Strasbourg, 1st February 2009

CEP-CDPATEP (2009) 15E

EUROPEAN LANDSCAPE CONVENTION

CEP-CDPATEP

5th COUNCIL OF EUROPE CONFERENCE ON THE EUROPEAN LANDSCAPE CONVENTION

Council of Europe
Palais de l'Europe, Strasbourg
30-31 March 2009

ROAD INFRASTRUCTURES: TREE AVENUES IN THE LANDSCAPE

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Secretariat document
Cultural Heritage, Landscape and Spatial Planning Division
Directorate of Culture and Cultural and Natural Heritage

The Conference is invited to examine the report prepared in the framework of the CoE Work Programme of the European Landscape Convention 2007-2008 and in particular its conclusions, and to decide on possible follow-up.

Road infrastructures:
Tree avenues in the landscape

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INTRODUCTION

This report focuses on one feature of the landscapes we are familiar with – a feature for which some regions of Europe have been, and in some cases still are, renowned: tree-lined roads and streets.[1] It follows up on the T-FLOR 10 report entitled “Infrastructure and landscape: roads”, presented in 2007, which identified tree-lined roads as a landscape feature and cultural asset meriting conservation.

Many countries today use the French term “*allée”* – generally translated as “avenue” in English – to designate a road lined with trees which have been deliberately planted at regular intervals on either side of the roadway, be it a pathway in a park, an urban thoroughfare or a country road. As we will see, the use of the term *allée* or avenue is both correct and deeply rooted in the history of this type of feature. In the English version of this document we will refer to “tree-lined roads” or "avenues" to designate roads with trees planted on one or both sides.[2]

This landscape feature was once widespread across Europe and draws on a long and rich heritage. It offers innumerable benefits for the landscape and the environment, and also in safety and economic terms. Yet projects which recognise this value and engage in a policy of highlighting and conserving it are rare. Some countries have gone to the other extreme: this heritage has already more or less disappeared under the combined influence of the car culture, reduced awareness and loss of specialist expertise. Elsewhere it is to be feared that tree-lined roads are becoming a thing of the past. Can anything be done to halt this trend?

In this report, after outlining the history of tree-lined roads and surveying the current situation, we will show why this is a heritage we must preserve. Drawing inspiration from good practice identified in countries which have recently become aware of the importance of conservation, we will outline the framework of a conservation policy and finally make a number of recommendations.

This document does not claim to be exhaustive. We have simply attempted to cite specific examples in order to clarify the current situation in 15 or so European countries. It is important to emphasise that these examples are not intended to convey value judgements: they simply serve as concrete illustrations of the challenges we face in this area, to help us advance our common practice and conserve our heritage effectively.

Paragraphs shaded in grey present historic references, quotations and examples illustrating the main text. Readers may skip them without detriment to the main argument of the report.

[1] This report is not concerned with individual trees, or with rows of trees bordering other landscape features – canals, for example – even though these may share some characteristics in common with tree-lined roads. Their contribution to our landscape and culture would merit a study in its own right.

[2] The question of terminology is examined in an Annex to this report, where we propose that the French term “allée” – used in the French title of this report – should be more widely adopted in the future.

HISTORY

The rows of trees we can still see today along some of Europe's roads and streets have a long and rich history. The earliest features of this type date back nearly 500 years from the present day. In our view it is important to take account of this historical dimension – even though its treatment here is necessarily brief – because of the light it throws on the rich heritage that still survives in some regions of Europe.

Figure 1: Map of Bäckaskog Castle (Sweden) dating from 1773, showing all the tree-lined roads around the castle

Baroque avenues ("*allées*")

Tree-lined avenues seem to have made their first appearance on the European continent in the Italian Renaissance gardens of the first half of the 16th century. They were "imported" to France, where they were soon described using the term "*allée*" which had been used for passageways in buildings in previous centuries and now came to designate a passageway in a virtual edifice, the garden.

