see Figure 2).³⁸ Another, the Mail de l'Arsenal, was planned in 1597 and planted in 1604 on what is currently the Boulevard Morland near the site of Charles V's first row of elms (see Figure 3), as well as in front of the fortifications seen on Figure 1. The Mail de l'Arsenal was 500 m long and 5,75 m wide. It was planted with two rows of mulberry trees and elms to shade players and mark the edges

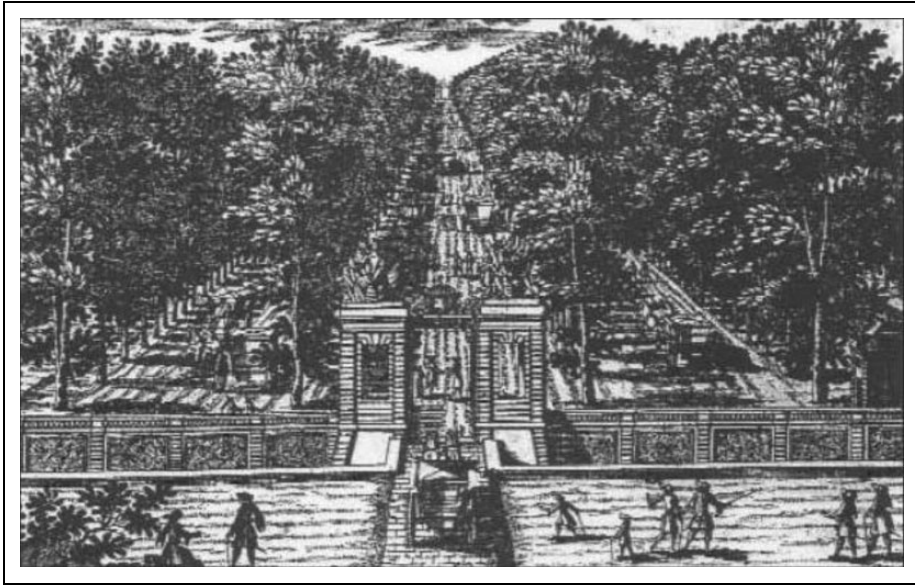


Figure 4. Le Cours de la Reine by P. Aveline (17th century). In Roger-Viollet no. 25293-17 (Musée Carnavalet d'Histoire de Paris).

of the course.³⁹ These mails were the very first tree-lined allées not located in gardens or on top of battlements. They were designed as places of leisure to walk, to see, and to be seen. The word “promenade” appears in French in 1570 and the now defunct term “promenoir” referred to a linear space lined with trees designed for the purpose of promenading in urban areas.⁴⁰ When Parisians lost interest in the pall-mall game, the long tree-lined allées remained and became dedicated to promenading.⁴¹

Queen Margot, that is, Marguerite de Valois (1553–1615), the daughter of Henri II and Catherine de Medici and first wife of Henri IV, established her Paris residence just outside the fortifications on the left bank across the Louvre. She had a “promenade” planted, with hedges, lines of trees, and drainage channels on the 2.4 hectares of the Pré-aux-Clercs. This new promenade was renamed Cours de la Reine Margot or Cours de la Reine Marguerite. It remained until 1734 but has since disappeared.⁴² Queen Marie de Medicis (1575–1642), Henri IV’s second wife, later commissioned the more famous and still existing Cours-la-Reine, which was planted in 1628. Located at the end of Tuileries garden, it was primarily designed for recreational carriage promenades. It included three long alleys planted with 1600 elms, one every four meter (see Figure 4).⁴³ This Cours is the first combination of trees alignments and wheeled vehicle use, that is, the ancestor of the tree-lined boulevard.⁴⁴

Thus, by the mid-seventeenth century, Paris had one row of elms on the Quai des Célestins dating back to the 1300s, two pall-malls east and west of the city center built in the 1600s and transformed into promenades, and two new Cours dedicated to promenading. Throughout the sixteenth and seventeenth centuries, the most common species planted in Paris were elm, mulberry, and linden (lime) trees. Oaks were not considered appropriate for garden allées, most likely due to their slow growth rates.⁴⁵ These five sites of linear allées lined with regularly spaced elms, lime, and mulberry trees would become the model for additional alignments of street trees in the seventeenth century.

This is not to say that all urban trees were limited to these few essences. Large private gardens planted with a variety of trees were also created in the sixteenth and early seventeenth centuries. The

Tuileries gardens in continuation of the Louvre is the first truly Parisian public park. Originally designed for Catherine Medici in 1564, it brought the Italian Renaissance Gardens model to Paris and created a space for fashionable recreation along garden allées. The tradition of establishing straight streets and allées with long vistas terminated by monuments dates back to the early sixteenth-century Italian model, highlighting the continuation with previous urban landscape models. Louis XIV would later open the Tuileries to “les honnêtes gens” (members of high society), and the people of Paris could enter the garden once a year for the Saint-John festivities.⁴⁶ Following similar Italian landscape models, Marie de Médicis ordered the creation of the Luxembourg gardens to complement her new palace (the current Senate building) after she left the Louvre in 1612. The Luxembourg garden included Italian-inspired features, geometric patterns, flowerbeds, sculptures, and tree-lined allées providing long perspectives. These elements are still present today, although the general orientation has changed. Following the King’s lead at the Tuileries, Royal princes opened the Jardin du Luxembourg, and later the Palais Royal, to the public.⁴⁷

The Italian influences in this period are noteworthy. The inspiration for these Queens’ Cours may have been the rural allées along the Arno River outside Florence, or the promenades along the Roman Forum, in Chiaia or Palermo.⁴⁸ Access to these Cours was first restricted to wealthy Parisians, continuing the Italian tradition of private gardens conditionally open to a limited public. The model was exported throughout Europe to the Netherlands with tree-lined pall-malls planted in The Hague and Utrecht (the Maliebaan built in 1637) and to London with the Pall-mall at St. James Park (1661). Other tree-lined boulevards planted in the same era include Unter den Linden in Berlin, planted with lime trees in 1647 (according to Holmes: “the nearest approach in Berlin to a Parisian boulevard”⁴⁹) and Hamburg’s Jungfernstieg, with a row of linden trees planted in 1665 along the waterfront.

The first part of the seventeenth century also saw some major urban development projects. The Place Royale—now Place des Vosges—and Place Dauphine were built between 1605 and 1612 (as ordered by Royal ordinances).⁵⁰ These innovative residential projects, the first coherent royal urbanism projects in the city, were sponsored by Henri IV and finished by Louis XIII. In both, residential structures frame large geometric open spaces designed to host public gatherings. The Place Royale includes, at its center, an equestrian statue of Louis XIII. Cut grass parterres were added at the end of the seventeenth century, creating symmetrical allées that lead to the central statue. These open spaces borrowed from and extended the Italian plaza model. As Italian piazzas, they did not include *any* tree in their original designs, only cut grass parterres (see Figure 5). In the early seventeenth century, open spaces for social gathering and public events were more desirable and elegant than trees for high-end residential areas. At the time, tree planting was reserved to selected Mails and Cours, to private gardens not visible from the street, and to the public areas along the fortifications outside the city. Both the Place des Vosges and Dauphine were planted with trees at the end of the eighteenth century at the residents’ request to achieve their current layout.⁵¹ Thus, the desire for adding trees in open spaces in residential areas seems to emerge between the mid-seventeenth and mid-eighteenth centuries, long after the constructions of Mails and Cours.

