BUILDING A NEW SHARED
URBAN CULTURE TOGETHER

LA CHARTE DE L'ARBRE*

*The Tree Charter

GRANDLYON
la métropole

LA CHARTE DE L'ARBRE*

Urban sprawl has to come to an end. Analyse the main sources of greenhouse gas emissions and such a conclusion is incontrovertible. The widespread growth of car-dependant suburban neighbourhoods has brought unsustainable energy waste and pollution levels. Putting an end to such development patterns is one of the primary goals of the Lyon 2030 Strategic Plan adopted last year.

And yet…
The success of suburban housing reveals a deeper yearning that it would be wrong to ignore. It reflects a growing public demand for renewed contact with nature. The often polluted and hard landscapes of large cities are far from meeting people's desire to live in a green and peaceful environment.

The Greater Lyon Authority has therefore launched a green offensive to enhance quality of place and provide attractive living in a high-density setting. Regeneration projects such as Confluence, with its quiet, car-free walks along the River Saône, proudly illustrate this approach.

Updating our 11-year old Tree Charter is a key stepping stone in this strategy. While it helps encourage nature's return to our city, it also facilitates the adoption of a more holistic approach to urban trees and their interactions with the built environment. This new Tree Charter puts us at the forefront of urban forestry and will breathe new life into Lyon… and its residents.

Gérard Collomb
President of the Greater Lyon Authority

*The Tree Charter

RIGHT TREE, RIGHT PLACE

BY FRANCIS HALLÉ*

I am delighted to have this opportunity to contribute my botanical expertise to the Greater Lyon Authority and the Lyon boroughs' significant efforts to raise awareness about trees among local residents and visitors.
Let's face it, many fellow citizens pay little attention to trees and see them as objects rather than living organisms, with no particular function aside from providing a bit of shade. Few are aware of the level of expertise, effort and commitment required to establish and maintain a beautiful, healthy and safe urban tree population.
If people were to make the effort to notice a tree, learn to recognise it, remember its name and its geographical origin, observe the fauna that it supports, and follow its evolution from season to season and year to year, then the tree would no longer be a stranger and would instead become a character to be greeted, as alive as you and me!
Lyon has made a name for itself in France for turning friendship towards trees into a robust long-term policy underpinned by good practice: sustainable management of soil resources, careful selection of species adapted to the available space, rejection of hazard-generating excessive weed removal and pruning… Hence the «right tree, right place» adage of those who look after the urban forest. Their work deserves all our respect. Can you imagine the horror of a large city without trees?
In the surrounding hills, along the riverbanks, or simply in the streets, Lyons' residents and visitors have access to several hundred different tree species originating from all around the world: from Japan to Iran, Korea to North America. They demonstrate that nature can be urban, as can culture. So why not embrace the combination they can offer?

***Dr Francis Hallé is a French botanist and biologist, specialist in tropical rainforests and in tree architecture and professor emeritus of the University of Montpellier. He led the «Radeau des cimes» («Treetop Raft») expedition from 1986 to 1993 using an aerostatic balloon to survey and study for the first time tropical forests at canopy level. Dr Francis Hallé is the author of multiple books including *In Praise of Plants* (L'Éloge de la Plante, Éditions du Seuil, 1999, translation in 2011, Timber Press, Inc), *Le Radeau des cimes* (Lattès, 2000, in French, no translation), *Plaidoyer pour l'arbre* (Actes Sud, 2005, in French, no translation), *Du bon usage des arbres* (Actes Sud, 2011, in French, no translation). Dr Francis Hallé co-directed a documentary film with Luc Jacquet: *Il était une forêt* (2013), *Once upon a Forest* (2014).**

...TO BUILD A BETTER UNDERSTANDING THE ROLE OF TREES IN CITIES

... TO ESTABLISH A SET OF COMMON PRINCIPLES

... TO GUIDE IMPLEMENTATION

FIND THE TREE CHARTER AND OTHER ASSOCIATED DOCUMENTS ON

http://blogs.grandlyon.com/developpementdurable/en-actions/dispositifs-partenariaux/charte-de-larbre/

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A NEW TREE CHARTER FOR LYON

WHY A NEW TREE CHARTER?

Eleven years have passed since the adoption of the first Tree Charter – a brief moment in the life of a tree. However, in this time period, the approach to urban trees has significantly evolved, to the point that it is necessary to update the Tree Charter.

TREES AT THE HEART OF NEW POLICY FOCUS

New environmental, economic and social concerns have dominated the past decade, many of which were only emerging at the end of the 1990s when the first Tree Charter was drafted. The progressive adoption of sustainable development principles is a primary focus for contemporary public policy. Urban greening is one of the main tools available to facilitate this transition and help tackle climate adaptation, biodiversity conservation and urban density issues. Updating the Tree Charter ensures these critical issues are adequately addressed.

REMAINING AT THE FOREFRONT OF URBAN FORESTRY

The first Tree Charter has undoubtedly brought positive change: awareness of urban trees among residents has greatly improved and the Greater Lyon Authority (GLA)* has adopted a holistic range of good practices for the protection and development of the local tree population. Such success needs to be used as a springboard to ensure that trees become an integral component of all future urban development. Fully achieving this more ambitious objective will take a small revolution in how most people look at urban trees, ie:

> Recognising trees as living organisms in constant interaction with their environment.

> Understanding and utilising the contributions urban trees make to landscape character and local ecosystems, regardless of their location (street, private garden, public park, brownfield land, farmland, natural area…).

> Seeing the relevance of urban forestry, and its associated challenges and opportunities, to all urban policy areas.

A more holistic and cross-disciplinary approach is needed in order to engage everyone. To this end, the new Tree Charter is designed as a partnership-building tool. It aims to help coordinate and guide all stakeholders interested in taking action for urban trees. As such, it goes far beyond the previous charter, which was primarily focused on improvement within GLA services. This shift in target audience offers a challenge comparable in scale and ambition to that of facilitating the rediscovery of urban trees during the 1990s.

By setting for itself a new and ambitious goal, Lyon will maintain its leading position on the critical contemporary issues of quality of place and life.

This new Tree Charter follows the North American approach to urban forestry.
The term «urban forest» refers to the trees and associated other vegetation growing in the built environment. In this approach, trees are important in terms of both their individual intrinsic value and their contribution to the wider environment.

This approach is useful in more ways than one. It facilitates the adoption of a strategic, citywide perspective on urban tree management. It also challenges the siloed approach often prevalent in local authorities when it comes to managing trees, or more generally, natural resources.

The «urban forest» should not be confused with a wooded area that might be enjoyed along with other types of green space in a city – such type of green space is referred to in this document as «woodlands».

* About the Greater Lyon Authority (GLA):
The GLA is the top-tier administrative body for Greater Lyon, France, which encompasses 59 local boroughs (including the Municipality of Lyon right at its heart) and covers about 1.3 million residents over 200 square miles. The GLA is led by a 165-member assembly, a 25-member executive committee and a president. All are indirectly elected. The GLA is responsible for policy and delivery in wide-ranging domains including transport and mobility, economic development, housing, planning, energy, social care, water management, waste management, culture, education, etc. The GLA also oversees the design and delivery of all new public spaces (whether parklands, highways or civic spaces) as well as the management of all highways and civic spaces (maintenance of small parks is handed over to local boroughs). As a result the GLA is directly responsible for all the trees found in Lyon's public realm. Throughout this document, the term Lyon is used to refer to the whole area overseen by the Greater Lyon Authority.

INTRODUCTION

FOR ALL TO SIGN!

Individuals as well as public, non-for-profit and private organisations all share the responsibility for granting (or not!) a role and place for trees in Lyon.

Who should sign the Tree Charter?

> Owners of land with trees (local authorities, private businesses, public agencies, community groups, individuals).

> Professionals who work with or on trees (arboriculturists, nursery workers, landscape architects, urban designers, etc).

> Users of the urban environment interested in enhancing, through their daily behaviour, the benefits they get from trees and the quality of the urban forest (individuals, community groups, environmental NGOs).

"…sustainable urban forests depend to a large degree on sustainable private forests…[they] are composed of all trees in the community, regardless of ownership." Clark et al, A Model of Urban Forest Sustainability, Journal of Arboriculture, 23 (1): January 1997

Taking action to enhance the tree population (management, protection, planting)

Taking action to raise awareness about the role of urban trees

A TREE CHARTER FOR ACTION

Signing the Tree Charter provides a means to endorse publicly the key principles it advocates. Beyond a simple declaration of intent, the Tree Charter aims to be first and foremost a tool for enabling action. Signatories therefore also commit to implement, within their remit, the recommendations through a public action plan.

WHAT IS THE GLA'S ROLE?

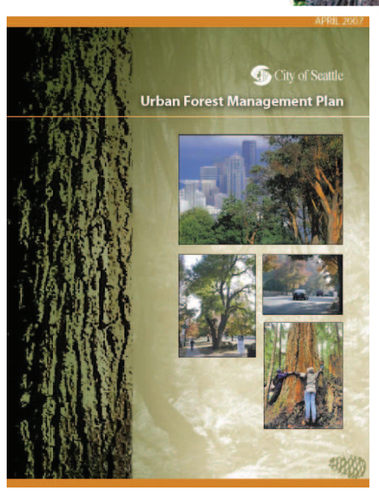
Capitalising on the arboriculture expertise it has acquired during the past two decades and its overarching strategic coordination role, the GLA is launching and piloting this partnership-building approach.
The GLA is hoping to facilitate the emergence of new governance mechanisms for the urban forest and, more widely, on urban nature issues. The development and implementation protocol underpinning the present Tree Charter has been designed to be as open and collaborative as possible.
The GLA's role in the Tree Charter is not only limited to facilitation. The GLA is responsible for the management of 100,000 trees in highways and civic spaces and 56,000 trees in parks. Like other signatories, the GLA has developed its own action plan. This action plan focuses on awareness raising and enhancing tree population management.

POSITIONING LYON AMONG THE WORLD LEADERS IN URBAN GREENING

At a time when over half the world's population lives in cities, interest in bringing nature into the built environment is no longer primarily a «developed world» concern. There is a wide recognition that, far from being an expendable extra, nature is essential to ensure the liveability of ever larger – and growing - cities. The United Nation recommends the planting of trees to help enhance the resilience of urban environments against the impact of climate change.
From Shanghai to Ouagadougou, cities all around the world have now joined the US pioneers (such as Chicago and Seattle) in integrating urban forestry as one of the top agenda items to manage and facilitate development. With its new Tree Charter, Lyon positions itself firmly within this worldwide urban greening movement.

ALIGNMENT WITH LYON'S SUSTAINABLE DEVELOPMENT STRATEGY

The Tree Charter is aligned with both national and local policy aiming to promote sustainable development. It actively supports the implementation of the Grenelles 1 and 2 Acts*, the Lyon Agenda 21, the Lyon 2030 Plan, and other key local strategic documents. Thanks to its thematic approach, the Charter closely builds upon Lyon's Climate Adaptation Plan and its Sustainable Transport Strategy, thus helping to strengthen the GLA's integrated approach to planning and delivery. Issues and opportunities associated with urban trees overlap with multiple urban policy agendas including environmental quality, mobility and access, climate change adaptation, community cohesion, public space use and design, flooding and stormwater management, etc. The Tree Charter raises urban forestry to a matter of strategic importance to be approached with commitment and delivered collaboratively.



Some international urban forest strategies: Melbourne, Seattle, Montréal...

HOW URBAN TREES CAME INTO BEING

TREES AND CITIES, A RICH AND COMPLEX HISTORY

How urban trees came into being
When cities forget about trees…
…And rediscover them, in extremis

CAUGHT IN A PARADOX

The first Tree Charter spawned encouraging change
- Positive tree results
- An emerging shared tree culture

Conflicting beliefs and mistreatments still linger
- A cherished heritage and symbolic value
- A growing emblem for a 'biophilic' urban renaissance
-… still often poorly treated

Above all, trees are living organisms

A SERVICE-PROVIDING INFRASTRUCTURE

Trees are key features in the urban landscape
Trees as infrastructure
Trees for water sensitive urban design
A highly relevant urban cooling function
Important soil protection benefits
Trees are effective agents to tackle urban pollution
Trees for wellbeing and community cohesion
An economic asset

TREES AND CITIES,
A RICH AND COMPLEX HISTORY

The role and place given to trees in towns and cities has evolved over time. Building a better understanding of this evolution provides a useful foundation to think about the future: past relationships between city dwellers and trees cast a revealing light on current mindsets, expectations and resulting management practices.

HOW URBAN TREES CAME INTO BEING

Antiquity
Trees were scarce in Roman-era cities. Their presence in a neighbourhood was a sign of affluence.

Medieval age
Medieval towns and cities were designed as enclosed spaces, which imposed constraints on the inclusion of trees. Isolated specimens were sometimes used to emphasise the special and symbolic character of a particular place. In most instances, trees were only found contributing to the food supply in convents' gardens and residences of the nobility.

Renaissance
During the renaissance, trees started to be planted on a larger scale to serve practical purposes such as enhancing sanitation or creating firewood reserves. The popularity of "jeu de maille" (a lawn game similar to cricket and requiring a wooden pole) also contributed to this trend.

18th century
This period sees the appearance of avenue trees and their use as part of urban planning efforts to create larger streets to facilitate traffic and movement (eg boulevards and parkways). Urban trees are used to help bring structure to and unify urban landscapes.

19th century
The integration of trees as part of urban regeneration projects becomes standard practice. The urban tree becomes the centrepiece of contemporary approaches to beautify and enhance public health in cities.

A few time markers for Lyon:

> Up until the 17th century, most of the Lyon tree population consisted of fruit trees in private gardens and nobilities' residences.
> At the beginning of the 17th century, the Bellecour Square was designed with 300 lime trees in staggered rows. Further planting with a second generation of limes took place in 1740.
> The earliest known avenue planting dates back from the middle of the 18th century. It took place in the Brotteaux neighbourhood and was most likely lined with poplars or willows.
> The first large avenues were created between 1820-1845 and lined with poplars.
> During 1840-1860, plane trees started to appear on the Saône embankments. They were soon also planted along the Cour de Verdun and the Rhône embankments.
> The heyday of large-scale tree planting in Lyon was during the Haussmanian era. The Lyon administrative head Claude-Marius Vaisse and his chief engineer Gustave Bonnet created large new arterials throughout the city, the largest of which were lined with trees. Large streets subsequently created were systematically planted.
> In 1850, the Bellecour Square limes were replaced with horse chestnut trees. The other three sides of the square are lined with a double row of planes.
> From 1856 to 1860, Denis Bülher created the Tête d'Or Park.
> In 1866, the fortifications of the Croix-Rousse neighbourhood were replaced with a large boulevard lined with four rows of planes, totalling 930 trees, the largest single planting in Lyon.