These "*allées*" became inextricably linked with the formal, "French" style of garden design, which used them lavishly to emphasise the main lines of the composition and to guide the eye towards a chosen focal point. Initially this focal point was located within the garden, but designers soon came to prefer vistas which led into the distance – towards the summit of a nearby mountain or a far-off castle. Alternatively they resorted to artifice to create an illusion of space – by placing a painting at the far end of the "*allée*". This practice was evident in France in the first half of the 17th century and also in the baroque gardens of southern Germany and Austria. With Le Nôtre's influence in France and in gardens following the formal French style elsewhere, the preference was for perspectives opening onto infinity.

Having invited the gaze to roam beyond the boundaries of the garden itself, tree-lined avenues soon did likewise, moving into the surrounding countryside. This transition came about within just a few decades and affected all countries. Previously limited to the gardens around the castle or manor-house and the avenues leading towards it, tree-lined roads now extended beyond this sphere, criss-crossing entire estates – as can still be seen today in the south-east of Sweden, for example.

Between 1596 and 1605, the Duke of Croÿ planted tree avenues leading to the castle at Heverlee, now in Belgian Flanders, and also around the fields of the estate. In 1647, Friedrich Wilhelm of Brandenburg planted six rows of lime trees leading from his residence over a distance of 1 km – creating Berlin's famous boulevard Unter den Linden. In 1667, garden designer André Le Nôtre created the Avenue des Tuileries, which started at the Château du Louvre in Paris and opened onto countryside, with two rows of elms framed by two rows of plane trees extending over nearly 2 km.

Figure 2: One of the many avenues in the grounds of Övedskloster Castle leads towards the church. The clipped style of pruning, which is rare in Sweden, retains the view of the church, accentuating the formal qualities of the design. **Figure 3:** Avenue leading to the castle at Gasiorowo, in the Polish county of Olsztyn.

Tree-lined malls, promenades, boulevards and avenues

Although the baroque "*allée*" is primarily associated with manor houses, castles and then with their surrounding areas, it also appears at town gateways in the 16th century in the form of ornamental promenades and malls, or connecting the town with a nearby castle or château. Tree-lined avenues also accompany fortifications, as can be seen from relief maps of fortified towns in France under Louis XIV, from the late 17th century onwards.

The Promenade de la Treille, a historic esplanade in Geneva, was planted with walnut and mulberry trees in 1558, then with limes and elms in 1706; two rows of chestnuts were added in 1720-1721. Since 1818, one of these chestnut trees – which was replaced in 1905 – has been designated as the city's "official" chestnut tree: the appearance of its first leaf marks the start of spring and is announced in the press.

In the 19th century, towns and cities were transformed. Ramparts which had become obsolete were dismantled, leading to the birth of the "boulevard" – a term which had its origins in military engineering but now took on a new meaning, designating a tree-lined promenade around the outskirts of a town or city.

Unlike Gothenburg in Sweden which dismantled its ramparts in 1807 and planted boulevards in 1823, and Brussels which did the same between 1820 and 1840, the northern French town of Soissons initially restored its ramparts in 1821. However they proved ineffective in the war of 1870 and so they were demolished and replaced by boulevards around 1885.

Figure 4: This painting, *View of the Château de Mariemont* by Jan Brueghel the Elder (1612), shows Chaussée Brunehaut, a tree-lined avenue leading to the château. **Figure 5:** Seven other hunting avenues were built on the estate including this one, which has survived through the centuries, becoming incorporated in the town as it has grown; it is known in Belgium as the "Drève de Mariemont"

Within towns and cities the appearance of tree-lined streets was driven by other changes. From the early 19th century, following the earlier example of St Petersburg, cities in Scandinavia – Helsinki in 1817 and Vänersborg in Sweden in 1834, for example – began to create wide thoroughfares which were planted with trees, the aim in this case being to prevent and limit the destruction caused by fires. In Paris, prefect Haussmann embarked on a programme of grand avenues, which came to be known as “boulevards”, on a scale more ambitious than anywhere in Europe except Vienna. In 1856 this programme was underpinned by an edict specifying the number of rows of trees to be planted according to the width of the roadway.