Another central feature of the seventeenth century, New World explorations and scientific advances changed dramatically the content of one particular garden. In 1635, Louis XIII’s physician planted a royal medicinal garden (the Jardin du Roi, now Jardin des Plantes) on the left bank. The garden soon became a major botanical garden. The garden was opened to the public in 1640. By the 1690s, garden managers included botanists and scientists who curated thousands of exotic plant and tree species. The Royal Menagerie was transferred to the garden from Versailles in 1792, making the site an ever more interesting place to visit for scientists and curious Parisians. Tree planting in that location was about science and exploring the curiosities of the world, a direct embodiment of the Renaissance and precursor to the Enlightenment era. However, in this era, street trees remained limited to very few species, and tree diversity remained limited to this unique scientific garden.

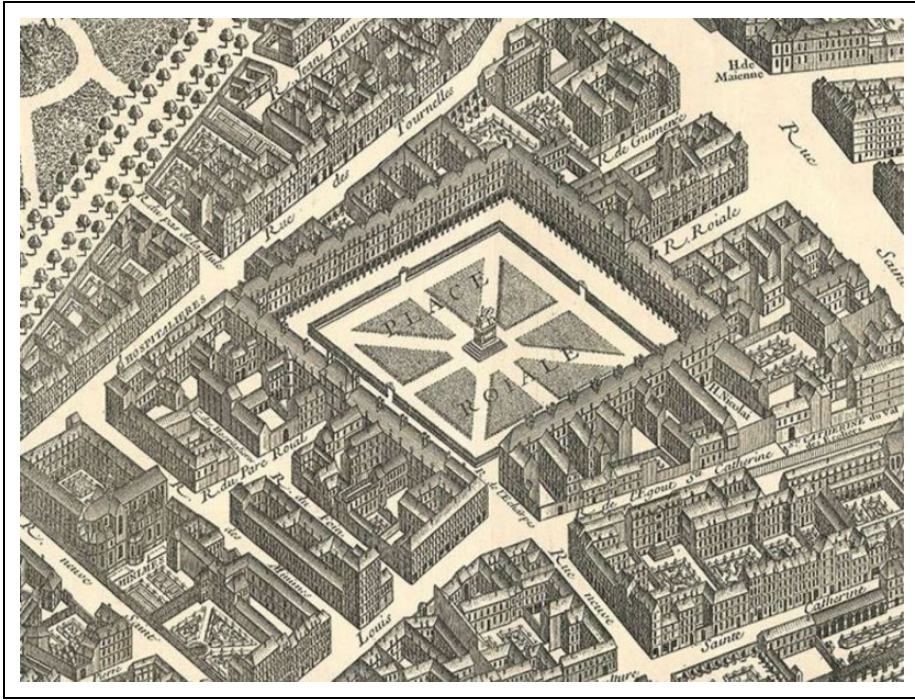


Figure 5. Place Royale, now Place des Vosges, Plan Turgot. Plan Turgot: <http://www.geographicus.com/P/AntiqueMap/Paris-turgot-1900>.

From Louis XIV to the Revolution: Tree-lined boulevards and liberty trees. At Versailles and in Paris, Louis XIV (1638–1715), the Sun King, expressed the grandeur of his personal power in baroque landscape, palaces, and gardens. The landscape designs created for him by LeNôtre at Versailles were soon copied at most European courts.⁶⁶ They combined intricate and geometric flowerbeds, grandiose perspectives, fountains and basins, and tree-lined allées that structure the landscape, create dramatic vistas, and provide linear environments for promenading. Louis XIV had LeNôtre redesign the Tuileries gardens at the Louvre in 1664. The formal French garden was extended to the west to lengthen and continue the perspective of the palace in approximately its current design. At Versailles and in the Tuileries in Paris, tree-lined allées belonged within the gardens. Along with the pall-malls and Cours, they provided a model for the future tree-lined boulevards.⁵²

Louis XIV also had two important squares built in Paris: Place des Victoires (also named Place des Conquêtes and Place Louis le Grand) and Place Vendôme. These two places were designed with equestrian statues of the King at their center, surrounded by residential buildings. They created public spaces to celebrate the King's glory and victories.⁵³ Just as the Places des Vosges and Dauphine, they were originally designed without trees. Unlike Place des Vosges and Dauphine, however, they remain vegetation-free to this day (see Figure 6). Later, but following a similar pattern, the Place Louis XV (renamed Place de la Concorde) was designed in 1755, without trees, around an equestrian statue of the King. It also remains tree-free today and hosts the Presidential Review of the Troops every July 14.⁴⁷ Designing without trees was intended, in these cases, to not detract from the geometry and symmetry of the space, building facades, and the equestrian sculptures and columns at the center of the squares and to provide spaces for grand public ceremonies. This design draws directly from the Italian Renaissance piazzas (Rome, Florence, Sienna) which were geometrically-shaped open spaces devoid of any planting. In this case, it is the *absence of trees*

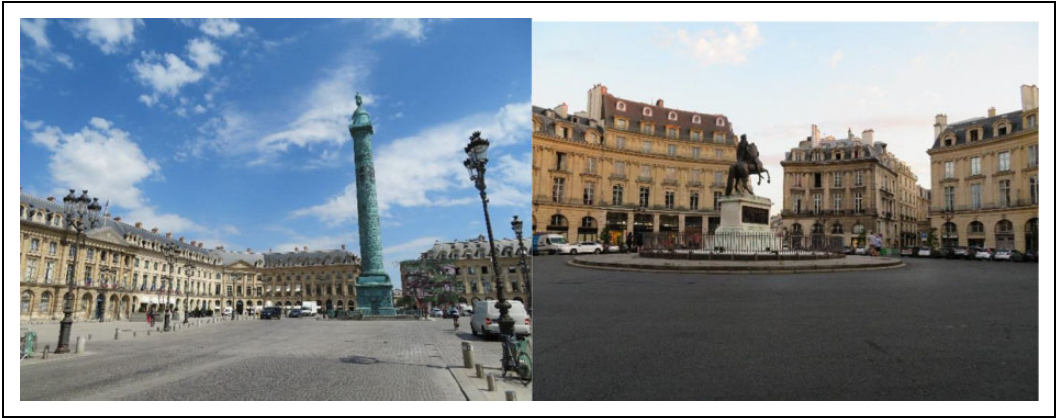


Figure 6. Place Vendôme and Place des Victoires. *Source:* the author.

that marked Royal power and the grandiosity of the project. To this day, nothing detracts from their formalism and symmetry.⁵⁴

At the end of the seventeenth century, Paris thus had three streetscape models: those with absolutely no trees or natural elements (Place des Victoires, Place Vendôme, Place de la Concorde), those with low flower beds (Place Royale/des Vosges, Place Dauphine), and tree-lined linear promenades (repurposed pall-malls, Cours la Reine). By that time, the city had also come to be seen as a place of filth, noise, overcrowding, and depravation, and series of programs would seek to bring order and sanitation to the city over the next two centuries—starting with sewerage disposal and the opening of wide boulevards.