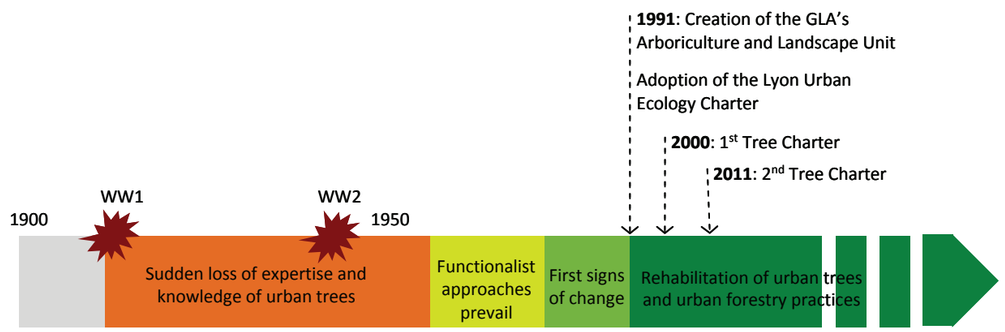
Severe pollarding of plane trees along the Croix-Rousse Boulevard in the 1970s

WHEN CITIES FORGET ABOUT TREES…

The 20th century brought a clear departure from the way in which urban tree planting had been evolving. During the first half of the 20th century, the two world wars pushed landscape and urban design considerations into the background. During the 1950s, when reconstruction took place, the focus was on buildings. In these newly built neighbourhoods, vegetation is scarce. In the 1960s and the 1970s, in line with the functionalist approach that prevailed at the time, car-centric urban design and low-cost large-scale developments led to a further setback for urban tree populations. The «boom era» certainly wasn't such for urban trees, which also suffered at the time from poor management practices. The loss of life caused by world war one led to a considerable loss of arboricultural skills and knowledge. This gap was subsequently filled with new management techniques inspired from the green revolution in agriculture. The general spread of severe pruning made possible by the invention of the chainsaw is a good illustration of this shift.

…AND REDISCOVER THEM, IN EXTREMIS

During the 1980s, the rise of environmental concerns resulted in large scale urban tree planting. However, prevalent tree management practices were then so inappropriate to tree needs that most urban tree populations were in very poor health. It is only from the 1990s that greater awareness arose among French local authorities about the appalling conditions of their tree stock. Under the auspices of an urban ecology programme, the Greater Lyon Authority is among the first local government body to commit to rehabilitating the role and place of trees in the built environment. This results in the creation in 1991 of a Landscape and Arboriculture unit within its highway department and the adoption of the first Tree Charter in 2000. The first of its kind on a national level, the charter established the five core principles (landscape dynamics, diversity, permanence, longevity and economy) that provided a framework for Lyon's rediscovery of trees.



CAUGHT IN A PARADOX

THE FIRST TREE CHARTER GAVE RISE TO ENCOURAGING CHANGE…

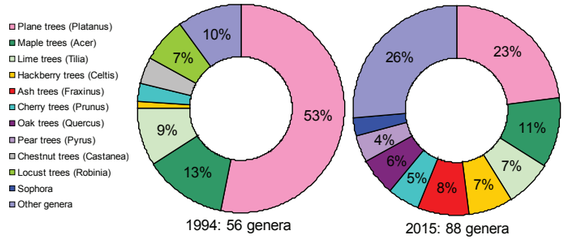
The first Tree Charter was made necessary by a context in which a functionalist approach to urban development ignored tree health considerations and failed to exploit the benefits trees can bring to urban environments. The present charter builds upon the work initiated 11 years ago, which has demonstrated relevance and efficiency.

> POSITIVE TREE RESULTS

A richer tree population

The good practices adopted as a result of the Tree Charter have brought both quantitative and qualitative enhancement without requiring a big rise in public expenditure. Lyon's highway tree population grew from 40,000 in 1990 to 68,000 in 2005 and over 100,000 in 2015. As a result, 400 hectares of public space benefits from canopy cover, which represents about 13% of highway land. On a qualitative level, systematic efforts towards species diversification have also started to make a visible impact.

Genus diversity in the tree population managed by the GLA



Better cared-for trees

More proactive planning of works and enhancements in the standards of practice for routine interventions have resulted in much improved tree health. The achievement of 11 years of focus on better tree care and better understanding of tree needs include: a sensible approach to pruning, wildlife-friendly care as standard and a reduction in soil sealing and compaction.

> AN EMERGING SHARED TREE CULTURE

Beyond its direct impact on Lyon's tree population, the Tree Charter has also stimulated interest in urban trees from a wide range of stakeholders. Communication campaigns have also helped to spread a «tree culture» among the wider public.

The Tree Charter has provided the GLA team with shared principles that have made it much easier to take a cross-departmental and cross-disciplinary approach to urban trees. Such a breakdown of silos has enabled the development of solutions that offer better conditions for both trees and the surrounding infrastructure, including underground utilities and accessible public space (such as improvements in tree grate design).

On-site learning at real project sites is the GLA's preferred approach to engagement with schoolchildren

CONFLICTING BELIEFS AND MISTREATMENTS STILL LINGER

In spite of the marked positive changes the first Tree Charter has brought, some contradictions still remain in people's beliefs and behaviours about trees.

A CHERISHED HERITAGE AND SYMBOLIC VALUE

People have always imbued trees with a strong symbolic value. Trees are featured in countless myths and have been a source of inspiration for artists since time immemorial. As a result, trees hold an important place in our collective imagination. With their long lifespan, trees offer a compelling link between past and present. They are often invested with memorial value both at a collective level (eg trees of the French Revolution) and at an individual level. City dwellers frequently forge strong emotional bonds to the (sometimes scarce) trees found in the built environment. The level of social demand for the protection of veteran urban trees provides a good illustration of this strong attachment.

A GROWING EMBLEM FOR A "BIOPHILIC" URBAN RENAISSANCE…

Social demand for urban trees is at an all-time high. The stature and longevity of trees have made them the most obvious symbol of urban nature, which people long for. This desire for nature has grown out of a powerful urban shift in people's way of life. In an era when over 80% of the French population live in an urban setting, urbanity should no longer be defined as antithetical to nature. Contemporary cities are reinventing themselves, and in doing so, have embraced a new vocabulary to project themselves forward, dreaming of a new «natural», «biophilic» or «fertile» future.

These aspirations are rooted in two intuitions: nature is now seen as quintessential to and inseparable from quality of life. Nature is also perceived as easier to protect and maintain when it is part of everyday life and close to where people live and work, which, for the vast majority of people, means in cities and suburbs. Trees have thus become a key component of a 21st century definition of urbanity. As an emblem of urban nature, trees are now invested with an ever-greater symbolic value, which reinforces their already strong position in the collective imagination.

… STILL OFTEN POORLY TREATED

In spite of strong social demand and progress in the adoption of higher standards of tree management, cities remain hostile environments for trees. Air pollution, de-icing salt, hot glare from glass frontages, permanent shade cast from tall buildings… the functional needs of cities inherently create harsh conditions for trees. More often than not, this is made worse by direct aggression caused by:

> Vehicles bumping into trees or illegally parking on their roots.

> Acts of vandalism such as snapping branches and carving inscriptions.

> Using trees as a support to hold cables, display posters, hang a coat rack or even a bar table…

> Dog owners letting their canine friends burn trunks and roots with urine and excrement.

When small conflicts arise, residents often still prefer the easy solution of sacrificing the tree and its needs. From branches that obstruct a view and falling leaves and fruit to the presence of insects, the most minor inconvenience can lead to requests for severe pruning or complete removal of the culprit tree(s). Resolving these conflicts – whether real or exaggerated – requires time and resources from the GLA's arboriculture team and adds up to a significant expense.

ABOVE ALL, TREES ARE LIVING ORGANISMS

How can one explain that, while social demand for urban trees is at an all time high, trees are routinely subjected to aggressive behaviours? Often involuntary and even unwitting, such attacks are for the most part due to a lack of understanding and acknowledgement of the fact that trees are living organisms.

The image of urban trees as objects, at worst on par with street furniture or at best akin to some sort of monument, dominates collective representations. In sharp contrast with other plants, trees can seem particularly robust and almost invulnerable. However, in spite of appearances, wounds inflicted to the bark or to the roots of trees can strongly deteriorate the health of these trees and even lead to early death if repeated. Contrary to public perception, the most life-critical wood layer in a tree trunk is on the outside, not the inside.

Trees tend to be perceived as permanent features of the urban landscape. Due to their long lifespan, envisioning the life cycle of trees requires an effort of imagination. It is important to ensure that the emotional connections trees often attract does not lead to forgetting that trees are mortal. The systematic opposition to tree removal and the renewing of trees that have reached their end of life bears many similarities with "therapeutic obstinacy" and, as such, can represent a form of abuse.

However "urban" a tree might be, and although it might be part of a very artificial display of nature, it still remains, above all, a living organism. Acknowledging this is the starting point for granting trees the respect they deserve. As living organisms, trees have needs as well as a life cycle that needs to be taken into account.

The lifecycle of urban trees

Whether growing in an urban or a more natural setting, the lifecycle of a tree is identical. However, in towns and cities, people are responsible for ensuring its biological needs can be met, supporting all phases of its development and managing succession planting.

1/ Urban trees are born in tree nurseries. They stay there for five to 15 years. During this time their crown and root systems are progressively shaped.

2/ The young tree arrives in the city. It needs intensive care to adapt successfully to its new environment and grow happily. This includes regular watering, staking that helps it to stand straight, and formative pruning that, over time, gives it its adult shape and branch structure.

3/ A few years on, the tree is in peak growth and does not require any special care.

4/ When reaching the end of its life, trees produce more dead wood, become fragile, tend to attract parasites and can become a safety hazard. It then requires special care, which can be quite costly: pruning of the dead wood, crown size reduction, cabling or bracing of branches that might break, etc. At this point it is time to plan for removal and replacement.

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A SERVICE-PROVIDING INFRASTRUCTURE

In spite of the special connection people often feel towards urban trees, the prevailing attitude towards them, unfortunately, often results in abuse. The best way to stimulate a more constructive and coherent approach is to analyse objectively the reasons why trees are necessary for contemporary urban living. Such analysis highlights the impressive range of services urban forests can provide.

TREES ARE KEY FEATURES IN THE URBAN LANDSCAPE

Trees are widely recognised for their aesthetic value. The canopy provided by urban trees offers wide-ranging pleasant sensorial stimuli that often inspires artistic creation. However, the value of urban trees shouldn't be exclusively narrowed down to ornamental considerations. Trees are key features in the urban landscape. They can grant a human scale to streets lined with tall buildings. They can also soften transitions between disparate spaces, as well as creating different atmospheres, while helping to hide or emphasise views or architectural features as required. Trees are essential allies for staging and highlighting the positive traits of any townscape.

Trees also help with landscape perception. Trees can help public realm users better gauge distances, heights, and perspective. They also offer reference points for spatial orientation. Trees contribute to local identity and historic character.

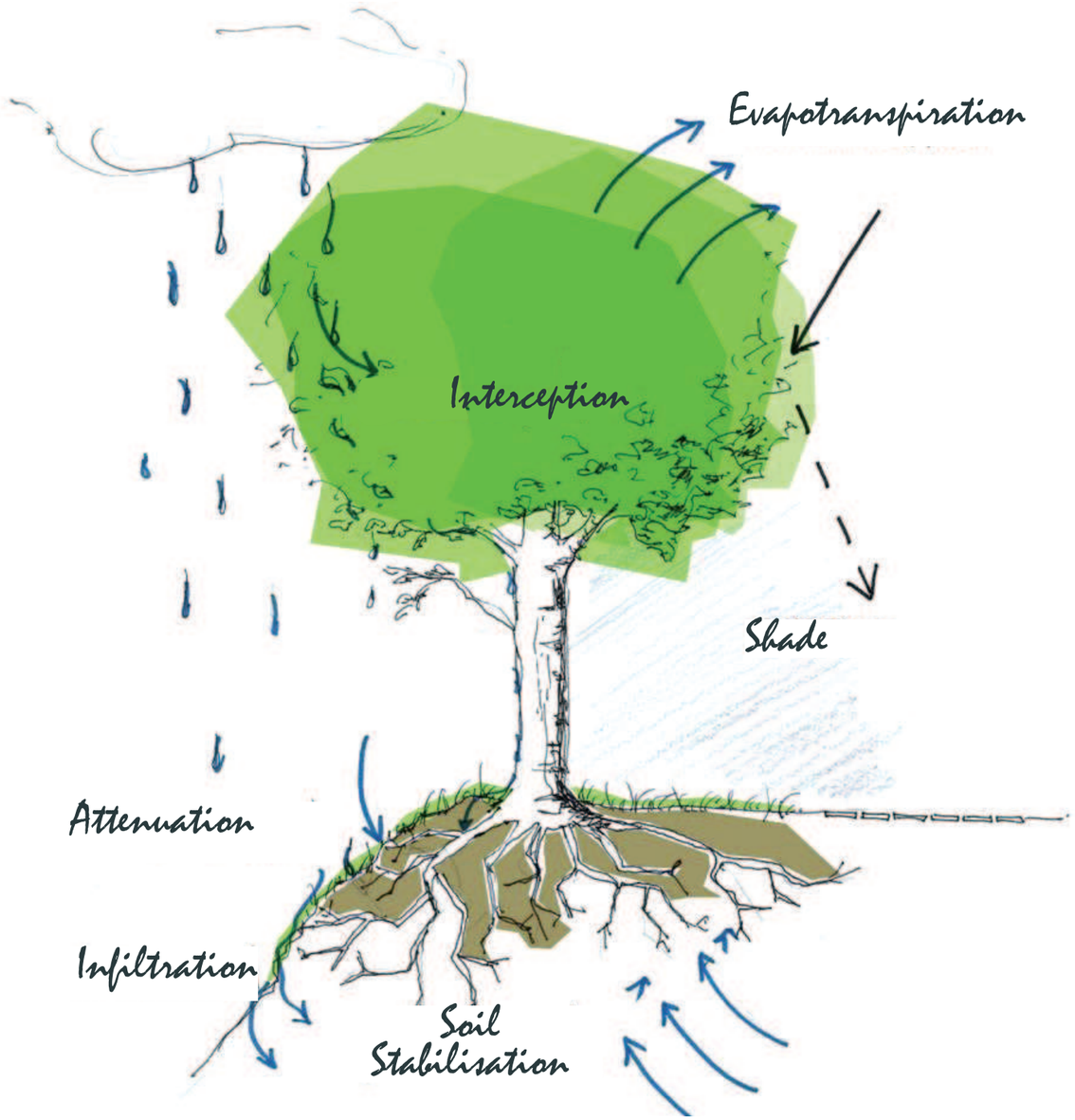
Trees are great time markers in fast changing urban environments where volatility is usually the norm. Their growth testifies to the passing of time, while changes in foliage (for deciduous trees) highlight the passing of seasons. With their long lifespan, urban trees also help create links between generations. The species and planting layouts of trees that have reached maturity today bear witness to past generations' expectations and vision of urban nature. By contrast, the planting of new trees is a great opportunity to look to the future and reflect on the urban landscapes to be handed over to future generations.