Figure 6: Just before Haussmann, from 1830 onwards prefect Rambuteau created the new Champs-Élysées avenue in Paris, lined with “English” style pavements planted with trees. **Figure 7:** Avinguda Diagonal in Barcelona, another avenue structured by rows of trees

Tree-lined country roads

While tree-lined avenues were becoming common in the gardens and then around the properties of wealthy landlords, and while rows of trees were being planted around and within the perimeters of towns and cities, trees were also being planted in rows along the roads crossing the countryside of Europe. France seems to have been the first country to issue a decree to this effect, under King Henri II in 1522. Other states took similar measures – Saxony in 1580, Hesse in 1625, Prussia in 1714, Austria in 1763, Brandenburg in 1765, Denmark in 1793 and Sweden in 1734, to name just a few examples.

These edicts were designed to meet specific needs – foremost among them a shortage of wood caused by forest clearing, wars, and harsh winters, and sometimes by all these factors combined. The timber was primarily destined for the army and navy, along with cartwrights and firewood, and – in the 19th century and the first half of the 20th century – industry. The leaves were also used to feed cattle and for sericulture and the fruits too had their uses.

For Chaumont de la Millière, responsible for the administration of French roads between 1781 and 1792, tree planting along roadways was vital because the scarcity of wood was "beginning to cause concern which is all too well founded" (Reverdy, 1997)*. By 1789, the shortage of firewood was beginning to make itself felt, its price having more than doubled in 20 years.*

Figure 8: Sweden's willows supplied firewood, fodder, and wood for fences

The planting of trees along roadways was also driven by another important factor: the desire to prevent neighbouring landowners trespassing on public territory, and vice versa. An edict issued by Henri III in France in 1579 states this explicitly.

Tree planting also fulfilled a technical function: the trees drained and stabilised the highway and the verges, which was especially important in marshy areas, in Prussia for example. They also sheltered travellers from the wind – as with the cypresses in southern France, for example – or provided shade in unsheltered sunny areas. Moreover they helped to prevent soil erosion caused by wind, as on the southern coasts of Sweden.

Trees also played an important role in guiding travellers and troops during snowy or foggy weather, in times of flooding and by night, as well as functioning as a protective barrier. During the 1930s some trees along Swedish roads were explicitly designated as "*skyddsträd*" – in other words trees fulfilling a security function.

In the 19th century, stagecoach operators in Langres in eastern France complained that "there are many gaps in the rows of trees along the roads they travel and that as a result there is

> *nothing to mark the borders of the roads on dark nights or in the snowy season. Travellers are suffering grievous accidents in consequence. The petitioners request that these roads be lined with trees in those places where they are lacking at the cost of the proper authorities"* (Raffeau, 1986).

The eternal quest for beauty

To say that the rows of trees planted along country roads fulfilled not just practical purposes but also a deep-seated aesthetic impulse, just like Baroque *allées* and urban boulevards, is neither a misreading nor a merely modern interpretation.

Figures 9, 10, 11 and 12: The beauty of the spring landscape in Luxembourg and Sweden, with its mixed rows of chestnut and pear trees, is every bit as striking as the fiery autumn colours of tree-lined roads in France and Poland.

In fact comparisons between tree-lined roads and garden avenues have always been made. From the early 17th century onwards, Baroque *allées* were the subject of theoretical treatises which precisely defined their geometry, applying principles of regularity, symmetry and proportion; likewise, the trees planted along country roads were set at regular intervals and, in France at least, observing a strict symmetry – elm opposite elm, etc. Of course roads in the countryside are not always straight, but gardens, too had curved avenues which appeared as a result of the English influence from the early 18th century.

During his travels in France between 1787 and 1790, Arthur Young admired the French roads, as "much more like the well kept alleys of a garden than a common high way" (Raffeau, 1984)*. In 1802, Baron de Pradt expressed the view that "[tree] plantations ornament and honour a country. What more impressive and at the same time more agreeable sight can be offered to the traveller, be he foreign or even French, than these uninterrupted rows of trees which everywhere provide shelter from the sun's heat and from blustery winds, presenting the road he travels on in the same form as the avenues in his garden"* (Depradt, 1802)*.*

The elegant avenues of trees which define the structure of a garden, and then of the surrounding countryside, offer the local populace a visible symbol of the magnificence, power and wealth of the person who planted them. This extraordinary emblematic expression of power and control exercised over the countryside and its inhabitants, inextricably linked with ideas of prestige, has remained attractive through all periods and at all social levels. This drive to embellish and to exercise influence is a real and constant force that is clearly apparent in many quotations from the 16th century through to the present day.