The sociopolitical context for the creation of new tree-planted boulevards is complex. Relationships between Louis XIV and Paris were particularly tense after the Thirty Year War. In 1648, the Parliament of Paris sought to reduce royal powers. The Fronde insurrection erected barricades in Paris in 1648, followed by a brief siege of the city in 1649 and military confrontations within the city in 1652. In 1683, Paris was no longer the capital. While Louis XIV shifted his focus on Versailles, he also ordered the first large-scale addition of wide tree-lined boulevards in Paris, by Royal decree of 1669, primarily as a way to facilitate troops' movement in the city.⁵⁵

The only lands available for new wide boulevards were rural paths at the edge of the city and city walls and ramparts.⁵⁶ After the addition of tree-lined avenues around the new Military School at the Champ de Mars, Louis XIV had the boulevards and avenues built and planted with trees at the city's northern and eastern edges: the Boulevards St. Martin and St. Antoine, and the Avenues of Vincennes and Saint Mandé as specified by the decree "Arrêté du Conseil d'Etat" of 1670.⁵⁷ On the right bank, the boulevard linking Porte Saint Antoine to Porte Saint Honoré (an arc surrounding the city on the north, the current "Grands Boulevards") was planted by Royal ordnance of November 4, 1684 (see Figure 7). The Ordinance explains that the King had decided on June 7, 1670, and March 11, 1671, to create new city walls planted with trees "as much for beautification (. . .) as to provide a promenade for the bourgeois and the city residents."⁵⁸ The King's order dated April 7, 1685, continues this tree-lined boulevard along the ramparts from Porte Saint Antoine to Porte Poissonnière to the north.⁵⁹ Ramparts were planted with trees for promenading from Porte Saint Denys to Porte Saint Honoré in 1671 and from Porte Saint Anne to Porte Saint Honoré and at the Ramparts du Temple in 1684.⁶⁰

On the left bank, the October 18, 1704, royal order adds a tree-planted rampart along St. Germain-des-Prés and continues it from the Seine river to rue de Varenne, and then, with a 1715 order, from rue du Cherche-Midi to the Invalides, and from rue de Varenne to rue d'Enfer with four rows of



Figure 7. Vue du boulevard prise de la Porte St. Antoine by L.J. Mondhare (18th century). Bibliothèque Nationale de France. https://data.bnf.fr/14531157/louis-joseph_mondhare/

trees.⁶¹ Rows of trees were also planted in front of the Invalides and of the Saint Louis Hospital, and along the Cours des Capucins at the Faubourg St. Jacques.⁶²

More famous, the Champs-Élysées were designed by LeNôtre in 1667. This grandiose avenue continued the linear perspective of the Louvre and Tuileries Gardens with a double row of elms. The Champs-Élysées and the nearby Cours-la-Reine were later replanted (in 1758 and 1784) with 3,044 elms and 4,303 linden (lime) trees.⁶³ As in earlier centuries, these planting programs used very few tree species. Homogeneity of shape, color, and growth rates were more valued than species, shape, or color diversity, which follows closely Boyceau's 1638 treatise on garden design.⁶⁴

Ramparts provided a good location for tree planting in the 1670s. Around the country as in Paris (and some Italian cities, e.g., Lucca), ramparts were planted with trees partly because they provided the space needed for trees, and partly because trees' roots systems contributed to the stability of the structures. This is visible on many illustrations of the ramparts near the Bastille prison. The "Nouveau Cours" (now "Grands Boulevards") was added by Louis XIV between 1668 and 1705 in place of the Louis XIII ramparts and moats (Figure 8). This long arc-shaped boulevard linked Porte Saint Antoine (Bastille) to Porte Saint Honoré (now Place de la Madeleine). It was lined with four rows of elms to provide shade and a pleasant environment for promenades.⁶⁵

Finally, in the city of Versailles, Louis XIV, with Colbert's managerial leadership, ordered not only the construction of the palace and gardens but also the creation of (still existing) three tree-lined avenues that meet up at the palace.⁶⁶ This is an explicit expression of absolutism, where all major urban arteries lead to the King. The model was copied by Margrave Karl Wilhelm III for his Karlsruhe palace in 1715, among others. Overall, Louis XIV continued and vastly expanded the practice in place with the pall-malls and Cours and generalized the tree-lined boulevards and avenues that meet at focal points and became Paris' iconic design in the nineteenth century.

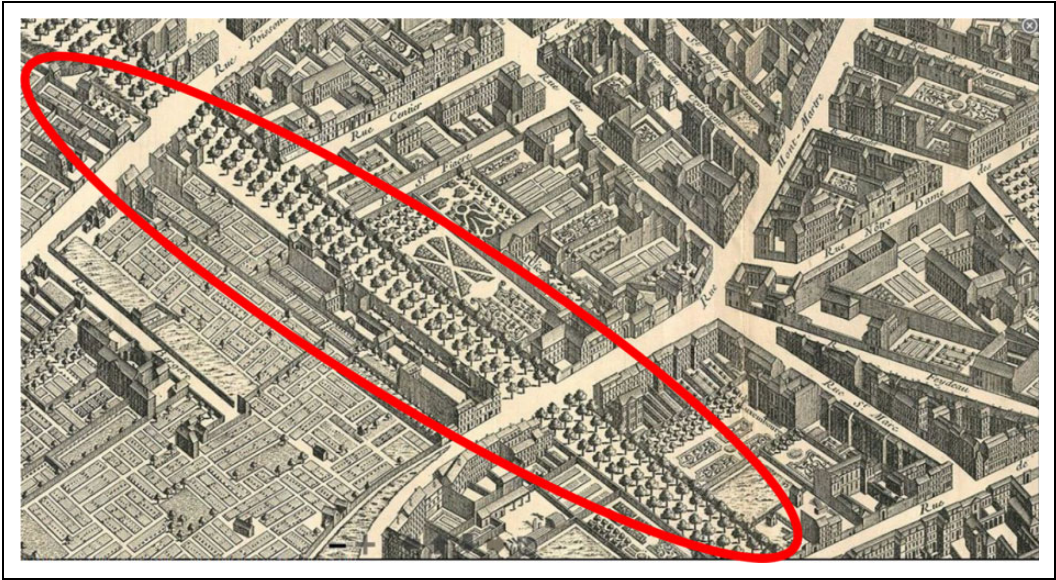


Figure 8. Nouveau Cours, Plan Turgot. Plan Turgot: <http://www.geographicus.com/P/AntiqueMap/Paris-turgot-1900>.