TREES AS INFRASTRUCTURE

Trees as support for urban biodiversity

Due to their high visibility and strong symbolic value, urban trees have become an emblem for urban nature. Trees are also essential to the health and wellbeing of urban wildlife: they provide food and habitat to a wide range of plants and animals (fungi, birds, small mammals, bats, insects, etc) as well as helping to enhance the ecological permeability of the built environment. The wildlife biodiversity supported by urban tree canopies is directly linked to the diversity of species that make up the local tree population. In addition to this, the adoption of good practices for tree management has positive ripple effects on the health of natural ecosystems and habitats that are found in cities.

Initially intended to help protect tree roots, the planting of ground cover around trees also benefits wildlife by offering another habitat layer.



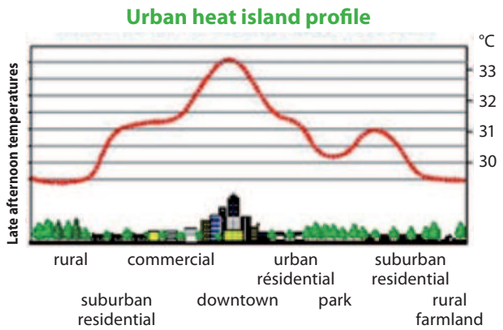
One adult tree = five air conditioning units working 20 hours/day = 11.4kWh of energy saved per day, amounting to 500 euros of energy cost saving per year (assuming a yearly energy consumption of 1000 kWh/yr)

TREES FOR WATER-SENSITIVE URBAN DESIGN

Trees are essential to manage and recycle rainwater in urban areas. In highly impermeable built-up areas, trees help alleviate the pressure on the drainage or sewer systems by intercepting rain with their leaves and branches. Where soil sealing is low, trees are also very helpful in delaying water release into soils, thus maximising infiltration and reducing the risk of soil erosion. Strategies to generalise the adoption of sustainable drainage systems (SuDS) in urban environments should therefore be designed and implemented hand in hand with the local approach to urban trees.

A HIGHLY RELEVANT URBAN COOLING FUNCTION

With climate change, the importance of trees for maintaining urban comfort has become even greater. Trees are very effective at cooling urban temperatures, both passively through shading and actively through evapotranspiration. Trees also facilitate air flow, and thus help to ventilate the built environment. This impact on the urban micro-climate is particularly effective in combating the urban heat island effect and helping cities adapt to a changing climate. The soil around a tree can provide durable carbon stores, which also helps to mitigate climate change.



IMPORTANT SOIL PROTECTION BENEFITS

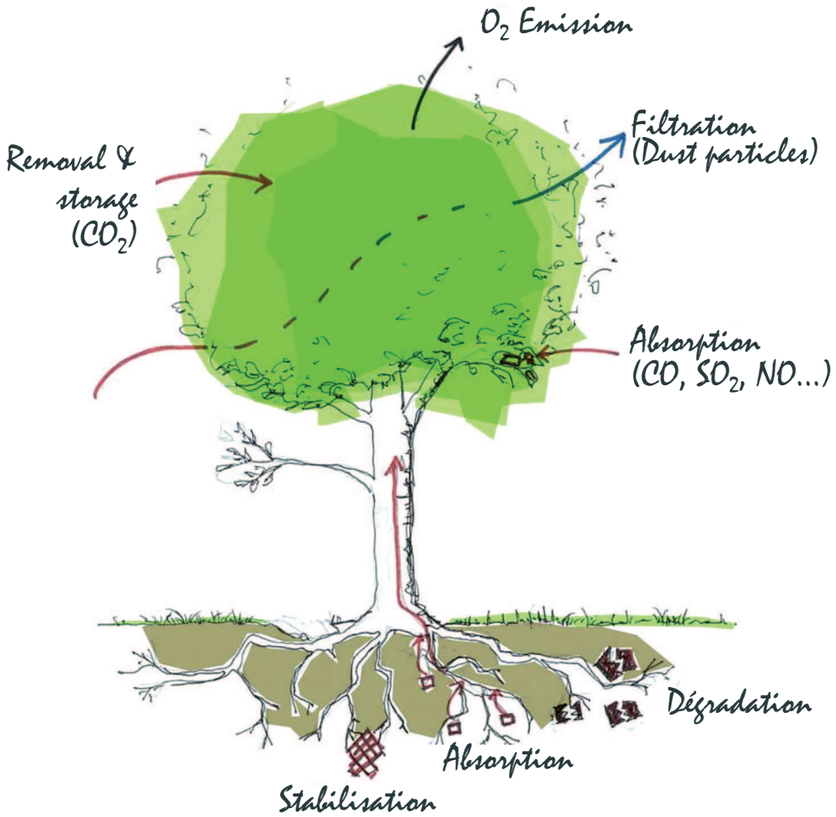
Thanks to their extensive root systems, trees can help to reduce soil erosion, facilitate soil stabilisation and prevent landslides. Trees are critical allies for management and prevention in high geotechnical risk areas such as some of the ravines found in parts of Lyon.

TREES ARE EFFECTIVE AGENTS TO TACKLE URBAN POLLUTION…

… air quality
Trees greatly contribute to enhancing urban air quality. In addition to their well-known ability to produce oxygen through photosynthesis, trees absorb airborne pollutants such as ozone, sulphur dioxide, nitrate dioxide and carbon dioxide in towns and cities. Trees also remove dust and particulate matter found in the air.

… noise
Trees can help reduce noise pollution when integrated with other noise reduction devices (such as embankments and walls). Street trees can also help muffle traffic noises by reducing sound reverberating off building facades.

… soil contamination
Water and soil quality are a critical environmental issue, particularly in urban settings. Urban trees can play a role in addressing this issue. Some tree species such as willow, poplar, birch or locust trees are particularly effective for bioremediation. This approach relies on the capacity some plants have to absorb, neutralise and/or transform a wide range of pollutants (such as metals, pesticides and solvents). Bioremediation is therefore particularly interesting as a way to prepare polluted brownfields or wasteland sites for redevelopment as part of an urban infill strategy to limit sprawl.



TREES FOR WELLBEING AND COMMUNITY COHESION

There is a strong social demand for urban trees. In addition to helping urban environments function better, trees also have direct positive benefits for city dwellers both at an individual and a collective level. Urban trees can help build stronger community cohesion and enhance how safe and healthy people feel.

The presence of trees in cities, particularly within parks and green spaces, contribute to community cohesion. By providing places for children to play, meeting points, or offering shelter against sunshine or rain, urban trees help create places where people can meet, chat and relax. Studies have shown that the higher the number of trees in a neighbourhood, the more local public space is used for a wide range of activities.

In some countries, where planting fruit trees in public spaces is common practice, the integration of trees to local community life is even greater as inhabitants get together for harvesting. If it were to be rediscovered, the food production role of trees could make a significant contribution to the quality of local community life within French towns and cities.

Evidence also shows that, in addition to reinforcing community cohesion, the presence of greenery within towns and cities, particularly trees, can help make people feel safer as well as reduce crime.

A rich and diverse treescape has also been shown to help reduce stress and contribute to psychological health. Some academics go even further and have proposed that there is a cause and effect relationship between the presence of greenery in different forms in urban settings and the reduction of chronic stress, asthma, obesity and illness recovery times.

AN ECONOMIC ASSET

Wood: a renewable material with future

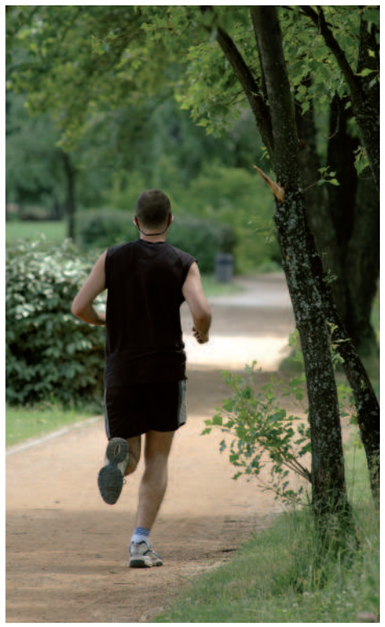
In the current context, the wood industry is bound to have a bright future. As a renewable material, wood is used in product manufacturing, construction and energy production. Strategies to grow a local supply chain for wood-based energy or compost might rely on the creation of suburban woodland, agroforestry development and the recycling of green waste – especially wood arisings (the branches removed from trees or trees that have been felled).

Technologic parc of «La porte des Alpes»

Cité Internationale of Lyon

Trees make places more attractive

Although the varied benefits of trees might not always be understood individually, people still perceive trees on the whole as making places more attractive, whether at a town or neighbourhood level.



The size and diversity of parks and woodlands is one of the main criteria used to assess urban landscape character and environmental quality. The urban forest has an impact on a town's image and the "business climate" it provides to attract inward investment.

A significant return on investment !

What is the value of the services provided by urban trees? This question remained unanswered for a long time due to the indirect and diverse nature of the services provided by urban trees and the beneficiaries involved.

A team of academics supported by the US Department of Agriculture developed an evaluation and modelling tool for urban tree services. Their findings surpassed expectations: while most thought it would at best demonstrate an even balance between tree costs and tree benefits, the assessment showed a positive return ranging from 1.7 to 2.4 depending on context. Urban trees are not only essential to quality of life, they also offer good value for money.

Under the motto "Trees Pay Us Back" many cities across the US have initiated very ambitious urban forestry programmes to significantly increase canopy coverage.

EIGHT PRINCIPLES TO CREATE, MANAGE AND SHARE TODAY'S AND TOMORROW'S TREESCAPES

DIVERSITY: BRINGING AESTHETIC, ECOLOGICAL AND CULTURAL VALUE

Using the landscape value of trees to best advantage
Choosing the right tree for the right place
Building a preventative shield against pests and diseases
Diversity and allergies
Informed diversity
Anticipating climat change and adapting species selection

PERMANENCE: PROVIDING YEAR-ROUND LANDSCAPE INTEREST

Evergreens for permanence in the landscape
The microclimate impact of evergreens
Beyond evergreens
Maximising the length of time deciduous trees are in leaf
"Demographic" management for long-term permanence

LONGEVITY: TURNING TIME INTO AN ALLY

Extending tree life expectancy: planting fewer to plant better
Resisting the temptation to speed up time when planting new trees
Resisting the temptation to fill space
Protecting heritage trees

LANDSCAPE DYNAMICS: INTEGRATING ON-GOING CHANGE

Taking a long-term approach to landscape dynamics
Capitalising on dynamics to deliver ambitious landscape visions
Using landscape dynamics to enhance ecological value and connectivity

ECONOMY: CONTROLLING COSTS AND EXPENDITURE

Planting at the right density
Planting medium-sized nursery stock
Planting in accordance with available space
Planting better for getting longer-lived trees
Achieving substantial reduction in routine maintenance costs
Understanding the asset value of urban trees

ENGAGEMENT: CREATING A SHARED URBAN TREE CULTURE

Listening and understanding
Facilitating acceptance
Awareness raising and education
Sharing ownership

SOLIDARITY: USING TREES TO STRENGTHEN COMMUNITIES

Trees and spatial justice
Trees and future generations
Trees and knowledge sharing
Trees and solidarity

RESEARCH AND INNOVATION: BUILDING A BETTER FUTURE FOR TREES AND CITIES

Lack of scientific understanding
Taking part in the "Plante & Cité" national knowledge network
Continuous improvement through innovation

DIVERSITY:

BRINGING AESTHETIC, ECOLOGICAL AND CULTURAL VALUE

There are over 300 species to choose from when planting new trees in hard landscapes or green spaces across Lyon, offering wide-ranging options for adding volume, structure, transparency, texture and colour to the built environment. A diverse plant palette benefits both wildlife and people. It is also essential for building better resilience to ongoing climate change.

A rich selection of amenity trees to work with
The 300+ tree species that are adapted to Lyon's climate and suitable for planting in the built environment are from diverse origins. Some are native to local woodlands. Others come from further afield in Europe, Asia or America and have been successfully introduced for centuries. Others still are new cultivars born out of horticultural expertise. Together, they offer a rich selection of amenity trees to introduce into the urban landscape.

Building a common culture around trees
The diversification of urban tree species provides local residents with the opportunity to discover a wider range of trees, build greater appreciation of them and ultimately, develop more respect for them. When supported with adequate communication strategies, planting new trees as well as other essential urban forest management interventions (pruning, clear-felling, removal and replacement) become practices that belong to a shared urban tree culture.

Using the landscape value of trees to best advantage

Trees are more than greenery. Trees derive their aesthetic value from many attributes including flowers, barks, foliage nuances and luminosity, crown shape and type of shade cast. Choices made in mixing species or in pruning regimes also have a strong impact on colour variation and form. These attributes and options provide the material for an endless variety of compositions.

Abiding by the diversity principle does not mean closing off the possibility of adjacent planting of several trees of the same species to help structure and unify the urban landscape. The diversity principle can be compatible with the French tradition of single-species avenue planting, as long as each of these homogenous structural elements draws from a wide palette of trees. Trees can be used to help convey the hierarchy of urban spaces by using the logic of varying composition eg linear and regular plantings along arterial or collector roads or civic spaces with high symbolic value; more informal plantings or garden-like approaches in a residential context.