For Stanislas, Duke of Lorraine, in 1741, and for Chaumont de la Millière, in charge of the administration of French roads, in 1790, trees were "one of the principal ornaments of roads" (Chaumont de la Millière, 1790)*. In 1874, Swedish building regulations encourage the planting of trees along roads above all for their aesthetic and ornamental value. In Luxembourg, in 1915, "the primary objective must not be lost from view: this being to authorise only appropriate and aesthetically satisfying tree plantations along public highways"* (Wagner, 1915)*. In 1979, a circular from the French roads department notes that "trees planted along our roads, generally in rows, framed them beneath a vault of greenery, giving our road network a distinctive identity which was internationally renowned"* (Direction des Routes et de la Circulation routière [Roads and road traffic department], 1979)*. In 2004, the Danish roads department, referring to trees which lined the roads before 1950, acknowledged that they represented one of the most attractive landscaping features ever seen in Denmark.*

The 20th century: a turning point

The long and rich history of tree-lined roads reached its peak in the late 19th and early 20th centuries. In 1897, France had 2,935,000 trees along its roads, accounting for nearly two-thirds of all the roads where tree planting was possible. As tree-lined roads became ever more widespread they became more democratic in character. This trend went on generally through to the 1920s with the garden cities and the planting of fruit trees in the countryside, continuing even up to the Second World War. By this stage the popularity of this type of feature remained high: so much so in Sweden, for example, that private householders were fond of planting trees along the pathway leading to their house, however modest it might be.

Yet the advent of the automobile and the dynamic economic growth of the post-war period were to radically transform this heritage, to disastrous effect.

Tree felling

Motorway construction boomed in response to the increase in road traffic; existing roads were expanded, irregular roads were straightened, and the trees were swept aside in the process. These developments were condemned as vandalism in the Swedish press as early as 1928. Yet most of the devastation in Western Europe took place in the post-war period. Eastern Europe in turn saw a boom in car ownership in the 1990s and it is to be feared that large-scale tree felling now threatens the remnants of Europe's heritage.

Comparing the former West Germany with the former East Germany, where the heritage was preserved for a long period, provides a striking illustration of the devastating effects of previous development policies: even though the West is 2.5 times larger, its tree-lined roads – those lined with trees on both sides – cover nearly five times less distance than those in the East (5,200 km compared with 23,000 km). In France, the département *of Seine-et-Marne, even though it is one*

of the most aware of its heritage, now has less than one tenth (17,500) of the number of trees planted along its roads in the late 19th century (200,000).

Figure 13: In 1895, 87% of roads in the French *département* of Meuse were lined with trees on both sides: a total of 44,000 trees. Now just fragments of this heritage remain, comprising less than 7,000 trees in all.

Figure 14: Road widening works on the outskirts of Riga. **Figure 15:** Tree felling in Masuria, Poland.

Alongside the increased number of cars on the road, improved vehicle performance, particularly in terms of speed, made road safety a serious problem for society as a whole. The number of deaths on the roads grew dramatically over an extended period culminating in the 1970s in Western Europe. Eastern Europe saw an even more spectacular rate of increase in the early 1990s. Road safety policies were widely adopted, and enhanced over time, with impressive results despite the fact that overall distances travelled were constantly increasing.

In 1972, France recorded 16,545 deaths on the road. The total in 2007 was 4,620: down by two thirds. In Germany the number of people killed on the roads in the federal state of Mecklenburg-Western Pomerania[3] fell from 624 in 1991 to 144 in 2007 (a decrease of 77%).

Faced with road accidents ending with a violent impact against a tree, however, the public authorities' response was a simplistic one: cutting down the trees.

[3] For simplicity, the name of the state is abbreviated to Mecklenburg hereafter.