While the reign of Louis XIV is the most important of the seventeenth century in terms of urban development, Louis XV and XVI also left their marks on Paris. The tree-lined boulevards surrounding the walls, a project launched by Louis XIV, were completed between 1760 and 1785 by Louis XV and Louis XVI.⁶⁷ As Henri III did, Louis XV ordered, in 1720, the maintenance of sixty feet-wide roadways and the digging of drainage ditches on both sides of all French roads. He also ordered all owners of land abutting roads to maintain the roadways and to plant, six feet away from the road, elms, chestnuts, beech trees, and fruit trees. These edicts to plant alignments of trees alongside roads throughout the country intended to protect roadways from agricultural land encroachment.⁶⁸ They paved the way for the ongoing planting of trees along rural roads to provide shade. This practice also provided a link between rural roads and tree-lined boulevards around, and later within Paris, as the city incorporated adjacent lands.

The eighteenth century also saw the transformation of the Palais Royal, an influential gathering place located just North of the Louvre. In 1780, the Duc d'Orléans, at the time riddled with debt, ordered a very significant and controversial reduction of the garden space to accommodate for more profit-generating commercial and residential development. Cardinal Richelieu had built the Palais in 1628, with a large garden featuring cut grass parterres and two rows of elms planted in the 1630s, before giving it to Louis XIII in 1636. The gardens had been redesigned in 1692 by LeNôtre, and the elms were removed and replaced in the 1730s. The 1780 transformation dramatically reduced the garden size and featured a central courtyard lined with rows of lime/plane and horse chestnut trees planted in 1781. These species still frame this very formal garden today.⁶⁹ It became a popular venue for socializing and recreation and provided an important model for the integration of trees in the urban residential landscape. The model led to the planting of trees in Place des Vosges and Place Dauphine and to further integrating trees in residential areas throughout the city.

Despite these important developments, trees remained for the most part at the periphery of the City until the end of eighteenth century.⁷⁰ This periphery was impressive in and of itself. In 1782, Louis Sebastian Mercier described, in the *Tableaux de Paris*, the tree-lined outer boulevards as “a



Figure 9. Planting a Liberty Tree at the Paris City Hall. Source: Bibliothèque Nationale de France, <https://gallica.bnf.fr/ark:/12148/btv1b53014290c.item>.

vast and magnificent promenade . . . one does not see such superbly laid out works except in an immense and rich capital.”⁷¹ Although the narrow inner-city streets still did not allow for much planting, by the end of the eighteenth century, the trees on streets surrounding the city, along roads, on palmalls and on ramparts, and in the Palais Royal, provided a model that was extended to other French cities (e.g., Nantes, Bordeaux, Orleans, Reims), and extended within Paris over time.

The French Revolution changed power relations with regard to the state and local government and with regard to trees. Tree planting on streets had so far been strictly at the initiative of the kings.⁷² The Revolution removed the royalty and aristocracy from power, palaces, as well as royal gardens. Starting in 1792, planting trees became a Revolutionary symbolic act. “Liberty trees” (typically Italian poplars and oaks) were planted prominently in front of former palaces, prisons, churches, and monasteries, as well as in places of high traffic as symbols of popular power (see Figure 9).⁷³

The choice of oak trees is not surprising, as oaks have been venerated for their strength, longevity, and as a symbol of wisdom since antiquity in Greco-Roman and Celtic Europe. Italian poplars (“peupliers” in French) are a more recent choice.⁷⁴ The French developed a particular taste for Italian poplars at the end of the eighteenth century. Their yield was attractive, and the wordplay with popular/people (“peuple” in French) may have also been significant. Most notably, Girardin had planted many on the Island of Poplars where Rousseau was first buried in 1778 at Ermenonville.⁷⁵

Oaks and poplars embodied popular joy, political change, and democratic growth—the idea being that the tree would grow along with the new Republican institutions (the May tree tradition was probably the inspiration for this relationship to trees). They were also a symbol of patriotic sentiments during the Franco-Prussian war, merging symbols of national defense and revolutionary

ideals. The Revolutionary Abbé Grégoire estimated that there were more than 60,000 Liberty trees in French cities, with more than 200 in Paris.⁷⁶ Paradoxically, Louis XVI himself planted one in the Jardin des Tuileries. It was cut down in 1793 “en haine du tyran” (“in hatred of the tyrant”). These tree specimens were the first trees that carried a particular meaning in and of themselves as individual trees and living beings rather than as undifferentiated decorative objects.

Since the first and second empires: More and more diversified trees. Under the First Empire, Napoléon I launched and codified the first French modern nonreligious form of government and bureaucracy. It was highly centralized but devolved some authority to the local government structures created at the Revolution (communes and departments). Each of France’s 100 departments was headed by a Prefect. Each of the tens of thousands of Communes was headed by a mayor and city council. Considered of utmost national importance, Paris remained under the leadership of a Prefect named directly by the Emperor (and later by presidents).

The first decades of the nineteenth century, that is, the Restauration (1814–1830) and the constitutional July Monarchy (1830–1848), were marked by peace and economic prosperity. In Paris, this translated into new urbanism projects, with major beautification and infrastructure projects, including the creation of sidewalks (proposed by the fifth prefect of the Seine, Laborde, in 1812), the construction of new bridges, sewer systems, and the completion of the riverbanks.⁷⁷ The overall municipal budget allocated funding to beautification projects, including tree planting.⁷⁸

The eighth prefect of the Seine, Rambuteau, is the precursor of Baron Haussmann. Originally a chamberlain of Napoléon I, he lost his position in 1815 but was later elected deputy in 1827 and 1830. Although he was appointed Prefect of the Seine between 1833 and 1848 under the July Monarchy, he embodied the ideals of Napoléon’s administration. At the time, growing hygienist concerns highlighted the need to address unsanitary conditions, especially following the 1832 cholera epidemic (although modern concerns over sanitation go back to the Enlightenment movement of mid-eighteenth century⁴⁷). Before Haussmann, Rambuteau used the 1841 law allowing the expropriation of private property in the “public interest” to start the major renovation of Paris. He planned the great boulevards and avenues that transformed and decongested the city center.⁷⁷ The Louis XIV model of boulevards-promenades structured this grand urban redesign. Rambuteau’s motto was, “Water, air, shade”. He added many trees to the city to purify the air and to replace the greenery that was lost as private gardens were quickly replaced by buildings. Tree-lined boulevards were designed for beautification, comfort, shade, recreation, promenading, and sanitary fresh air.⁷⁹

In addition, standard sidewalk widths that allowed for tree planting were established in the 1830s under the leadership of Partiot, Directeur du Pavé de Paris.⁴⁰ Rambuteau also added rows of street trees when approving and financing large urban projects. For instance, the Sanitation Council (“Conseil de Salubrité”) approved on April 1, 1836, the construction of a new municipal slaughterhouse. It imposed various conditions for the project dealing with construction materials, water, aeration, sanitation, as well as the planting of three rows of trees around the perimeter of the site.⁷⁸ Similarly, the flower market approved in 1836 for the Quai Desaix was accompanied by the planting of rows of trees.⁸⁰