Choosing the right tree for the right place

"Right tree, right place» is the basic principle for planting design. In a context in which the available space for planting is limited and heavily constrained, species diversity offers great advantages. Having a wide palette to choose from gives a better chance of finding the tree species with the characteristics and growth patterns that will best suit the site – thus limiting the need for costly post-planting pruning regimes or other intensive management activities.

Tree species choice is too often primarily driven by aesthetic considerations such as crown volume and shape and/or flowering and foliage characteristics. To mitigate against short, medium and long term failure risks associated with climate change it is essential that species are selected on the basis of their adaptation to their anticipated growing environment. In the majority of projects, too little consideration is given to analysing and taking into account the specific characteristics of each planting site.

Building a preventative shield against pests and diseases

Like other living organisms, trees are vulnerable to pests and diseases. In some cases, this can quickly turn into a fast-spreading epidemic. Contributing factors might include wind, insects, birds and interventions by people. Most epidemics are species specific: they will only affect one type of tree. This is why concentrating many trees of the same species in the same area greatly increases biosecurity risks. By contrast, natural environments with diverse species are better equipped to withstand epidemics.

> Diversification of species is the only effective, cost-effective and sustainable solution to plant pathology issues.

Setting a clear target figure is very helpful when it comes to implementing the diversity principle. The 10% diversity rule needs to be adopted by others involved in the management of trees. This rule aims to ensure that no single tree species represents more than 10% of the total tree population under management. This will ensure that, in the case of an epidemic, only 10% of the Lyon's tree population would potentially be affected. The landscape, technical and financial impacts of a crisis of such a scale would be manageable.

The special case of plane trees
The enthusiasm for plane tree planting since the 1830-40s has created in Lyon, like in many other French cities, a monoculture situation. A number of factors have contributed to this: planes are easy to clone and multiply, are very adaptable ecologically and architecturally, and grow rapidly. Overuse has facilitated the development of a number of diseases, including the canker stain disease, which appeared in Lyon in 1992. To limit the spread of this incurable pathology, the systematic removal of affected specimens is now a legal requirement.

Between 1992 and 2011, the proportion of plane trees in the GLA-managed tree population decreased from 52% to 26%. This rebalancing is the combined result of a high death rate in planes and the commitment to no longer plant new ones, instead systematically choosing a diverse range of species for all new or replacement plantings.

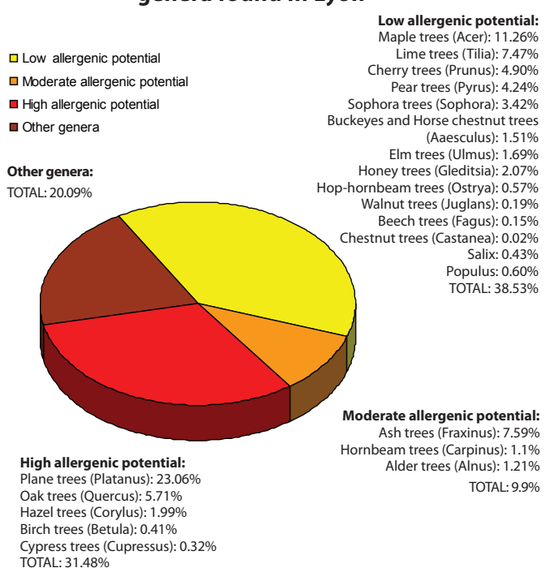
DIVERSITY AND ALLERGIES

More and more people today suffer from allergies. Airborne pollution has increased urban residents' sensitivity to dust mites, house dust, pollens, etc, including tree pollens. Issues do not arise with all tree species. The most allergenic pollens typically come from the native species such as birches, poplars, alders, ashes, pines and oaks, that are commonly found in and around Lyon and have fine pollens that can be easily carried by wind over long distances. Addressing tree-related allergy issues is complex because it is dependant on much more than the management of the urban tree population. Action is therefore required at two levels :

> Within projects, care is required to avoid creating concentrations of allergenic species.

> An effective communication strategy needs to be developed to warn people of upcoming pollen level variations, based on data gathered from "sentinel pollen gardens".

Allergenic potential of the main tree genera found in Lyon



INFORMED DIVERSITY

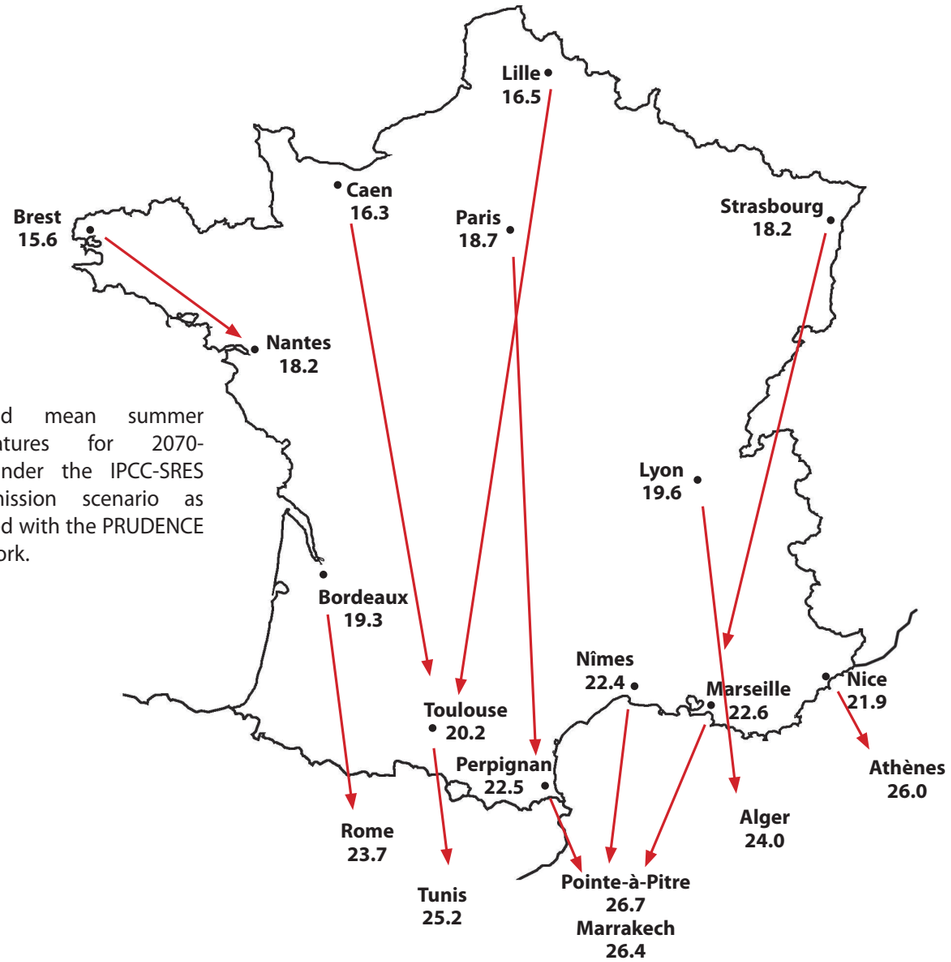
Although tree species diversification offers unarguable landscape and disease prevention benefits, its implementation still warrants careful consideration. To avoid uninformed approaches resulting in landscape character loss, the use of character assessments conducted at the right (often cross-boundary) scale to match key landscape character areas (such as the Saone Valley or the Franc Lyonnais) should be encouraged.

In proximity to natural green space and rural areas, the use of native species, especially for hedges, should be encouraged. This approach helps to soften the transitions between built-up and rural areas and supports biodiversity.

Lyon enjoys a diverse landscape, with strong local identities

ANTICIPATING CLIMATE CHANGE AND ADAPTING SPECIES SELECTION

To achieve long-lived plantings, it is of utmost importance to take into account anticipated climate change. While debate remains on the scale of the phenomenon over the medium and long-term, or on the potential impact man-led mitigation measures might have, research conducted around the world over the past 20 years has demonstrated that our climate has been affected by global warming. It is already established that, by the end of the 21st century, average temperatures will increase by +2 degrees celsius (according to the most optimistic forecasts) up to +6 degrees celsius (according to the more pessimistic scenarios). It is helpful to keep in mind that, since the last glacial era, temperatures on earth have risen by +5 degrees celsius, and that a one-degree increase leads to a 150km northward shift in species range (ie with a one-degree increase, the plant mix that is best adapted to the new climate is one that was previously best adapted to more southern latitudes).



Projected mean summer temperatures for 2070-2100 under the IPCC-SRES A2 emission scenario as modelled with the PRUDENCE framework.

Hackberry, a mediterranean species increasingly used in Lyon

In this context, species selection becomes central to the design of an effective planting strategy not simply for aesthetic or landscape considerations, but also to ensure the newly planted trees will be able to cope with the anticipated temperature rise.

In addition to species diversification, a progressive shift towards more heat-tolerant species is required. This will affect landscape perception and visual identities across Lyon. Modelling work will be required to help better anticipate the impact of and imagine adequate responses to these important changes.

BUILDING KNOWLEDGE

It is important to monitor the growth patterns and maintenance needs of the new species being introduced in Lyon, paying particular attention to responses to climate change. Indicators might include phenological traits (leafing, blooming and fruiting cycles) as well as pests and diseases.

Collating this information and comparing it with results observed in other locations are two essential steps to building a reliable knowledge base for climate-wise plant selection. VégéBase, the online plant database developed by Plante & Cité, provides a useful tool to compile and share such information.

PROVIDING YEAR-ROUND LANDSCAPE INTEREST

Attractive city life requires year-round landscape interest, celebrating the changes in atmosphere brought by different seasons. To achieve this, a better understanding of the seasonal variations of plants needs to be built into projects.

Evergreens for permanence in the landscape

Street tree planting in Lyon traditionally favoured deciduous trees, especially planes. This largely explains why today it is only in summertime that Lyon's landscapes feel the richest. The introduction of some evergreens – whether conifers or broadleaves - can help provide greenery all year round. They can be used for street tree planting so long as they do not create a screen blocking the view of nearby properties. Evergreens can also bring value when planted in isolation within public or private gardens, enlivening the winter scene.

It is very important to factor in seasonal changes in the design process. This should be considered for each vegetation layer.

Quick sketches, showing the visual impact of proposed plantings for each of the seasons, can facilitate the integration of seasonality into the design process.

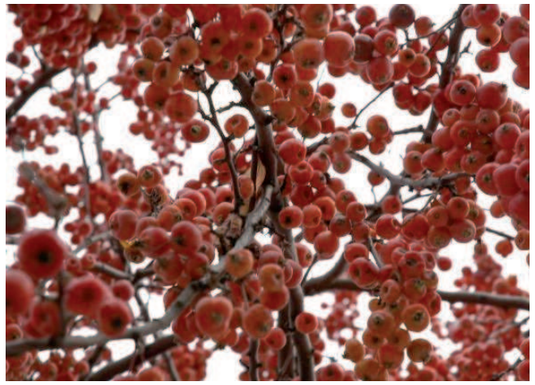
The microclimate impact of evergreens

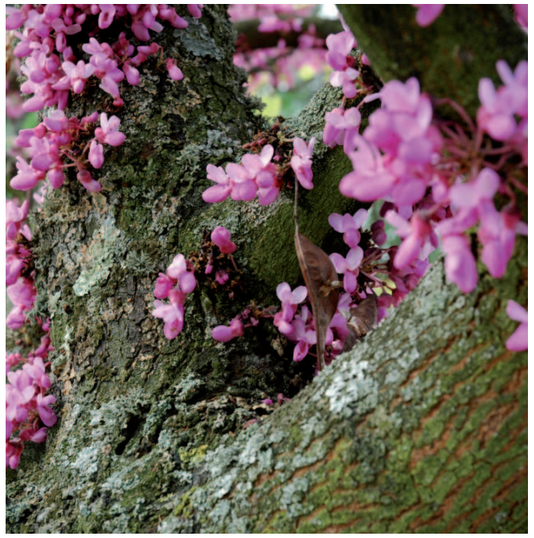
While evergreens can help to enliven the winter landscape, careful consideration is needed of their impact on local microclimate. While shade is often desirable in the summer, it is important to let the sun hit buildings in the winter to help warm buildings up. Deciduous trees should therefore be preferred in close proximity to building facades.

Beyond evergreens

Springtime blooms, leaf colour in summer and fall, the type of bark and fruits all contribute to landscape character changes throughout the seasons. The winter silhouette of trees also varies from species to species and brings aesthetic value and structure to the townscape. This can be amplified in public parks as well as in private gardens by adding other vegetation layers such as shrubs and grasses. The resulting diversity of colour and shape further enhances the year-round interest of plantings found in the townscape.

Combining evergreen trees with other vegetation layers helps to provide habitat and food for wildlife during all seasons. It contributes to maintaining ecological connectivity all year round.





Making the most of species diversity and vegetation layers helps to create year-round high-impact landscapes.

MAXIMISING THE LENGTH OF TIME DECIDUOUS TREES ARE IN LEAF

Limited pruning will help ensure most branches, leaves and buds are preserved and that leaves open at the normal time, ie typically around April. If the trees were planted well and adequately spaced, they will then grow vigorously and stay in-leaf late into the autumn. By contrast, severe pruning will delay the leafing process by one to two month(s) and create a sad-looking winter scene.

"DEMOGRAPHIC" MANAGEMENT FOR LONG-TERM PERMANENCE

There are many reasons why the urban treescape is constantly changing, including differences in growth rates and life expectancy, accidents, diseases, and scheduled removal. To confer some form of overall permanence in spite of its ever-changing constituent parts, a "demographic", strategic and future-looking management strategy is required. New tree production and new planting must compensate tree deaths and removals. The long-term resources needed for planting and felling must therefore be proactively anticipated. A demographic approach to tree population management equally applies to street trees and park trees. It is essential to the long-term successful creation of attractive urban landscapes.

Across Lyon's public space, around 1,000 dying trees are removed and replaced every year. Maintaining adequate levels of management skills and resources is essential to preserve a balanced demographic profile in the local tree population.

LONGEVITY:

TURNING TIME INTO AN ALLY

The life expectancy of urban trees is usually shorter than that of their cousins growing in their native natural settings. While trees can live for several hundreds of years in the wild, they rarely exceed one hundred years in the city, and urban tree life expectancy is typically is no more than 50 to 60 years. This is largely due to poor planting conditions in the past two centuries and the growing stress factors affecting urban trees. However, this trend can be reversed if greater attention is given to the enabling factors for growing long-lived urban trees.