In the 1960s, Italian writer Gianni Roghi protested against the destruction of 260,000 trees lining Italy's roads over a five-year period, "on the pretext that they would be dangerous for drivers" (Roghi, 1964)*. In France, in 1970, President Georges Pompidou protested against a ministerial circular because "felling roadside trees will become the norm, under the pretext of safety." His protest apparently went unheeded: as recently as 2008 the* Conseil Général *of Mayenne was subsidising the felling of roadside trees.*[4]

Mardi 29 juillet 2008

LE FAIT DU JOUR

Arbres tueurs

Certes, un accident-mortel ou non- est toujours un drame. Il génère son lot d'émotions, d'incompréhensions et bien vite de mesures pour empêcher la répétition de nouvelles tragédies.

conseil général regorgent de demandes d'élus réclamant que l'on élimine ces « *arbres assasssins* ». Des réactions vives suscitées au lendemain d'accidents meurtriers. D'ailleurs en février 2007, le Département

CTUALITES

ENVIRONNEMENT

Pas de coup de frein à l'abattage d'arbres

La coupe cette semaine de 63 arbres le long de la D 74, au nord de Val-de-Meuse, se justifie, selon le Département, par «des problèmes de sécurité». Exemple d'une délicate conciliation entre prévention routière et protection du paysage.

Figure 16: Trees are still accused of being the cause of deaths on the roads and whole rows of them are being cut down, as evidenced by the titles of these recent newspaper articles: "The killing trees" and "No brake on tree felling".

These radical measures are in keeping with the "forgiving roadsides" or "Vision Zero" concepts implemented, for example, in Sweden and Switzerland. Based on the idea of the right to error, this kind of approach maintains that the seriousness of an accident should not be exacerbated by the way road verges are configured. These concepts are the subject of countless working parties, drawing on the findings of road safety inspections and EuroRAP, the European Road Assessment Programme. In concrete terms this means the definition of so-called "safe" distances within which all fixed obstacles should either be removed or protected by crash barriers.

The WHO World Report on Road Traffic Injury Prevention, referring to Sweden's Vision Zero, recommends the "systematic removal of roadside hazards, such as trees, utility poles and other solid objects" (WHO, 2004). The disappearance of most roadside trees in Denmark resulted from the application of a ministerial circular to the same effect as early as 1952.

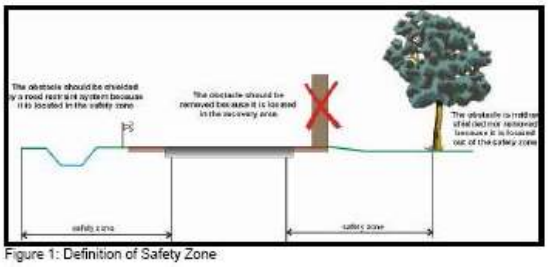

Figure 1: Definition of Safety Zone

Figure 17: The image used to define the concept of a "safety" zone in Europe's RISER project (Roadside Infrastructure for Safer European Roads). Even though the definition applies equally to utility poles, parapets and so on, the picture still shows a tree.

Compared with tree-lined roads in the open countryside, the situation regarding tree-lined urban streets is more varied. Some of the heritage in this area has been conserved, or even supplemented, as the result of political will, in many cases going back to the 1980s or 1990s. Yet where these features are not endangered by the pressure on land availability, the trees are often disregarded

[4] See Annex

during real-estate or infrastructure projects and totally neglected while the works are under way, resulting in unnecessary loss through felling or tree death.

Figure 18: Riga, a “green city”, with a large number of trees which requires constant vigilance, as in forest regions.