The First Empire and the Restauration periods saw the addition of street trees along the boulevards Bel Air and Bourdon, along the Avenue de l’Observatoire, and the restoration of the Champs-Élysées and Cours la Reine. Trees were also added along the Bassin de la Villette and the Canal St Martin (mainly poplars) to serve the working-class populations of the northeast of the city. As Napoléon built and centralized France’s military power, he oversaw the widening and paving of streets to support the movement of troops and artillery. He created new and wider streets. One of the most iconic, rue de Rivoli, runs east–west from the Louvre to Bastille. Named after Napoléon’s victory against Austria, it was designed as a triumphal and grandiose neoclassical parade route. Characteristically, it was never planted with *any* trees, as had been the case for the Place des

Victoires, Place Vendôme, or Place de la Concorde. The association of grandiose celebration of military victories appears to remain connected with a decision to not plant or shade the streetscape, perhaps to not detract from formal sculptures and facades. Napoléon, on the other hand, had trees planted along French roads to provide shade and protect his marching armies from heat and wind. In the cities he invaded, Napoléon brought the French urbanization model: after demolishing bastions and fortifications, he widened streets and planted trees, for example, in Brussels.⁸¹

Under the Second Empire, Napoléon III and the Prefect of the Seine Baron Haussmann pursued the joint goals of rational planning, modern sanitation, facilitating military/police movements, and beautifying the city.⁸² Their explicitly articulated purpose was to make Paris into a modern world-class city for the general public and the merchant bourgeoisie. Building on his predecessors, the Baron Haussmann led well-known urbanization projects. From 1850 to 1870, the Second Empire demolished about 60 percent of the existing street network. Continuing in the tradition of planting trees on the outskirts of the city, Haussmann converted old city walls into tree-lined boulevards.⁸³

In 1860, the size of Paris doubled with the annexation of nearby Faubourgs which became arrondissements eleven to twenty. About twenty new major boulevards were added, most of them around twenty-four to thirty meter wide. This width allowed for wide sidewalks and tree planting to improve pedestrian comfort. The Second Empire also added trees in the Bois Boulogne and Vincennes, in new large parks (e.g., Monceau, Buttes Chaumont), and in neighborhood parks.⁸⁴ These parks undoubtedly contributed to increased property values and disproportionately benefited the bourgeois class, as park development was often an opportunity for financial speculation.⁸⁵ For instance, the Parc Monceau, previously owned by Philip d'Orleans, Duke of Chartres, in the 1770s was seized and nationalized during the Revolution. In the mid-1800s, the land was split between the state, which donated the land to the city, and the Pereire brothers, real estate developers who had financed some of Haussmann's works. When the Pereire brothers developed their property, the park shrunk in size significantly. Nonetheless, additions of trees along boulevards and in parks constitute the distinctive element of the Parisian street system and were copied in other countries. In the UK, Robinson's 1869 book *The Parks, Promenades and Gardens of Paris* recommends copying the Paris tree-lined boulevards and river embankments in London.

Barillet-Deschamps, horticulturist, landscape architect, and Paris' chief gardener under the Second Empire, worked with Haussmann's engineer Alphand.⁸⁶ Together, they were in charge of parks and promenades and conducted the first census of street trees in 1855: Paris counted 38,000 trees along its avenues and boulevards. By the mid-nineteenth century, Paris led Europe in urban tree planting.⁸⁷ About 80,000 street trees were planted between 1853 and 1890, bringing the number of street trees to about 100,000 by the end of the nineteenth century.⁸⁸ These additions were also an occasion to diversify tree species. Until the nineteenth century, the main species of trees planted on streets were planes, lime trees, horse chestnuts, linden, and elms, selected for their fast growth, resistance to heavy pruning, and good shade.⁸⁹ Jouanet, who was in charge of tree selection for the Services des Arbres et Plantation (Service of Trees and Plantations), applied the scientific method. Taking into account the number and variety of trees, as well as average leaf area per tree species, he sought to maximize total leaf surface to provide sufficient air purification. He calculated that Paris had about 140 square meter of leaf area per capita. He also diversified street trees to fifteen species.⁹⁰ About 33 percent of planted trees were plane (as in London), 20 percent were horse chestnuts, 18 percent were still elms (which would later be reduced by Dutch Elm disease, "graphiose" in French), 11 percent were ailanthus (from Asia), and some were American walnuts and Asian species. This quantity and mix of trees forms the basis of Paris' current tree inventory.

Today, Paris street and park trees are under the responsibility of the Municipal Direction of Green Spaces and the Environment (Direction des Espaces Verts et de l'Environnement), a centralized Paris-wide agency that answers directly to the Mayor and Council.⁹¹ The current municipality has shifted its urban forestry and arboriculture focus toward sustainable management and tree

diversification. The city uses no chemical applications for pest control. New trees are diversified, adapted, regional, and climate-resilient species, with a focus on flowering trees to support the bee populations of the 300 Parisian beehives.⁹²

A century after Hausmann's additions, in 1970, Paris had 87,700 street trees (41 percent planes, 14 percent horse chestnuts, 9 percent elms, and 6 percent Sophora). Paris had 96,000 street trees in 1993 and about 100,000 in 2004. In 2014, the municipality set a goal to add 20,000 trees by 2020. Elms have almost disappeared from the Parisian landscape. Sophoras and lindens are being reinserted in the species mix. Today, Paris boasts a total of about 200,000 trees—excluding the two woodlands Bois de Boulogne and Bois de Vincennes which count about 300,000 trees combined⁹³:

- 100,000 street trees along 700 linear km of streets,
- 40,000 trees in 490 parks, gardens, and squares,
- 30,000 trees in 20 cemeteries (within and outside city limits),
- 6,000 along the boulevard périphérique, the highway surrounding the city, and
- 7,000 trees in schools and day care centers, and 4,000 in sports complexes.

The current Paris tree inventory comprises about 190 species (171 deciduous and 17 conifers). However, 58 percent of all the alignments trees along streets remain single-species, highlighting the need for diversification to reduce the risk of disease propagation. This is done mainly through the tree replacement cycle. The municipality replaces annually 1,500 street trees and 1,500 park trees.⁹⁴ The city has also set up an open access real-time tree management database for ongoing tree surveillance and tracking and for public information.⁹⁵ A recent development is the naturalization of tree pits or tree beds. Where feasible, the city replaces tree grates with grasses and wildflowers. It also recently initiated a small program that grants residents the right to plant anything they wish at the base of selected trees, creating small planting areas⁹⁶ (Figure 10).

Discussion: Lessons from 600 Years of Street Trees Planting

This review of street trees in Paris highlights the surprising stability of street tree planting practices despite major sociocultural-political changes over the past 600 years. It then explores how street tree planting programs and rationales shed light on prevailing frameworks of human–nature relationships in the city.