Extending tree life expectancy: Planting fewer to plant better

Achieving a better return on the investment that is tree planting by maximising the number of years any given tree remains healthy requires creating adequate conditions right from the start. This includes:

> Choosing a planting density that is adequate to the species and the context.

> Selecting a species that is adapted to the above-ground space available for canopy growth – without requiring repeated pruning.

> Providing a rooting environment that is adequate in quality and size to support the tree effectively.

> Supporting the natural growth of the tree with limited pruning.

> Providing protection against vandalism, collisions and soil pollution.

Cities are manmade environments. The conditions in which urban trees grow are therefore a matter of choice. Such conditions can be improved if greater attention is given to catering to tree needs, such as soil volume and access to water. Providing urban trees with the opportunity to better fulfil their genetic potential for long life is a critical stepping-stone towards sustainable development.

Across Lyon in 1996, 48% of the 1,000 trees being replaced in highways and civic spaces were less than 30 years old, and only 8% were one hundred years old.

Resisting the temptation to speed up time when olanting new trees.

In an effort to meet the demand for greener urban environments as quickly as possible, it is not uncommon to see the transplanting of older trees, the planting of new young trees at too high a density, or the promise of trees that will immediately look like mature ones. Such approaches are costly to start with and have proven to be ineffective in the medium and long term. Larger caliper (ie older) trees are more expensive, tend to recover with greater difficulty from being transplanted, and have a lower life expectancy than their smaller (ie younger) counterparts. Choosing to plant trees that are already very large is even less justified when taking into consideration the fact that well planted and adequately maintained younger specimens will very quickly fill the available space. Young trees chosen from a high quality stock should come with all the root system they need to establish quickly once planted.

Cutting down a tree is undeniably heartbreaking. This is precisely why it is critical to communicate effectively in such circumstances, so as to make it less traumatic while at the same time not dismissing the impact. It is also important to build up community interest in young trees, raising awareness about their characteristics and advantages.

Urban development and tree growth both need time to achieve successful outcomes.

Preconceived, well-intentioned ideas about tree transplants are a financial and technical miscalculation.
It is believed that transplanting will help to:
> Save an older tree that would have been removed to make way for a new development.

> Appease local residents who are used to having a tree in their everyday environment.

> Save time and offer a mature landscape for the site where the tree is transplanted.

In reality, transplanting a tree:
> Is very costly: transplanting an old tree will cost 10 to 100 times more and it will have a shorter lifespan than a newly bought young one.

> Is impractical: millions of young trees are available in nurseries.

> Has a high risk of failure: there is a high chance that the tree will either die or vegetate because too many roots have to be pruned to allow for the transplant to take place.

... Resisting the temptation to fill space

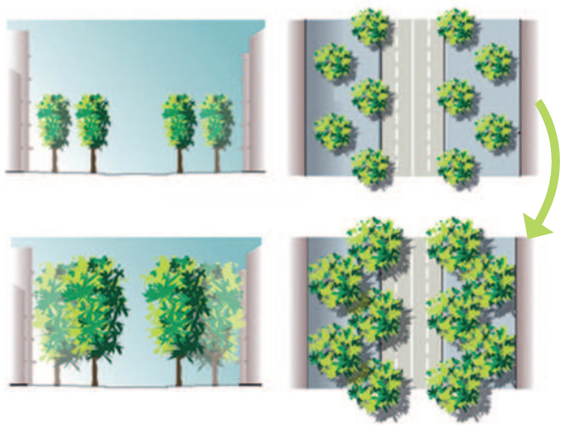
Over-planting is another common misplaced response to the desire to achieve instant effect. A canopy of trees planted too close to one another will inevitably join and can create a «green wall» that obstructs light and views for nearby residents. Unfortunately this is a situation that is too often seen and culturally accepted in our urban landscapes.

Achieving the right tree spacing can be done in one of two ways - and which is best is a debate that has been dividing tree specialists for the past 200 years:

A/ Planting at high density. This gives priority to achieving instant visual impact and relies on progressive clear-felling as trees grow older. Often favoured during the 20th century, this solution was rarely implemented in full, as it proved difficult to remove healthy trees when time had come to fell. Poorly implemented, this strategy has led to the over-abundance of costly tree populations due to the level of regular pruning required.

Planting at high density can be appropriate when working with a very young tree stock (saplings) that will benefit from being planted very close to one another and progressively clear-felled to adapt the tree density to the volume of these trees. Planting at high density can also prove a suitable solution when combining short-lived and longer-lived trees. The felling of the faster growing, shorter-lived trees will coincide with their natural end of life.

B/ Planting at final density. Under this approach, enough space is provided between trees so that they can reach their mature size without interfering with one another. This approach seems more appropriate for the urban environment: it avoids the psychological trauma associated with tree removal as well as the added expenditure required to clear-fell high-density plantings. It also removes the need for costly and unattractive pruning.



Staggered planting along the Croix-Rousse boulevard keeps the visual impact of two rows of trees on each side of the road while providing enough space in between neighbouring trees for unimpeded canopy growth.

Protecting heritage trees

Due to their age, their location or their unusual species, some trees might have heritage value. But unlike monuments, heritage trees are living organisms with a declining capacity to adapt and recover from stress as they grow older. It is therefore essential to build inventories and protect such high-value specimens, whether they are located on private or public land. Planning requirements and works specifications need to take a stringent and concrete approach to their protection: it is not for the tree to adapt to the project but rather for the project to adapt to and support the protection of heritage trees.

LANDSCAPE DYNAMICS:

INTEGRATING ONGOING CHANGE

Because trees are living organisms and need a long time to mature, the landscapes they inhabit change over space and time. This evolutionary dimension is captured by the concept of landscape dynamics. It must be taken into consideration early on in projects, as soon as design concepts are being developed. This ensures the resulting landscape provides value at all stages of its life and helps to limit the extra maintenance costs that often result from poor anticipation of the maturation process.

Young and mature pines have very different silhouettes and landscape impacts. This promises to bring a spectacular transformation of the Place des Archives over time.

Taking a long-term approach to landscape dynamics

Adequately integrating landscape dynamics into projects requires forethought, starting with the initial design stage. Key areas to focus on include species choice and layout, maintenance plans and timing for succession planting. It is also important to ensure that maintenance and renewal activities are conducted as planned over the long term.

Between the time when it is planted and the time when it reaches maturity, the shape and aspect of a tree evolves quite considerably. As a result, a tree-rich townscape never remains the same. This landscape dynamic ought to be understood, respected and factored into decision-making.

Generous and majestic landscapes are critical in making towns and cities attractive. Residents enjoy being able to go for a walk to get a feeling of respite from the hustle and bustle of city life. In a generous landscape, adequate space is provided to allow tree canopies to fully develop their natural shape.

Townscapes are compositions of built forms and open spaces. Because urban development is too often approached as a gap filling exercise, the rare remaining open spaces become a premium.

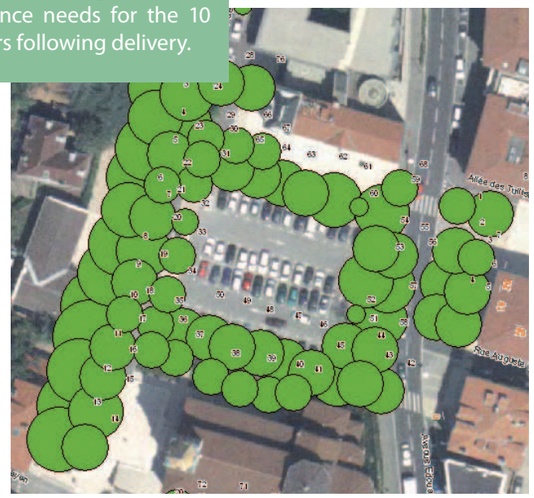
> Using landscape dynamics as a design tool

Alongside species diversity, another effective way to achieve varied landscape composition and scale is to play with the way in which trees evolve during their lifecycle.

Designing with landscape dynamics in mind is also a great way to create the environment that will deliver the veteran trees of tomorrow.

It is important to integrate the concept of landscape dynamics into projects right from the initial stages of design and anticipate the management and maintenance needs for the 10 to 20 years following delivery.

Quality of planting should override quantity. Rather than the number of trees, performance indicators ought to focus on qualitative outcomes such as total canopy cover, length of highways shaded, etc...



The Greater Lyon Authority is now able to calculate and model the canopy cover of highways.

Capitalising on tree ynamics to deliver ambitious landscape visions

> Not giving up on large-growing trees

The dynamic quality that trees bring to the urban landscapes needs to be approached as an asset rather than as a liability. It should be factored into projects right from the initial design stages without leading to a lowering of ambitions. In too many instances, project designers take the easy way out of constructively integrating landscape dynamics into projects by systematically favouring small or medium-sized trees. This tends to create imbalanced and uninspiring landscapes where the green elements are out of proportion with the surrounding urban fabric.

Using landscape dynamics to enhance ecological value and connectivity

Tree planting and landscaping schemes should aim, as far as possible, to reinstate a natural ecosystems dynamic. This requires a deep understanding of the effective use of plant species combinations in response to local site characteristics. Design choices should aim to deliver an ecological equilibrium, where the need for recurring maintenance interventions (pruning, spraying, watering) is limited.

The successful delivery of greener, more attractive towns and cities requires a focus on achieving sound ecological equilibrium in all new landscape schemes so as to keep ongoing maintenance costs under control.

ECONOMY:

CONTROLLING COSTS AND EXPENDITURE

Planting and managing more trees for less is a requirement in the context of the current focus on cost effectiveness. It is a major objective for urban landscape managers. Securing better return on investment is one of the main outcomes associated with the first four principles presented in this charter.

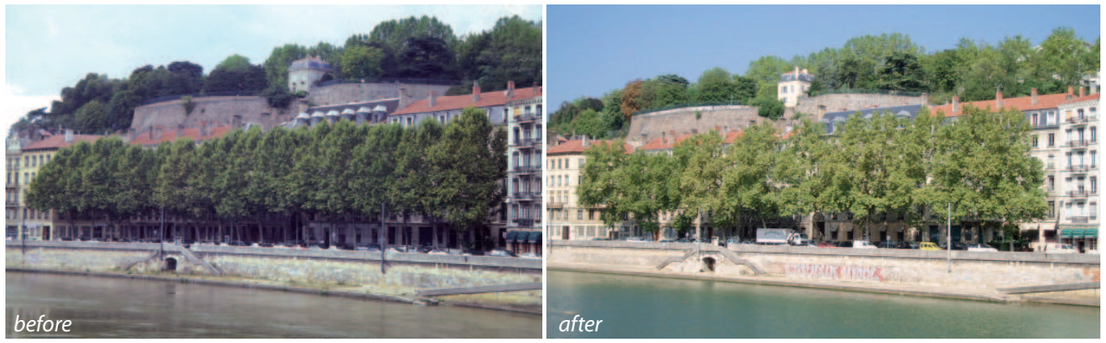
A landscape that is designed with naturally occurring change in mind, is diverse and therefore resilient to pests and diseases, has year-round impact and is long-lived is, essentially, cost-effective.

Planting at the right density

Planting a tree every 12 metres costs half as much as planting one every six metres. Within a given capital budget, choosing the right planting density can enable the funding of twice as many projects and meet the demands of twice as many residents while providing the same level of business to the contractors and supply chains involved in delivery.

Planting in accordance with available space

Planting the right tree in the right place is essential to minimise maintenance costs, particularly for pruning. It is sometimes better to take the decision not to plant at all.



Along the Saône River embankment, the same visual impact is achieved after the clear-felling of half of the trees, but nearby residents enjoy much more light.

Planting medium-sized nursery stock

Semi-mature trees (18-30cm in girth) grow faster and are significantly less expensive than larger nursery stock. Within a few years, a smaller calibre tree will most likely have caught up in size with older trees that were planted at the same time. The use of large calibre trees might still be worth considering in combination with younger specimens when instant impact is required. Under such circumstances the quality of the nursery stock used for the larger specimens will require thorough investigation, with a particular focus on the traceability of transplants.

It is perfectly normal to have young trees in the landscape: this is a prerequisite for endowing future generations with mature plantings.

Planting better for getting longer-lived trees

Planting a tree is an investment. Returns are all the greater when the longevity of the tree is maximised. Securing quality nursery stock and adequate rooting environments – two critical enabling factors for long-lived trees – should be made a priority.

Achieving substantial reductions in mantenance costs

Reducing the frequency and scale of pruning will help lower maintenance costs, which currently represent 70% of the total budget allocated to the maintenance of GLA trees.

Understanding the asset value of urban trees

Urban trees are typically looked upon as a cost-generating liability rather than a service-providing asset. The benefits well-integrated trees can provide to an urban setting are wide ranging, including health and wellbeing (stress reduction, contact with nature), environmental mitigation (regulation of the local micro-climate and water cycle) and economic (enhanced property values and attractive areas for business). Such benefits are difficult to quantify and express in monetary terms as they rarely have a direct financial translation. However, to ensure the returns trees can provide are truly maximised, better, more holistic evaluation models need to be used as part of a sustainable approach to urban development management.

Raising awareness of the wide-ranging benefits urban trees can provide is an essential step for changing mindsets and behaviours.

Rationalising quality of and approach to planting

Implementing the four first principles set out in this charter provides the best means for achieving the economy principle described here.

In a context in which resources are increasingly scarce, it is highly likely that the criteria driving decision making will shift considerably. Traditional criteria, such as aesthetic or use value or operational efficiency are likely to become secondary considerations to a more fundamental assessment of what is essential and non-essential to provide.

ENGAGEMENT:

CREATING A SHARED URBAN TREE CULTURE

Successfully enhancing the presence and role of nature in cities is largely down to good communication. Broadcasting information is not enough: a deeper level of understanding and a cultural shift are needed to achieve behavioural change. Ultimately, informed engagement and the participation of the local population is the best way to build sustainable cities with trees.

Listening and understanding

Local citizens' expectations are often varied and contradictory and, as a result, hard to identify and quantify. Getting better at listening to people's needs and feelings is essential if a meaningful dialogue is to take place about key objectives and a shared vision. Surveys based on an adequate sample size to yield representative results can be a useful tool.

New planting, whether in the public realm, in a park, or in a woodland, provides great opportunities for community engagement and participation, helping to raise awareness of the role of nature in cities.