> *In 1949 the Geneva press published an article which is just as pertinent today: "The 18 majestic chestnut trees, more than a century old, which lined the Geer estate in Malagnou have just fallen beneath the woodcutter’s axe. […] The company, which currently owns the estate, has decided to build […] an imposing group of 4 buildings for letting […]. One question springs instantly to mind: why wasn’t this huge edifice located in such as way as to spare the trees?”* (Garance, 1997)

Planting shortfall

The history of tree-lined roads in the 20th century is also shaped by another key factor: the fact that tree planting virtually grinds to a halt. Even though a few countries or regions – Luxembourg, some of the German *Länder*, particular provinces in Sweden and the Netherlands, for example – have maintained a tradition of planting or resumed it in the very recent past, the impact of these initiatives can be very limited or held in check by restrictive regulations: prohibitions on gap-filling, for example, or on planting along particular road networks, as in the German state of Brandenburg.

> *At the dawn of the 21st century, Denmark’s roads department acknowledged that even though the fellings had not been systematic, there had been no concerted planting effort, either, with the end result that : “broadly speaking, all the trees lining the country’s roads have disappeared with the modernisation of the road network, within the space of just a few decades.”* (Vejdirektoratet, 2004)

“Forgiving roadsides” policies have impacts extending beyond tree felling. They also explain the cessation of tree planting, because planting beyond the “safety” zone calls for land acquisitions that are difficult and costly, as well as making the maintenance of roadside verges even more expensive. So it is quite natural to abandon the idea altogether.

> *In Denmark the safety zone varies between 7m and 9m for roads with a 90 km/h speed limit, and in Italy, trees must be planted at a distance equal to their maximum height: which means … 30m for a plane tree.*


Figures 19 and 20: Planting at a greater distance from the roadway requires difficult land acquisitions. Examples from France and Sweden.


Figures 21 and 22: Even when the local authority decides to bear the additional costs involved in land acquisition, excessive planting distances make it impossible to re-create the “cathedral” effect produced when the proximity of the road and the trees creates a distinctive and integrated space.

This planting shortfall is critical given the natural ageing process affecting the remaining trees. The crisis is all the more severe because tree ageing and death are accelerated when the trees located alongside roads or streets are mistreated – and such mistreatment is all too evident.

> *In 1824 the town of Brive in France was described as possessing avenues planted with magnificent trees* (Orloff, 1824)*; in 2006, 40% of the 7,000 roadside trees were diseased or nearing the end of their lifespan.*

Incorrect pruning undertaken by staff lacking the necessary expertise is particularly symptomatic of this state of affairs. “Anyone can cut, but few know how to prune,” said Jean-Baptiste de La Quintinie, Louis XIV’s gardener. Sadly, his words still hold true today. Quite apart from the distressing visual results – diametrically opposed to the quest for beauty which inspired the planting of the trees in the first place – these expensive and inappropriate interventions can weaken the trees and lay them open to attack by pathogenic agents.


Figures 23 and 24: Technically incorrect, aesthetically offensive. These recent examples from Latvia and France are just a very small sample of practices which ought to be banned.


Figures 25 and 26: These examples are from Poland and Italy. Figure 25 shows another location where tree avenues were planted in the 19th century: cemeteries

> *In 1802, D. Depradt, a member of France's Constituent Assembly, remarked: "There is nothing more pleasant and at the same time more impressive than a tree bearing all its branches, and there is nothing more unpleasant or perhaps more ridiculous than trees stripped of their branches; and yet the latter is the state in which they appear on some of the roads in France"* (Depradt, 1802).

Works undertaken as part of an ongoing highway maintenance programme (mowing, shoulder grading, mechanical snow clearing) and as part of larger construction projects (earthworks, ditches for utilities, etc.) inflict multiple wounds on the trunk and the roots which can cause lasting damage. Further impacts and mutilations are caused by vehicles and agricultural machinery travelling along the road and by vandalism.

Tree death can also be accelerated by chemical substances, particularly salt: salt used for snow clearing and to stabilise unsurfaced roads, as in Sweden, or brine and detergents discharged by market traders, as in France.

Figures 27: Example of damage caused by shoulder grading works.

Figures 28 and 29: Examples of vandalism in France and Sweden. In the Netherlands, a car dealer infuriated by the tree in front of his showroom resorted to poisoning; in Luxembourg, nearly 1,000 trees have been vandalised since 1994.