Planting aligned and regularly spaced and low-variety trees: A highly stable practice. This historical review challenges the notion that modern tree-lined boulevards emerged with Haussmann. The Second Empire did double the number of street trees in Paris and began a tree species diversification campaign. However, it was building on the First Empire-trained Prefect Rambuteau's work during the July Monarchy in the first third of the nineteenth century. Rambuteau was himself building on Louis XIV's baroque urbanism, with wide tree-lined avenues meeting at grand intersections, especially Louis XIV's Nouveau Cours. Louis XIV, in turn, built on the Marie de Medici' 1628 Cours la Reine, which itself drew inspiration from Italian gardens, the Cours de la Reine Margot planted in the 1550s, and the Mails built in Paris in 1604. Those in turn built on the nearby Charles V's elm alignment on the Quai des Célestins, dating back to the 1350s. In other words, the street tree alignments we have come to take for granted, that were reproduced in all of Europe and the US East Coast, and that characterizes planted streets throughout the Western world, is a 600-year-old Italian and French Royal model.

The actors making decisions about the planting of urban trees have changed dramatically over the last 600 years. From the sixteenth to eighteenth centuries, only reigning kings and queens had the power to plant trees in urban public spaces, and royal landscape designers and gardeners planted



Figure 10. Contemporary tree beds. *Source:* the author.

trees to honor and pleasure the King. Until the French Revolution, the nobility and the church planted private gardens, but the general public only had limited access to nature in a few green spaces and ramparts controlled by the King. A major first, Louis XIV opened the Royal Tuileries garden to the public—although this access was limited—and had trees planted along boulevards on a much grander scale than his predecessors.⁴⁶

The Revolution sought to bring pride in the new regime and planted symbolic Liberty Trees in strategic public places. The Revolution also challenged the King's control of urban tree planting. Power over street trees changed dramatically in the first decades of the nineteenth century, when Napoléon created a government of municipal and departmental bureaucrats. These early municipal leaders included engineering, military, and medical elites, most often educated bourgeois who had risen within the Imperial administration. The creation of the position of Prefect of the Seine, which would be held by Haussmann under the Second Empire set the path toward the current municipal administration. Despite these major changes in the locus of decision-making power, planting trees in regular monospecies alignments alongside streets remained the dominant tree-planting strategy.

Street trees and underlying models of human–nature relations. For each era and set of decision makers, tree planting took on different meanings and sought to achieve different goals. Urban forestry practices stem directly from each era's prevailing views of the city, of nature, of ideal urban form and aesthetics, and of science and sanitation priorities. In this discussion, I seek to identify how tree-planting programs relate to various frameworks of human–nature relationships.

Commodity trees: Framing vistas, shade, and clean air. Since the sixteenth century, trees have been used as artifacts to support a variety of human needs. When they are planted for timber and to support artillery movements, trees are treated as a resource. When they are planted to protect

roadways from encroachment from abutting landowners, trees are used as permanent fence posts. When Napoléon orders tree planting along roads to shade his marching armies, and when Henri IV and Marie de Medici order tree planting to shade pallmall players and the urban leisure class, they are used as canopy cover.

In addition to general beautification goals, trees were planted to support the leisure activities of wealthy classes until the eighteenth century, and of all classes starting in the nineteenth century. The mails provided linear and shaded space for playing and socializing. The Cours-la-Reine was a place to stroll, to see and be seen, and to gossip and socialize. Today, trees still provide pleasant amenities for socializing on shaded benches in parks and along sidewalks. In these contexts, trees provide the frame for quasi-enclosed shaded outdoor public spaces. Trees thus have a long history of being used as objects serving a wide array of social functions. This reflects a highly utilitarian view of trees and nature, where trees are commodified as useful objects.

To implement modern city ideals, the sanitation movement of the nineteenth century demolished older structures and street networks and replaced them with straight and wide tree-lined boulevards, constructed water and wastewater conveyance systems, and adopted stringent building codes ensuring quasi-universal access to sunlight and fresh air. For air quality, trees have long been recognized as “the lungs of the city.” Rambuteau and Haussmann planted tens of thousands of trees along boulevards and in parks to serve dual beautification and sanitation purposes. Earlier even, Louis XIV had trees planted on ramparts and boulevards to beautify the city and to make urban life healthier for all Parisians.⁴⁶ In this role, trees are more than just objects or artifacts: they are living organisms that are beneficial to humans.

Today, trees are also planted to reduce heat island effects. Trees increase water infiltration and evapotranspiration and provide shade. The focus on sustainability, climate change adaptation (for the trees), and mitigation (for humans) are recent shifts in management principles. Since the election of socialist mayor Delanoë (2001–2014), municipal officials and staff appear committed to sustainability and frame parks, urban forestry and arboriculture decisions in terms of biodiversity, climate adaptation, and mitigation.⁹⁷ In this context, trees are used for their ecosystem services as living creatures that support both human and ecological needs.

These changing rationales all point to the commodification of nature as an underlying principle in urban forestry practices. Whether street trees are planted to provide shaded promenades, clean air, shade for climate mitigation, or stormwater infiltration, they are commodified as means to another end (human pleasure, cooling, and health) rather than as ends in and of themselves.

Trees for beautification: Symbolic commodities or biophilia? Trees in public spaces and particularly the alignment of trees along streets and quays appeared in the first half of the sixteenth century with nonutilitarian aesthetic goals. From Charles V to Louis XIV, kings have planted trees for urban beautification purposes. These trees created pleasant shaded promenades and displayed kings’ and emperors’ power, near Royal palaces and often in continuation of Royal gardens (e.g., Quai des Célestins, Mail de l’Arsenal, Jardin des Tuileries). Planted avenues were also used to display nobility’s wealth and leisure and later for military parades (e.g., le Cours-la-Reine, Champs-Élysées).

In this context, trees take on a double role: beautification and symbolic expressions of power. The extent to which trees beautify the city, or the area surrounding a royal residence, suggests that Paris leaders found trees inherently beautiful. Biophilia was thus present among royalty many centuries ago, perhaps because the forest suggested the cornucopia of nature and Royal domains’ hunting grounds or due to human’s inherent predisposition to loving nature. However, we can also interpret street tree planting as kings’ use of trees as symbolic commodities. Perhaps it is not the trees themselves, but the grand perspectives they provide and the associated display of wealth, power, and control that matter.⁹⁸ In this case, trees are planted not because of the kings’ inherent taste for

nature, but for the extent to which they embody royal power in the city. In Paris, only kings were authorized to plant trees in public spaces. (In contrast, in Amsterdam, bourgeois homeowners could plant a tree in front of their house.) In addition, royal and imperial power could be expressed without any trees, for example, Place des Victoires and rue de Rivoli. This suggests that increasing the presence of nature in Paris was not a simply biophilic goal, but rather that trees, as well as the lines of sight created by the absence of trees, were used as symbolic commodities.