Facilitating acceptance

A better understanding of people's needs and perceptions might, at times, reveal the existence of misunderstanding, as well as of psychological blocks or cultural taboos, in respect to tree felling, change, etc. To address these issues, providing people with access to information is important.

Time is critical when it comes to managing urban trees. This is particularly important to emphasise when communicating about the urban forest.

Awareness raising and education

Everyone has a role to play in the sustainable management of the urban tree population. Whether a land owner or a resident, all should know about the benefits trees provide. Awareness of and appreciation for these benefits should be nurtured from an early age with children through working in partnership with schools and community groups.

> **Arbour Day:** organising festivals and events focused on trees and nature in the city and offering self-guided tree walks through local neighbourhoods are great ways to enable people to learn about the trees that grow in their surroundings and to appreciate them.

Sharing ownership

Public local authorities are not the sole custodians of quality of place: everyone has an impact on it through their daily lives. In many neighbourhoods the trees that give strength and texture to the local landscape are located on private land. Opportunities for planting may only exist in the private realm. All land owners and managers, whether individuals, businesses or agents, have a role to play in the protection, management and planting of trees.

The right type of information and advice needs to be made available to land owners, including «how-to» guides on pruning and species selection, as well as technical and financial support through better linkages between key players.

Owning land with trees is not a prerequisite to getting involved in the protection of the local tree population. Everyone can make a significant impact through their day-to-day behaviours (eg paying attention to avoid damaging a nearby tree when parking), as well as by becoming involved in community projects (eg planting at a local derelict site, adoption of a tree planter, etc).

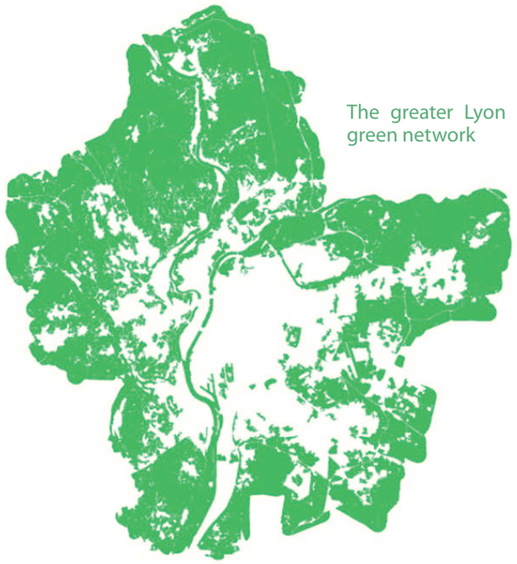
SOLIDARITY:

USING TREES TO STRENGTHEN COMMUNITIES

Trees have always been imbued with strong symbolic value. Images of the giving tree (offering food, energy, medicine), the tree house (providing shelter and protection) or the divine tree (linking the heavens and earth) are repeatedly found in traditional cultures and civilisations across the world. Trees also play an important role in people's perception of place and time. Trees are used as markers of passing time and their longevity grants them an aura of immortality. Their presence shapes the visual identity and character of many places.

Due to their symbolic value and essential reference point role, trees provide a perfect tool to help strengthen communities. Trees offer a valuable perspective on and vehicle for tackling the acute contemporary challenges our society faces in respect to cohesion and altruism. The links between trees and community strength or cohesion have both socio-political (in respect to disparities in access to nature) and trans-generational dimensions. There are also issues associated with knowledge sharing.

Taking a strategic approach to the planning of a well-distributed network of natural green space, including new areas of woodland in parks and new suburban forests in areas with limited canopy cover, can help achieve better access to trees for all.



The greater Lyon green network

Access to trees

Amenity trees and green spaces are rarely evenly spread across an area. Their distribution is influenced by multiple geographic factors (topography) and social factors (land use, history of land development, planning). Given the benefits urban trees can provide, from micro-climate regulation and pollutant removal to noise attenuation, their presence has a strong direct and indirect impact on the comfort and health of nearby populations. Urban sustainability can only be achieved if efforts are made to provide all residents with good access to services – including those provided by nature – as well as avoiding creating discrepancies in risk exposure. Strategic planning is required to ensure that there is equal investment in the key environmental contributors to quality of life in all neighbourhoods. The protection of existing, and provision of new, trees and green spaces are two essential tools for this.

Trees and future generations

One of the fundamental principles of sustainable development is to take future generations' wellbeing into account when making choices today. This mindset applies particularly well to trees whose life expectancy can span at least one human generation. Planting a tree is, by its nature, a trans-generational act that commits to the future. However, at a time when demands for immediate results and a certain egotistical sense of self abound in contemporary society, short-termism often dominates choices. The management of urban trees requires a long-term vision, one that looks to the future. A balance needs to be constantly found between protection and renewal so that the tree population that gets handed to the next generation is of good quality and sustainable.

The Gratte-Ciel neighbourhood in the Greater Lyon borough of Villeurbanne in 1934

In 2005, the same neighbourhood is home to a new generation of trees

Trees are an age-old symbol for altruistic values. In a Chinese proverb dating back several centuries, a wise man nearing death is asked what he wants to do while waiting for death. His answer is: "I want to plant trees because they outlive us and link us to future generations."

Trees and knowledge sharing

Like any other area of knowledge, urban arboriculture needs to be formalised, consolidated and shared. Formalisation is important because knowledge about urban trees is too often rooted in an oral tradition and, therefore, at risk of disappearing when the knowledge holders pass away. Consolidation is equally essential: multiple experiments, hypotheses, failures and successes over decades require coordinated validation to accumulate effectively into knowledge. Sharing ensures everyone can benefit: all key local stakeholders, as well as partners from further afield.

> As part of cooperation programmes with developing countries, the Greater Lyon Authority is involved in urban forestry training in Ouagadougou, Burkina Faso and Ho Chi Minh, Vietnam

The Échos-Paysage online resource created by the National Organisation of Landscape Contractors (UNEP), the Regional Agriculture and Forestry Unit, the City of Lyon and the Greater Lyon Authority provides small organisations, whether public or private, with knowledge and advice on how to integrate sustainable development principles in the land or projects they manage.
Visit www.echopaysage.fr (French language site) for more details.

Trees and solidarity

Trees are an effective vehicle to promote charitable giving and solidarity.

> Solidarity trees: The Notre Dame des Sans Abris homeless shelter initiated the Solidarity Trees programme in 2000 in partnership with several public sector agencies in Lyon, including the Greater Lyon Authority. The programme offers public or private sector donors recognition through a newly planted tree in a park or street, while all funds collected are used to help improve services to homeless people. Such initiatives illustrate the power of the symbolic value of trees to bring together environmental, social and economic issues.

Today, the Solidarity Trees programme is one of the primary sources of funding for the Notre Dame des Sans Abris homeless shelter.

Towards new partnerships to improve the urban forest?

In many countries, such as the United States, the planting and management of trees is delivered primarily through private sector interventions. By contrast, in France, local government is solely responsible for bringing nature into the built environment. Without forecasting a complete shift from one model to the other, a few clues seem to indicate that private patronage could soon play a greater role. Close to Paris, the publicly run Versailles Castle Estate now call on private philanthropy to help sponsor the renewal of trees in its estate. French non-for-profit organisations draw private funding towards the protection of the Amazonian forest through "adopt-a-tree" programmes.

Greater involvement of the private sector in the integration of nature in the built environment would not replace but rather complement public sector interventions. Trees are an easy candidate for further exploring this partnership approach.

RESEARCH AND INNOVATION:

BUILDING A BETTER FUTURE FOR TREES AND CITIES

To really adhere to the principles of sustainable development, the Tree Charter needs to facilitate research and development, particularly within Greater Lyon Authority-led public realm and green space projects. The reason for this is simple: the resilience of new plantings and the ability to control associated expenditure requires robust technical expertise. Developing such urban arboriculture and landscape management expertise requires proactive investment in research.

Lack of scientific understanding

The planting and management of urban trees has relied for a very long time on empirical knowledge. Contemporary practices still largely reflect this: very few have been subject to scientific validation. To fill this void, practitioners tend to default to standards and approaches that date back from the Haussmann era. However, planting conditions have drastically changed since the mid-19th century when Baron Haussmann was shaping Paris with tree-lined avenues. Furthermore, the evolution of scientific research and technology has considerably opened up opportunities for developing new solutions.

For the past 15 years the Sciencil programme has used the development of the Cité Internationale, a large regeneration programme of a former exhibition centre and fair ground in North Lyon, as an open research lab. The plantings have been monitored so as to generate extensive data to help validate innovative landscaping techniques and better understand the ecosystems of newly created landscapes.

Taking part in the Plante & Cité national knowledge network

Plante & Cité is a not-for-profit organisation dedicated to research and knowledge sharing on issues related to the integration of nature in built environments. Plante & Cité brings together the main local and regional authorities with key public and private stakeholders in the landscape sector. This network aims to compile existing scientific and technical knowledge on urban greening from international sources and to coordinate related applied research activities in France. Several local authorities, companies and consultants based in Lyon are members of this network, thus facilitating access to partners for research.

Growth studies

Soil studies

Continuous improvement through innovation

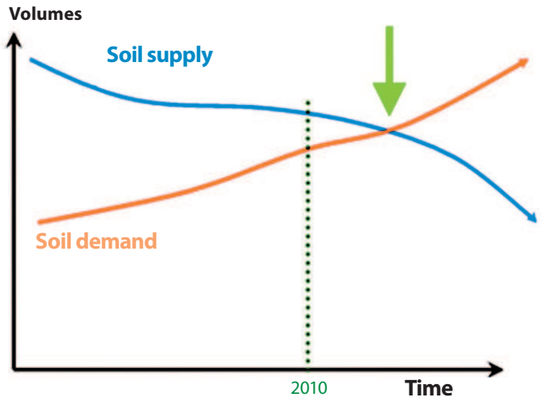
Special attention needs to be given to bringing innovation into projects – whether at a technical level or in the wider conceptual approach applied. All new major public realm projects or large development programmes should facilitate applied research on urban arboriculture and sustainable development. In light of the main challenges facing urban landscape management in the next decades, three areas of investigations should be prioritised: urban soil, water management and climate change.

Urban soils

Since the 19th century, soil used for new plantings in urban areas has traditionally been procured through scraping the topsoil layer of suburban farmland undergoing development. This model is not sustainable. Contemporary expectations of quality of place lead to growing demand for soil. In the meantime, supply is diminishing as tighter planning constraints limit the disappearance of farmland to urban sprawl. To avoid a soil crisis, change is required to:

> Waste fewer soil resources. To facilitate this, a soil audit methodology has been developed to assess existing onsite soil resources, guide earthmoving works and choose adapted plant materials.

> Develop new techniques to produce alternative growing media that can be used as a substitute to farm soil. This might involve the recycling of demolition waste, dredging silt, green waste compost or sludge from wastewater treatment.



Water management

Urban development leads to a water paradox: impervious surfaces above ground generate large amounts of stormwater runoff that are difficult to drain and channel away while increased drought of the below-ground environment requires more and more frequent use of irrigation systems fed with potable water. A more holistic approach that aims to integrate the water needs of urban trees and green spaces into a sustainable approach to urban drainage provides the best way forward to help resolve both issues. This would also stimulate the cooling benefits of trees. Trees work like pumps: through evapotranspiration they breathe out into the atmosphere the water they receive, which is a very effective mechanism for lowering air temperatures.

Climate change

Climate change poses a real threat to the future upkeep of urban green space and challenges long-held views of how to integrate nature into cities. Significant changes will need to take place in the plant palette used. Proactive action is needed to succeed in this transition. It is important to dedicate resources today towards better understanding the adaptation properties of a wider array of species, and carefully guiding species selection in large development projects and the renewal of suburban woodlands. It will also be to everyone's advantage to start making the most of the temperature cooling properties vegetation, particularly trees, can have. Using the tree population to help reduce the impact of summer heatwaves will also require proactive design.

FIVE PRIORITY AREAS FOR ACTION

A rich bundle of ideas, recommendations and expectations came out of the discussions and consultations held in the preparation of the Lyon Tree Charter. These were summarised and compiled under five priority areas for action. The goal here is to provide signatories of the Lyon Tree Charter with an easy-to-use starting point to choose some themes and pick some ideas to build up their own action plan.

BUILDING AN EVIDENCE BASE

1/ Inventory all main tree populations in Lyon
2/ Adapt species selection to climate change
3/ Integrate trees and water management
4/ Rationalise the use of farmland to supply growing media for urban landscapes
5/ Reduce the safety risks associated with urban trees

PUTTING EVIDENCE INTO PRACTICE

6/ Reduce the contribution of trees to allergies
7/ Develop suburban woodlands
8/ Promote root-safe excavation techniques
9/ Diversify tree species
10/ Create and promote income generation through the management of urban woodlands and green spaces

AWARENESS RAISING

11/ Enhance understanding and adoption of tree protection measures
12/ Promote the adoption of tree-friendly pruning practices
13/ Publicise the benefits of urban trees
14/ Support community-led initiatives for urban trees
15/ Create a network of self-guided nature walks

FACILITATING CROSS-DISCIPLINARY COLLABORATION

16/ Develop cross-disciplinary good practice guides
17/ Develop a common sustainable weed management strategy for tree surrounds
18/ Reach beyond the green sector for joint work on urban trees
19/ Spread the use of the tree and utilities joint protocol
20/ Further develop the Écho-Paysage online resource

EMBEDDING ACTION INTO POLICY AND STATUTORY DOCUMENTS

21/ Enhance the integration of trees in Local Plans
22/ Standardise the adoption of a holistic approach to project costing
23/ Set green space and canopy cover ratios for new public and private projects
24/ Integrate tree planting objectives into local sustainable transport plans
25/ Reinforce the integration of trees in local climate plans

BUILDING AN EVIDENCE BASE
1/ INVENTORY ALL MAIN TREE POPULATIONS IN LYON

Knowing the local tree resource is a prerequisite to its effective management. Multiple land ownership combined with a lack of skills, resources or interest has led to fragmented and incomplete baseline information. Surveys of the main tree populations should be conducted, particularly for trees in the public domain (eg highways and parks trees), as well as housing trees (owned and managed by social landlords). To facilitate this process, a common audit methodology should be used, as well as compatible data storage and handling tools. Creating such an evidence base will provide a strategic understanding of Lyon's canopy cover, enable effective monitoring of its evolution and facilitate the management and prevention of safety risks associated with trees.