Other attacks may be less obvious because they are less visible, but they are just as damaging, including asphyxiation caused by compacting the soil around the tree, and changes to its hydric environment. These conditions may arise when the water table is lowered, when leaks from underground pipe networks are repaired, when irrigation of neighbouring agricultural land is discontinued (as in the south of France), with embankment works – even temporary ones, and in particular when the level of the highway is altered.

The main factors affecting young trees are defective tree quality and lack of expertise (planting pits not large enough, soil not decompacted, lack of aftercare and especially inadequate watering), which very often compromise the future of the plantations.

> *It would appear that the observation by agronomist J-B. Rozier in 1789, decrying the malpractices perpetrated in some nurseries, remains true today: trees are "torn out of the ground with mutilated roots measuring 8 or 9 inches on each side … then we are surprised when a very large number of the trees fail to recover"* (Rozier, 1789).

Figures 30 and 31: Poor quality plants, poor planting conditions and lack of aftercare impede the creation of high-quality tree-lined roads.

In addition to these factors relating to tree management and the trees' environment, other external factors also play a contributory role in weakening our heritage: diseases, pests, climate change, etc.

Heritage in danger

The consequences of the situation outlined above can be illustrated by three concrete examples:

- Between 1995 and 2008, some routes in Sweden lost half of their trees as a result of tree deaths.
- In France, in a *département* which has actually had a renovation plan for its tree-lined roads in place since 1992, 15 years later one of its major roads had lost 10% of its trees and 50% of the remaining trees had to be cut down due to disease.
- In the canton of Geneva in Switzerland only one road lined with fruit trees on both sides survived beyond the 1950s. It covers a distance of 400 metres on either side of the Route de Bardonnex.

In these three cases replantings have been either non-existent or nowhere near sufficient to make up for the losses. Will we have to echo the 19th-century engineers of France's École Nationale des Ponts et Chaussées (national school of civil engineering) who observed that there were "great stretches without any trees" and predicted that "soon we won't see any trees at all along our roads" (Raffeau, 1986)?

Figure 32: Remnant of rows of Swedish whitebeams along a coast road in Scania (Sweden).

A MULTIFACETED HERITAGE

A shared heritage

Avenues and boulevards, *allées* in gardens and cemeteries, tree-lined country roads: there is nothing very surprising in the fact that we find all these kinds of features in various places in Europe. The continent has always been a place of intensive cultural exchange, particularly in the 18th century, and this effect has been overlaid by influences resulting from conquests and alliances.

Although tree-lined roads have existed far beyond the European arena, their rapid dissemination across the western world is closely linked with the influence of the French style of gardening: this is reflected in the use of the terms “allée” and “avenue” in many countries, terms which are also used for tree-lined roads in the open countryside. Having founded the École des Ponts et Chaussées in 1747, France exported both its expertise in road construction and its engineers’ taste for regular planting schemes, and this also played an important role.

Figures 33 and 34: Tree-lined roads in Romania and Italy.

Circulation of ideas and people: André Mollet, from a dynasty of French gardeners, worked in England, Holland and at the court of Queen Christina in Sweden. He published a small treatise, Jardin de Plaisir *(“The Pleasure Garden”), in French, German and Swedish, in Sweden in 1651; it was translated into English at a later date. Here he recommends that the garden’s primary ornament should be “a great avenue with two or three rows of trees, either wych-elms or limes”* (Mollet, 1651) *perpendicular to the façade. France also inspired King Frederick V of Denmark. Having visited Versailles in 1764, he summoned three French engineers whom he appointed to create a network of modern roads in Denmark. They imported “*allé*” – the Danish term for tree-lined roads. In Prussia, the first “*Chauseen*” (from the French* “chaussée*”) were built in 1787, drawing inspiration from French models. A decree of 1814 made it compulsory to plant trees along these roads.*

A heritage forging identity

Tree-lined roads create an effect of coherence which gives an estate or region its own distinctive appearance, a face: the landlord who planted his garden and the countryside with *allées* was clearly marking his ownership of the territory, both in the eyes of travellers and of his own subjects.