For the first time, the Revolution loaded specific tree specimens with meaning and importance. The new Republic and its democratic hopes radically changed the semiotics of urban trees. Unique, personalized, decorated, strategically placed, and carefully cared for. As metaphors for the Republic, Liberty Trees symbolized the power of the people and their freedom to plant trees in front of ex-palaces, churches, and new public buildings.⁹⁹ The Abbé Grégoire reported on Liberty Trees to the Republican Convention:¹⁰⁰

The Liberty tree will grow; with it will grow the children of the republic; with its presence, they will always feel sweet emotions . . . Here, the citizens will feel their heart beat as they talk about the love of the country, the sovereignty of the people . . .

We saw in all the communes [municipalities] magnificent trees raise their heads in defiance to the tyrants; the number of these trees is more than sixty thousands . . . (translated by the author)

Victor Hugo restated these ideas in his speech for the plantation of a Liberty Tree Place des Vosges (Place Royale) during the Commune of 1848:¹⁰¹

It is a beautiful and true symbol of liberty, a tree! Liberty has its roots in the heart of the people, as the tree in the heart of the earth; like the tree, liberty raises and open its branches into the sky; like the tree, liberty always grows and covers generations in its shade . . . (translated by the author)

Liberty trees are loved because they represent nature with its resilience, beauty, strength, and promises of growth. The decision to plant trees as a symbol of liberty and democracy surely stems from a deep biophilia stemming from pagan May tree/May pole traditions. However, here again this could also be interpreted as using the tree as a symbolic commodity to embody revolutionary values and power. In this case, however, many other republican symbols could have been used (e.g., fasces lictoriae, Phrygian caps, tricolored Cocardes). It must thus be an affinity for the living tree and a deeper biophilia that prompted this choice.

Each Liberty Tree was loved and cared for because of what it represented, but also as a unique specimen and living being. On the other hand, it is the globally perceived tree-lined boulevard, not the trees themselves, that have become iconic of Paris.¹⁰² Thus, biophilia in the streetscape appears to apply more to the row of trees as a whole (the ordered, controlled forest) rather than each tree specimen per se. The fact that extraordinary trees (e.g., the Robinier planted around 1600 in Square Viviani) are known in some circles but not to the general public confirms this hypothesis.

The coevolution of city trees and urban modernity: Street trees as orderly nature for an enlightened and healthy city. Early tree planting programs to beautify streets and quays near royal palaces were markers of power, and many of the early tree-lined avenues were continuations of royal gardens and palaces (e.g., Luxembourg, Tuileries). The most spectacular of these alignments and vistas links the Louvre to the Tuileries gardens and the Champs-Élysées. Other alignments border the wide boulevards planted in the seventeenth and eighteenth centuries (Vincennes, St. Antoine), and those opened in the nineteenth century. The explicit purpose of these planting programs by Rambuteau and Haussmann was, as for Louis XIV before, to open vistas, beautify the city on a large scale, and make the urban environment more pleasant and sanitary.

The Enlightenment worldview that emerged in the middle of the eighteenth century under Louis XIV stressed both the value of *nature and access to nature* (e.g., with Rousseau) and the value of *order* for clarity, reason, and understanding. Nature is expressed in the Enlightenment urban landscape with gardens, flower beds, and trees. Order is expressed with straight lines and symmetry of French gardens. The combination of nature and order, that is, orderly nature in the tree-lined allées, streets, and boulevards, thus provides the modern urban aesthetics model. It becomes expressed as a combination of hard lines (buildings, pavements) and soft lines (trees, flowers). Lining geometric/linear urban spaces with regularly spaced trees, that is, combining order and nature, becomes the French urban design model. It stood for an ideal of what humanity should become: enlightened, green, natural, linear, and ordered.

The enlightenment vision of the ideal city highlights the importance of trees:¹⁰³

1. The city is a space of magnificence to express rulers' power with long vistas and monumental spaces. Long vistas are often tree-lined, but occasionally magnificence is marked by the total absence of greenery (e.g., rue de Rivoli, Place Vendôme, Place des Victoires, Place de la Concorde).
2. Hygiene is essential, with straight and wide boulevards and tree-shaded promenades for recreation, fresh air, and sunlight.
3. The city is clear and ordered, an ideal implemented under the Second Empire. The mono-species and regular spacing of trees contribute to this clarity and order.
4. The population is inspired and improved by contact with symbols of national leadership, nature, and the elite in public spaces.

It is remarkable that when Rambuteau began planning the modern and practical urban transformation of Paris, this elected deputy who worked for Napoléon and for the first French parliamentary monarchy turned to the grand Louis XIV royal model of the tree-lined boulevard-promenade. Royal, imperial, republican, rational, and sanitary ideals expressed themselves similarly in the city. This suggests that this affinity for aligned trees as a form of orderly nature (an urban version of the savannah) derives from a general biophilic taste for a controlled nature. In this sense, the human control of an ordered nature is not a commodification of trees, but an evolution toward modern, ordered, airy, healthy landscapes with a strong natural presence. Urban residents have come to appreciate and expect tree-lined streets, and some tree-lined boulevards have become iconic (e.g., the Champs-Élysées).

While urban tree species are selected for their adaptation to the urban environment, we cannot talk of coevolution in the evolutionary biology sense. Urban trees do not adapt genetically to urban life. They do not reproduce genetically as they would in nature because once a street tree is planted, its seeds do not sprout into saplings. Instead, trees are grown and selected in nurseries and moved into the city. Nonetheless, we can talk about a coevolution in the sense that Parisians' experience of nature on streets, views of ideal urban landscape, and expectations have evolved with the generalization of street trees.

Tree diversity and care: Moving tree stewardship from the Royal Garden to the streets. The early private gardens of royalty, nobility, and of the church were designed and planted to include a wide array of medicinal and flowering species, for example, in the Jardin des Plantes starting in the 1640s. Exotic species were favored for their properties and rarity as they became available, that is, following European explorations around the Mediterranean, in the Orient, and later in the Americas. Tree diversity was therefore highly valued, and gardeners cared for these tree specimens with a strong stewardship ethics: once a tree (or animal) is in the Jardin des Plantes, it deserves attention, naming, and care. However, this stewardship attitude¹⁰⁴ was limited to one park dedicated to curiosity, exploration, and science. It did not extend onto streets, where most alignments were limited to two

to three species of interchangeable, fast-growing trees until the nineteenth century. Diversity increased in the course of the nineteenth century when trees were selected for their various shapes, colors, flowers, and textures and resilience to a harsh urban environment.

Recent development suggests that the stewardship model is diffusing throughout the city in the twentieth and twenty-first centuries. The online tree inventory shows not only the location and species of trees but also the municipal interventions to trim, treat, or otherwise care for the trees. Selecting trees for their role as habitat and pollinator support also highlights a stewardship role, in that case taking greater care of the wider ecosystems that trees participate in. In addition, the recent widening and naturalizing of tree beds highlight the importance of soils and water infiltration for tree health and seek to reconnect residents to urban trees and plants, involving them in caring for each individual tree and tree bed.