ACTION EXAMPLES:

> Survey the tree population of the land I own/manage.

> Develop a common audit methodology.

> Develop a data entry and management tool that can be widely used.

> Offer technical support to land owners interested in surveying the tree population on their estates.

> Improve the qualitative indicators (eg biodiversity) used to analyse the existing tree population.

BUILDING AN EVIDENCE BASE
2/ ADAPT SPECIES SELECTION TO CLIMATE CHANGE

Regardless of the emission scenario considered, there is now strong scientific consensus that the global mean temperature will continue to rise over the next decades. The expected increase ranges from +3 degrees celsius, according to more optimistic sources, to +6 degrees celsius degrees under more pessimistic scenarios. In this context, it is important to remember that for each one-degree mean temperature rise, vegetation types shift by 150km to 200km northward. Ongoing climate change will therefore lead to noticeable changes in landscapes.

If the trees being planted today are to survive for 100 years, the climate change this new generation of trees will experience needs to be taken into consideration. Existing knowledge on the adaptability of amenity tree species is poor and fragmented, which makes it difficult to improve our approach to species selection. Given their ability to cool temperatures, trees are also increasingly considered as a key tool to help adapt cities to climate change. Techniques and parameters to make the most of the cooling benefits trees can provide towards a defined bioclimatic objective are yet to be developed, calibrated and tested. Meeting the challenges and opportunities brought by climate change will require the whole landscape sector to get involved.

ACTION EXAMPLES:

> Develop observation protocols enabling a better understanding of tree species behaviour and adaptability.

> Compile existing observation data on species behaviour and adaptability.

> Develop approaches to better control tree provenance and overall traceability in the tree production system.

> Continue to test new species in partnership with the French National Federation of Amenity Plant Grower (FNPHP) and Plante & Cité.

> Develop contractual agreements with tree nurseries to grow new species.

> Develop resources to guide tree species selection.

> Analyse the impact of the evolution of tree species on local landscape character.

> Monitor the evolution of potentially invasive plant species.

> Monitor the evolution of pests and diseases that may affect trees.

> Define the parameters enabling use of vegetation to meet the bioclimatic objectives of projects.

> Embed and support this work in the Climate Adaptation and Mitigation Plan.

BUILDING AN EVIDENCE BASE

3/ INTEGRATE TREES AND WATER MANAGEMENT

For too long, water management in urban areas has been disconnected from natural cycles and a «collect-it, pipe-it, treat-it» logic has prevailed. This has led to a rapid increase in impervious cover. In the meantime, green spaces and vegetated areas in the public realm are often exposed to drought conditions requiring the installation of irrigation systems typically fed with potable water. Alternative and more sustainable approaches to urban drainage have been developed over the past decade. These approaches often suggest re-establishing a functional link between water and vegetated areas. The wider adoption of these approaches requires a better understanding of suitable species and of long-term management requirements (changes in permeability, resilience of plantings to exposure to pollution, renewal of plantings).

ACTION EXAMPLES:

> Understand and measure the contribution urban trees can make to sustainable urban drainage components.

> Bring together the key stakeholders involved in the Tree Charter, the Rhone-Alpes Region Infrastructure and Water Research Group (GRAIE) and the University of Lyon's Field Observatory of Urban Hydrology (OTHU) to work on this issue.

> Identify tree and shrub species that can be integrated to sustainable urban drainage solutions.

> Study the water pollutant filtering properties of trees and woodland soils.

> Study the impact of trees on the permeability and water infiltration rates of soils.

BUILDING AN EVIDENCE BASE

4/ RATIONALISE THE USE OF FARMLAND TO SUPPLY GROWING MEDIA FOR URBAN LANDSCAPES

Since the 19th century, greenfield development sites have been the main source of the soil needed for new urban green spaces and plantings in the public realm. Although this wasteful approach still largely dominates today, its limitations and unsustainable character have become more apparent. The ecological and food production potential of natural green space and farmland close to built-up areas must be protected. To achieve this, stopping urban sprawl and accommodating growth through infill developments and higher densities can at first seem to be an effective strategy. However, this fails to take into account the urban heat island that such dense urban fabric can generate – a phenomena that ongoing climate change will only exacerbate. The success of a densification and infill strategy largely relies on the ability to integrate significant amounts of vegetation into built-up areas, so as to ensure these areas are both attractive to residents and resilient climate-wise. Such an urban greening strategy requires large volumes of planting soils as existing urban soils are often largely sterile. Urban densification will therefore also lead to growing pressures on peri-urban green sites.

For the past 10 years the Greater Lyon Authority has championed the adoption of a strategic approach to soil conservation. This requires better knowledge and use of soil resources in both private developments and public landscape projects. It also requires the development of applied research focusing on innovative techniques to produce alternative growing substrates.

ACTION EXAMPLES:

> Map Lyon's soils.

> Develop a simple methodology to analyse and optimise reuse of soils on development sites.

> Standardise the use of soil tests prior to planting.

> Create a soil trading and exchange market for large development projects.

> Create artificial growing substrates that can be used in lieu of topsoil sourced from farmland.

> Improve soil enhancement techniques.

BUILDING AN EVIDENCE BASE

5/ REDUCE THE SAFETY RISKS ASSOCIATED WITH URBAN TREES

The storms experienced over the past decade have highlighted that trees can also be a source of great damage. The risks associated with falling branches or entire trees cannot be completely avoided if trees are to remain in the urban landscape. However, such risks can be reduced through:

– Regular surveying of tree health conditions by adequately trained arboriculturists to identify the early signs of branch or tree failure.

– Adequate ongoing maintenance to progressively remove potentially dangerous brittle branches or trees.

– Good adherence to tree protection measures for construction taking place near existing trees to avoid damage, particularly to roots, that can lead to failure several years later.

– Raising awareness among residents about safe behaviour during storms.

Aerology research underway in Lyon is starting to produce models helping to map the levels of wind exposure of a particular site or area. This work is expected to facilitate prevention and better management of risks associated with storms.

ACTION EXAMPLES:

> Modelling risks associated with high winds and storms in Lyon.

> Develop guidance on tree species choice and management regimes to prevent risks associated with storms.

> Enhance knowledge about the rooting behaviour of urban trees.

> Proactively manage plantings on steep slopes to limit instability issues.

> Raise public awareness about the risks associated with storms and strong winds.

PUTTING EVIDENCE INTO PRACTICE

6/ REDUCE THE CONTRIBUTION OF TREES TO ALLERGIES

More and more people suffer from allergies today. Pollens, including pollens from a number of tree species, are among the most common allergens. Pollens are particularly volatile: they can travel with the wind over hundred of kilometres. This makes pollen-related allergies particularly complex to address. Some knowledge exists that can nonetheless be tapped into to help reduce risks (through choice of species and location) and ensure that pollen-sensitive people are kept well informed.

ACTION EXAMPLES:

> Reduce the planting of most allergenic tree species.

> Develop public information on local pollen emission cycles through the creation and monitoring of "pollen watch" gardens.

> Collaborate with local health professionals specialising in allergies.

PUTTING EVIDENCE INTO PRACTICE

7/ DEVELOP SUBURBAN WOODLANDS

Due to its farming and industrial past, Lyon has few woodlands. Some benefited from statutory protection (West Lyon Valleys, Mont d'Or, and woodlands found on steep slopes locally called "balmes"), while others were recreated on former brownfield sites (Rhone riverbanks). Woodlands are unevenly distributed, leading to great disparities among neighbourhoods in term of physical access to and enjoyment of the benefits woodlands can provide. As Lyon continues to regenerate and grow, new areas of natural green space need to be made an integral part of new developments in order to enhance access to woodlands. Such newly created woodlands would help to meet the local needs for recreation, as well as deliver environmental services (water quality enhancement, soil contamination removal, carbon sink) and economic returns (energy from wood). The strategic planning and development of new woodlands will provide a valuable addition to Lyon's network of local nature reserves and «nature projects*».

ACTION EXAMPLES:

> Encourage the creation of new suburban woodlands.

> Enhance groundwater quality and protect potable water catchment basins through woodland creation.

> Build upon the network of local nature reserves and nature projects.

> Map existing and planned woodlands to help highlight where access is limited.

> Develop woodland projects associated with the development of energy from wood.

> Promote phytoremediation techniques for the decontamination of former industrial sites

> Partner with local authorities on the planting of a tree for each newborn resident.

** Nature projects are designed to conserve and raise awareness about wildlife through localised intervention (inventory of fauna and flora, hedge planting, pond creation, creation of nature trails, etc) across Lyon's built-up and more rural areas. Nature projects are led in partnership by the GLA with local Lyon boroughs.*

PUTTING EVIDENCE INTO PRACTICE

8/ PROMOTE ROOT-SAFE EXCAVATION TECHNIQUES

Root damage inflicted by excavation or construction works is responsible for a large number of premature tree failures. This leads to increased safety risks as the damaged tree undergoes early decline. Tree root damage can be avoided through the wider adoption of tree protection measures on construction sites and the more systematic use of the trenchless or root-safe excavation techniques routinely employed in other countries. These techniques need to be better documented. Efforts are also required to identify the best means to distribute such information and facilitate adoption by built environment and construction professionals.

ACTION EXAMPLES:

> Engage with construction and civil works contractors operating in Lyon to ensure a large proportion become signatories of the Trees Charter and all integrate tree-friendly practices in their ways of working.

> Provide technical advice on trenching.

> Promote and facilitate the development of trenchless pipe installation techniques.

> Facilitate the adoption of excavation and construction techniques that contribute to rather than detract from tree protection.

PUTTING EVIDENCE INTO PRACTICE

9/ DIVERSIFY TREE SPECIES

Premature tree failure is also often due to poor tree species choice. The palette of tree and shrub species used is currently limited, although potentially hundreds of species are available to choose from to find the right tree for a given site (right adult size, right capacity to grow and thrive out of the local soil conditions and moisture, right foliage characteristics, etc). Widespread poor plant knowledge is largely to blame for this self-perpetuating state of affairs: lack of knowledge about certain species leads to low demand which in turn reduces growers' appetite to invest in their production, thus limiting availability and visibility on the market.

ACTION EXAMPLES:

> Test the new tree species produced by a nursery to study their behaviour and promote their use.

> Offer tree and shrub selection for hedge planting (hedges for residential developments, farmfields, etc).

> Develop communication tools and advise providers on species selection.

PUTTING EVIDENCE INTO PRACTICE

10/ CREATE AND PROMOTE INCOME GENERATION THROUGH THE MANAGEMENT OF URBAN WOODLANDS AND GREEN SPACES

The development of suburban woodlands can contribute to the local economy. To achieve this, agroforestry systems, which integrate trees into farming practices, are to be encouraged. Of particular interest to Lyon could be the development of short coppicing for the production of wood fuel.

ACTION EXAMPLES:

> Promote agroforestry projects.

> Develop projects to develop local wood fuel supply.

> Create metropolitan parks providing an attractive setting for new developments, particularly in less attractive areas targeted for regeneration.

> Develop tree-based adventure parks (tree climbing and gliding courses, etc).

AWARENESS RAISING

11/ ENHANCE UNDERSTANDING AND ADOPTION OF TREE PROTECTION MEASURES

Current construction practices lead to considerable damage to private and public trees. The associated economic and landscape impacts are significant. Lack of understanding of tree needs among built environment professionals is one of the primary sources of existing bad practices. Achieving the significant cultural change needed to overcome this issue will require investment in training in basic tree knowledge, as well as providing practical support and advice for the adoption of root-safe construction and excavation techniques near trees (eg use of airspade, no-dig trenching, stilt building foundations).

ACTION EXAMPLES:

> Produce and disseminate guidance on tree protection on construction sites.

> Raise awareness about tree protection issues among designers (architects) and order givers (developers, private individuals…).

> Raise awareness among construction companies and contractors.

AWARENESS RAISING

12/ PROMOTE THE ADOPTION OF TREE-FRIENDLY PRUNING PRACTICES

Like other living organisms, trees are vulnerable to damage. Pruning trees badly can lead to permanent damage, visual disfigurement and create dangerous, long-term structural soundness problems. By contrast, following tree-friendly pruning practices ensures that the required maintenance can be conducted without harming the health of the tree. The advantages of tree-friendly pruning practices need to be better known by tree owners. Tree surgeons and other companies providing tree care services ought to be involved in this campaign and commit to avoiding extreme forms of topping and lopping. Successful widespread adoption of tree-friendly pruning also requires that good choices were made earlier on regarding species selection and planting location. Growth patterns and pruning needs should therefore also be addressed in the guidance provided on tree selection and planting.

ACTION EXAMPLES:

> Provide decision-makers with arguments in favour of tree-friendly pruning.

> Provide advice to land owners and managers of estates with large tree population.

> Produce guidance about commissioning tree pruning for residents.

AWARENESS RAISING

13/ PUBLICISE THE BENEFITS OF URBAN TREES

Decision-makers and the wider public often know little about the wide range of services and benefits urban trees provide. The emphasis is more typically placed on the costs associated with the presence of trees (eg leaf removal, ongoing maintenance, etc). A growing number of international studies detail the multiple benefits urban trees can generate (eg temperature regulation, stormwater management, soil stabilisation, attractive environment for business, health and wellbeing improvements, etc) and quantify their economic value. These studies demonstrate that benefits largely outweigh costs, thus adding a compelling return-on-investment argument to the case for urban trees. These findings need to be compiled and disseminated widely to help change mindsets about investing in tree planting.

ACTION EXAMPLES:

> Develop a compelling case for trees that can be used with decision-makers and communication campaigns.

> Develop evaluation tools to quantify and monetise the services provided by urban trees.

> Assess the role and challenges associated with trees in strategic planning.

> Monitor people's perceptions and expectations in relation to urban trees so as to assess the impact of tree-related communication campaigns and improve their effectiveness.

> Monitor publications related to trees and public health.

AWARENESS RAISING

14/ SUPPORT COMMUNITY-LED INITIATIVES FOR URBAN TREES

Quality of place and environmental health are shared concerns and responsibilities. There are many community-led initiatives to bring abandoned sites back into use or to green the urban landscape. Such grassroots efforts should be encouraged and promoted through communication campaigns, and supported through technical advice or logistical help (equipment loan, provision of seeds or young plants, etc). The impact will not only be environmental - it will also foster community cohesion and a sense of ownership.

ACTION EXAMPLES:

> Listen better to people's desires and expectations in respect of urban trees.