Furthermore, the rationales for selecting tree species have changed over time. Today, street tree selection is not merely a matter of aesthetics, speed of growth, or classification, but a matter of tree survival and adaptation to climate change. Trees species are now selected by municipal services for their adaptability and resilience to urban conditions and heat waves. The mix of trees planted includes Mediterranean species (e.g., European nettle tree or Mediterranean hackberry, Turkish hazel, holy oak). The city also favors regional species to support ecological linkages across the wider Paris region and trees from the Ile-de-France region that flower, produce seeds and fruits, and support the food chain and pollinators, especially for the bees. Species native to the region include European hornbeam, beech and aspen, and a variety of oak species.⁹⁶ Therefore, the environmental stewardship model of human–nature relationships has emerged in the last decades. It is noteworthy that in this stewardship model, we still see very little care for the tree as an individual living being. Trees are not named or known to residents, who have no personal or symbolic relationship to trees as they did briefly for Liberty Trees.

Conclusions

In the West, we have come to take aligned street trees for granted, in large cities as well as small towns. Here, I sought to explore the place of street trees in urban planning. Focusing on Paris allowed me to go back to the sixteenth century and the earliest rationales and models for street tree planting.

The social functions of trees for public spaces and promenades and the hygienic goal of air purification merged into the tree-lined street and boulevard design that has come to define the Paris streetscape. This design does not stem from the Haussmannian modernization of the urban landscape but instead owes its existence to a long series of royal and imperial preferences, aesthetics, and philosophical movements: a combination of Italian Renaissance-inspired promenades, Louis XIV's baroque grandiose projects, and Enlightenment-driven desire to integrate orderly nature in the city. Street trees provide an ordered, symmetrical, and controlled nature on streets and in the daily experience of Parisians.

Street trees are uniquely placed at the intersection of cities and nature. They are living beings planted and cared for but also urban objects selected for the taste, pleasure, comfort, and safety of urban dwellers. The history of urban forestry and arboriculture sheds a unique light on the evolution of the relationships between cities and nature and on how these relationships play out in urban policies and actions. Before the emergence of street trees, trees belonged to the private gardens of royalty, wealthy classes, and the church and to the countryside. While private gardens favored a diversity of ornamental and fruit trees, street trees included very few species (elms, mulberry, planes), selected mainly for their resilience and fast growth. The nineteenth century saw the diversification of street tree species to increase textures, shapes, and colors, but monospecies alignments remain common to this day (in Paris and most western cities).

Overall, tree management in Paris appears marked more by continuity than by change. The major role for urban trees in Paris is to support and participate in a specific urban form and aesthetic and to provide human and ecosystem services. Trees provide a visual green and soft relief from the urban mineral, hard, and gray context. As they did in the sixteenth century, tree alignment along streets, quays, and boulevards create grand vistas and perspectives, shade sidewalks, frame boulevards, and balance out large buildings.

At the forefront of the current urban forestry and arboriculture agenda, understandings of biodiversity, pollination, and climate change provide new diversification rationales and criteria. Tree selection practices have evolved considerably to encompass sustainability, biodiversity, climate adaptation and mitigation, bird, and pollinator habitat. However, the city still lives with 600-year-old royal planting models that have become so ingrained that street tree alignments have become the norm and expectation.

The history of street trees in Paris sheds light on the evolution of human–nature relationships over the last six centuries. First, trees are treated as a commodity to provide services to humans, including shaded promenades, clean air, cooling to mitigate urban heat islands, and stormwater infiltration. To that extent, trees are commodified as means to other ends rather than as end in and of themselves.

But trees cannot be reduced to commodities only. The history of urban trees in Paris provides strong support for the biophilia rationale: we plant trees because we love nature. Kings, emperors, and prefects chose to plant trees to embody their personal power in the urban landscape. Since they had many possible alternative devices, choosing trees highlights the human taste for controlled nature. It is not the tree itself *per se*, but the double or triple row of trees (i.e., the controlled forest) that is loved and iconized. One exception to this is the love and attachment given to individual Liberty Trees, which were chosen among many other possible symbols of the new Republic because of what the tree represents: nature, growth, potential, and hope.

We cannot talk of a coevolution of trees and humans in the biological evolutionary sense in 600 years because street trees do not reproduce and naturally evolve genetically in response to environmental changes. Nonetheless, Parisians' experience of nature, their views of ideal urban landscape, and expectations evolved with the generalization of street trees. In addition, tree diversity has increased dramatically over the last century in response to better understandings of the impact of pest, disease, and climate change on trees. To this limited extent, thus, we can talk of a nonbiological but cultural coevolution.

Finally, environmental stewardship can be traced back to the seventeenth century, but it was then limited to the care for exceptional, novelty, exotic tree specimens in the Jardin des Plantes. This was not environmental or ecological stewardship as we would understand the term today, but gardeners nonetheless exhibited particular care for each tree specimen, in contrast to street trees planted as timber commodities or participants in a uniform streetscape. Ecological stewardship in the modern sense of the word has since expanded beyond the garden to all street trees, with more municipal attention given to the selection and care of trees, now understood as part of broader ecological processes spanning from local pollinator habitat to climate change.

While the Paris urban street forest is now managed with ecological goals, straight and regularly spaced street tree alignments remain a stable feature of the urban forest. If planting trees in zigzags, clumps, random patterns, or interspersed with pockets of native grasses and flowers was found to be more ecologically beneficial, history provides no evidence that urban foresters are ready to challenge 600 years of history and public expectations. On the other hand, the Revolutionary experiment with Liberty Trees suggests additional benefits trees could provide. If residents were engaged in the selection and planting of meaningful trees, trees that would be known by name, perhaps dedicated to departed family members or to neighborhood or community events, these trees may enhance place attachment and embody environmental stewardship values (all living beings deserve care) that may diffuse to other domains of urban life.

Maps used for reference:

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101. Victor Hugo, “Discours lors de la plantation d’un arbre de la liberté sur la place des Vosges, 2 mars 1848,” in *Oeuvres Complètes de Victor Hugo, Actes et Paroles, Editions définitives d’après les manuscrits originaux* Vol I: (Paris, France: Hetzel-Quantin/L. Herbert Libraire, 1883), 171.

102. Arnon Golan, "The Street as Urban Icon? Tel Aviv's Rothschild Boulevard," *Urban Geography* 36, no. 5 (2015): 721–34.
103. Richard A. Etlin, *Symbolic Space: French Enlightenment Architecture and Its Legacy* (Chicago, IL: University of Chicago Press, 1994).
104. This stewardship, understood as caring and responsible management, focused on the preservation of isolated rare specimens for the sake of the King, not on ecosystem or environmental stewardship as we understand the term today.

Author Biography

Lucie Laurian grew up in Paris. She is a professor of urban and regional planning at the University of Iowa. Her research focuses on environmental planning, public participation, and the institutional factors that support the implementation of sustainability plans. She has researched French urban and environmental planning issues and published the first French environmental justice analyses. She also contributed the Chapter on Paris in Timothy Beatley's 2012 *Green Cities of Europe: Global Lessons on Green Urbanism* book (Island Press).