> Organise events celebrating trees.

> Ensure that awareness-raising initiatives associated with urban trees have a celebratory dimension.

> Encourage community-led planting and educational activities associated with trees.

> Establish simple mechanisms facilitating private sponsoring.

AWARENESS RAISING

15/ CREATE A NETWORK OF SELF-GUIDED NATURE WALKS

The relationship between nature, landscapes and a sense of identity is a growing area of focus in contemporary urban society. As a result, it is more common in cities today to find thematic trails enabling residents and visitors alike to learn about the unique traits and history of a particular site or of a whole neighbourhood. Discovering plants and wildlife, whether in a city centre street or in a nature preserve, offers a great way to enrich people's perception of the urban landscape. Whatever their focus, these interpretative self-guided walks should complement and enrich one another both in terms of content and format. The goal is to provide a diverse and layered understanding of local landscapes, based on a coherent network covering the whole of Lyon.

ACTION EXAMPLES:

> Develop a self-guided tree walk in each local authority tied to a Lyon guide to veteran trees.

> Develop a network of nature and tree trails.

> Encourage community-led projects to create interpretative nature trails.

FACILITATING CROSS-DISCIPLINARY COLLABORATION

16/ DEVELOP CROSS-DISCIPLINARY GOOD PRACTICE GUIDES

There is too little dialogue among built environment professionals. The 20th century saw a rapid increase in professional specialisation, which has spawned conflict-prone siloed approaches and simplistic decisions. To avoid repeating past mistakes, it is essential to rebuild a shared culture, based on an ability to listen, dialogue and find holistic solutions. Trees are under the influence of a wide range of disciplines, stakeholders and policy areas. Successful integration of trees into the built environment will therefore require extensive exchanges and discussions among a range of professionals to achieve joint analysis and problem solving.

ACTION EXAMPLES:

> Convene seminars involving both landscape and urban planning practitioners.

> Instigate joint problem analysis and solving on trees and lighting.

> Instigate joint problem analysis and solving on trees and security surveillance cameras.

> Instigate joint problem analysis and solving on trees and accessibility.

> Instigate joint problem analysis and solving on trees, street cleaning and winter treatment.

> Develop a cross-departmental guide on the design and maintenance of tree surrounds.

> Instigate joint problem analysis and solving on green waste and food waste recycling.

> Develop a cross-departmental guide on trees and public transport.

> Instigate cross-disciplinary analysis and reflections on enhancing the symbiosis between cities and living organisms.

FACILITATING CROSS-DISCIPLINARY COLLABORATION

17/ DEVELOP A COMMON SUSTAINABLE WEED MANAGEMENT STRATEGY FOR TREE SURROUNDS

Depending on the location, certain maintenance tasks are performed by different bodies. In some cases, to deliver better overall results, coordination would be helpful. This is particularly the case for weed management around trees. The development of a shared management strategy could facilitate coordination on the techniques used and objectives pursued, which would help to deliver a more robust, efficient and clear service to local citizens. To succeed, the development of such strategy would initially need to involve the Greater Lyon Authority and interested local boroughs. Later on, it could also be used as an example to promote the adoption of similar maintenance practices by private landowners.

ACTION EXAMPLES:

> Benchmark available methods for weed management near trees.

> Develop a common sustainable weed management strategy for tree surrounds.

> Educate professional practitioners and the wider public on reduced pesticide use.

> Develop awareness raising campaigns encouraging private land owners to adopt more sustainable approaches to weed management near trees.

FACILITATING CROSS-DISCIPLINARY COLLABORATION

18/ REACH BEYOND THE GREEN SECTOR FOR JOINT WORK ON URBAN TREES

The Tree Charter aims to facilitate a strategic and coordinated approach to the design and management of Lyon's tree population and widen the range of stakeholders involved. Among these stakeholders, priority should be given to the owners and/or managers of land assets that strongly influence the quality of Lyon's landscapes. These include:

– Transport professionals with a direct influence on the image Lyon projects from its main access routes and entry points (highways authorities, canals and waterways authority, railways companies and the national rail infrastructure owner, the Bron and St-Exupéry airport authorities).

– The owners and/or managers of large public estates with a significant tree population (hospitals, universities, social housing).

– The owners and/or managers of large private estates with a significant tree population (property management companies).

– Developers – as they have a big impact on tree protection and new tree planting in developments.

Good information as well as technical advice should be offered to ensure these key stakeholders endorse the Tree Charter and the principles it advocates.

ACTION EXAMPLES:

> Organise events and presentations to raise awareness about the Tree Charter and encourage its adoption.

> Contribute technical expertise to the development of audience-specific guidance.

FACILITATING CROSS-DISCIPLINARY COLLABORATION

19/ SPREAD THE USE OF THE TREE AND UTILITIES JOINT PROTOCOL

The presence of above- or below-ground utilities often leaves little space for trees. Existing standards for installing new utility apparatus close to existing trees and for planting new trees near existing utility apparatus are very limiting. To overcome this, some local authorities have defined derogation procedures through the development of a tree and utilities joint protocol. The Greater Lyon Authority chose this approach in 1997 and co-produced such a protocol in partnership with the main utility companies and/or their representatives. The protocol has helped to resolve deadlocks and avoid conflicts on countless projects. It is worth ensuring that the provisions of the protocol remain up to date and that it becomes more widely adopted.

ACTION EXAMPLES:

> Update the Lyon tree and utilities joint protocol.

> Encourage the adoption of the protocol by new partners (utility companies, civil works managers).

> Adapt the provisions of the protocol to the specific requirements of different types of utilities.

> Encourage the development and adoption of trenchless installation techniques to lay utilities around and below trees.

FACILITATING CROSS-DISCIPLINARY COLLABORATION

20/ FURTHER DEVELOP THE ÉCHO-PAYSAGE ONLINE RESOURCE

The wide adoption of good practice in sustainable development requires significant changes in perceptions, habits and behaviour. Providing opportunities to exchange and share experiences is a powerful way to facilitate and speed up this process. It is with this objective in mind that the online knowledge and exchange hub Écho-Paysage was set up in the Rhône Alpes region. Écho-Paysage currently brings together some local authorities (City of Lyon, Greater Lyon Authority), the National Organisation of Landscape Contractors (UNEP) and the Regional Agriculture and Forestry Unit (DRAF). Continued support is needed to maintain and grow Écho-Paysage, widening the range of public and private partners involved.

ACTION EXAMPLES:

> Invite a wider range of professional organisations engaged in the landscape sector to take part in Écho-Paysage.

> Intensify collaboration with the Greater Lyon Development Agency (co-sponsoring of nature projects).

> Develop a partnership with the Rhône Department Architecture Centre.

> Partner with Plantes & Cité and the National Training Centre for Local Government Engineers to organise continuing professional development and training events.

> Use the Écho-Paysage online resource to spread more widely locally the evidence and best practice advice produced by Plante & Cité.

> Engage universities and their PhD students on the research needs identified through the Écho-Paysage network and exchanges.

EMBEDDING ACTION INTO POLICY AND STATUTORY DOCUMENTS

21/ ENHANCE THE INTEGRATION OF TREES IN LOCAL PLANS

Nearly 80% of Lyon's trees grow on private land. Statutory tree protection measures are therefore critical. The Local Plan allows for the use of tree preservation orders and the protection of woodlands. The mapping of these tree protection measures needs to be updated and extended. There is also a need for a compensatory mechanism that acknowledges the benefits private trees generate for the wider community by offsetting charges incurred by the tree owner.

ACTION EXAMPLES:

> Improve the mapping of trees requiring protection.

> Better communicate statutory regulations relevant to urban trees.

> Further define the criteria for granting statutory protection such as Protected Woodland (EBC) and Protected Green Space for Enhancement (EVMV) and the management and maintenance requirements associated with such statutory protection.

> Better support the long-term management and maintenance of EBC and EVMV through the creation of compensatory measures offsetting the impact of statutory protection for protected tree owners.

> Provide advice on tree protection, tree species choice for new planting and hedgerow management in pre-application documents for planning consent.

> Require the intervention of a landscape or arboriculture specialist in all development projects, including an EBC or a EVMV.

> Embed some micro-climate performance requirements in policies addressing the inclusion of green space, landscaping and trees in the built environment.

> Encourage voluntary enlistment for statutory protection by simplifying the application process.

EMBEDDING ACTION INTO POLICY AND STATUTORY DOCUMENTS

22/ STANDARDISE THE ADOPTION OF A HOLISTIC APPROACH TO PROJECT COSTING

Traditional approaches to projects often separate issues associated with the initial design and build from those related to ongoing management and maintenance. This traditional approach overlooks the fact that management costs are the direct results of design choices. To make choices that work both in the short and the long term, a whole life approach to project costing is needed. Achieving more sustainable outcomes often requires choosing tailored solutions over standard approaches. Holistic approaches to costing often show that investing more resources upfront to better understand the site leads to significant savings further down the road.

ACTION EXAMPLES:

> Integrate an assessment of ongoing management costs into all project proposals.

> Quantify the ecosystems services associated with the preservation and/or planting of tree in all projects.

> Develop a guide to management costs for the wider public.

EMBEDDING ACTION INTO POLICY AND STATUTORY DOCUMENTS

23/ SET GREEN SPACE AND CANOPY COVER RATIOS FOR NEW PUBLIC AND PRIVATE PROJECTS

Trees and woodlands are unevenly distributed across Lyon. This is in part due to history: older neighbourhoods tend to be denser with trees only found in the public realm. Development patterns also have an impact: in residential areas, the larger the land plot, the greater the number of and the bigger the trees. Contemporary single-home land plots are so small that there is no space left to plant trees. The evolution of farming has also had an influence: where mixed crop and stock farming have been replaced with intensive monocultures, hedgerows and small woodlands have disappeared. The uneven distribution of trees and woodlands in Lyon is also largely explained by topography and soil characteristics. Understanding these constraints is essential to develop area-specific environmental ratios that can be integrated into public and private project proposals. Such environmental performance targets might include vegetated area, canopy cover and impervious cover ratios.

ACTION EXAMPLES:

> Integrate environmental ratios to the Local Plan.

> Strategically plan land acquisition to create new woodland in under-served areas.

EMBEDDING ACTION INTO POLICY AND STATUTORY DOCUMENTS

24/ INTEGRATE TREE PLANTING OBJECTIVES INTO LOCAL SUSTAINABLE TRANSPORT PLANS

Since ancient times, trees have been valued for the shade they provide. This is also what motivated the 17th century Colbertian* tradition of roadside tree planting and the 19th century vision of a network of canopied boulevards as the backbone for urban modernisation. The link between mobility and greening is self-evident in the name "promenade" that was given to the avenues created. Today, health and sustainability concerns are bringing walking and cycling back into cities – and with this, a renewed concern for user comfort. Unlike vehicle users, pedestrians and cyclists directly experience the local micro-climate. In a context where the anticipated global temperature rise will be exacerbated by the urban heat island effect, providing shade for pedestrians and cyclists is an utmost priority. If it is to be acted upon, this priority needs to be embedded in the Lyon Sustainable Transport Plan.

ACTION EXAMPLES:

> Promote the use of trees to enhance the amenity value of highways (ie streets as places rather than just corridors catering to vehicular movement).

> Embed the link between greening and sustainable transport (shade, enhanced protection feeling).

> Ensure key strategic cycling and walking routes are supported by new planting.

** Jean-Baptiste Colbert served as the French minister of finance from 1665 to 1683 under the rule of King Louis XIV. Colbert established the first French national agency for the construction of roads and bridges, which created a network of tree-lined roads to get in and out of Paris and Versailles easily.*

RELIER LES ACTIONS AUX PROCESSUS POLITIQUES OU RÉGLEMENTAIRES

25/ REINFORCE THE INTEGRATION OF TREES IN LOCAL CLIMATE PLANS

With a majority of people (50% worldwide, 80% in France) living in cities, local authorities have a critical role to play in facilitating and promoting the necessary changes required to respond to ongoing climate change. To tackle this issue the Greater Lyon Authority, like other local authorities, is developing a Climate Change Mitigation and Adaptation Plan. As its name indicates, the plan is divided into two major sections. One focuses on mitigation issues and quantifies the main local sources of greenhouse gas emissions in order to set out strategies for their reduction. The other explores the adaptation measures needed to avoid or reduce the potential negative impacts of climate change on health and safety, the environment and the economy. The Tree Charter demonstrates the effectiveness of trees in moderating heat waves, summer temperature peaks and the urban heat island effect. Authorities need to establish a link between the Tree Charter and their Climate Change Mitigation and Adaptation Plan so that the actions identified in each are aligned and mutually supportive.

ACTION EXAMPLES:

> Integrate the Tree Charter objectives and recommendations into the Lyon Climate Change Mitigation and Adaption Plan.

> Develop a technical guide on the use of vegetation to reduce the urban heat island effect.

> Propose experiments that can be embedded into projects that will help enhance technical knowledge about the impact of vegetation on urban micro-climates.

LA CHARTE DE L'ARBRE*

*The Tree Charter

_ _ _ _ _ _ _ _ _ _ _ _ _ hereby states his/her/its commitment to the presence of trees in the urban environment, in recognition of the significant ecological, cultural, social and economical benefits they provide.

_ _ _ _ _ _ _ _ _ _ _ _ _ endorses the Tree Charter principles and commits to abide by them and help disseminate them.

To ensure this commitment leads to sustained and concrete action, _ _ _ _ _ _ _ _ _ _ will develop and implement his/her/its own Tree Charter action plan, with input from other Tree Charter signatories.

Location: _ _ _ _ _ _ _ _ _ _ _ _ _ Date: _ _ _ _ _ _ _ _ _ _ _ _ _

Signature: _ _ _ _ _ _ _ _ _ _ _ _ _

For the above Tree Charter signatory, the lead contact person on Tree Charter related projects will be:

Name: _ _ _ _ _ _ _ _ _ _ _ _ _ _

Contact details: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Once completed and signed, please return this form to:

Métroploe de Lyon
20 rue du Lac – CS 33569
69505 Lyon Cedex 03
France
Mail: arbres@grandlyon.com

NEED MOR INFORMATIONS ABOUT THE TREE CHARTER...

WANT TO BECOME SIGNATORY...

VISIT OUR BLOG !

http://blogs.grandlyon.com/developpementdurable/en-actions/dispositifs-partenariaux/charte-de-larbre/

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LA CHARTE DE L'ARBRE*

*The Tree Charter

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