For English soldiers in the First World War, for example, France was identified with the endless lines of trees along the roads which led them to the front. Even today, in a highly urbanised département *like Val-de-Marne, near Paris, rows of trees and the cohesive identity they create are used to differentiate roads managed by the* Conseil Général *from roads managed by the municipal authorities.*

Yet if tree-lined roads share a common language, every region, every country, and every individual *allée* has its own particular accent and mood which sets it apart: there is nothing dull or predictable about this kind of feature.

The plantations can be geometrically varied: square planting, as was the norm in France, or in a quincunx, – a pattern used for narrower roads in north Germany, Belgium, Luxembourg and the Netherlands, for example, and still preferred today in some of these countries; symmetry of the species in relation to the road's axis (France) or lack of symmetry; variation in the number of rows of trees from one to two, four, etc.

Some "very beautiful staggered rows of beeches" are mentioned near Bayeux in France in 1823 but this style of planting is rare, perhaps because – as Du Breuil mentions in his manual of arboriculture in 1860 – this form was thought to require extreme precision in planting in order to achieve a harmonious effect.


Figures 35 and 36: In the Netherlands roads lined with two rows of trees on either side are common; by contrast this road in Belgium has a single row of plane trees on either side


Figures 37 and 38: Matching rows of planes in southern France and chestnut trees in Mecklenburg

Regional variations can be seen above all in the choice of species, which varies according to geography, climate and soil type as well as reflecting changing fashions. The choice also varies

generally according to the type of feature involved: baroque *allées*, urban avenues, country roads, streets in garden cities, private avenues.

In parks there was a preference for limes and hornbeams, which were more amenable to clipping in highly architectural shapes. Chestnut trees were also very popular, as were some conifers, yews and spruces for example, planted in alternating sequences as at Chantilly or Charlottenburg and prized for their striking shapes and the fact that they remained green all year round.

In Luxembourg the tree species to be planted in each canton were defined in a circular of 1894. Forest trees, which were regarded as more aesthetically satisfying than fruit trees, were reserved for major roads and the outskirts of towns.
In Austria, apple trees, pear trees, cherry trees and service trees were reserved for the Mostviertel and Weinviertel regions, rowans and birches for the Waldviertel region, walnut trees and false acacias for the Pannonian Plain, oaks for Upper Austria, sycamores and planes for the areas around the castles of Lower Austria and limes and chestnuts for prestigious plantations. In Mecklenburg chestnut trees were traditionally planted along the approach to agricultural estates.
In 1766, Lombardy poplars were introduced to Leipzig, in Germany, from France; the first avenues were planted in Potsdam in 1770 and near Karlsruhe. The plane tree was introduced to Potsdam in 1797.

Figures 39 and 40: Double row of Swedish whitebeams, fashionable in the south of the country in the early 20th century, and Lombardy poplars in Luxembourg.

The resources available to the planters and the availability of the trees also explain the differences between some types of plantation. This can still be clearly seen in Sweden today, where rows of trees along country roads were traditionally planted by local farmers, who generally used a mixture of different species found in the nearby forest. Meanwhile, from the 17th century, wealthy landlords were able to import lime trees from Holland or Germany to create uniform avenues more consistent with the canons of formal beauty.

In Scania (Sweden), only 39% of tree-lined roads are single-species. The rows of trees can include as many as nine different tree species. Elsewhere alternative solutions were found to the problem of the quality of plants sourced in the forest: nurseries were created in France in the 1720s; in Brandenburg a decree of 1814 ordered the creation of nurseries at intervals of 15km along the new "Chausseen".


Figure 41: In the background, to the left, a very regular avenue of lime trees leads to an estate; on the right a recent and much less homogeneous plantation borders a public road (in Sweden). **Figure 42:** Limes, elms, chestnuts, ash trees and Norway maples line either side of this road in south-western Sweden

Local usage has also traditionally been a deciding factor in the choice of species: in the vine-growing region of Burgundy, 18th-century roads were lined with elms and whitebeams used for the presses; elsewhere, mulberries were planted for silk farming. Meanwhile poplar planting expanded significantly in the 19th century because the tree's rapid growth made it popular for domestic and industrial purposes.

Fruit trees have their own separate history. They were already planted in the 18th century, but became more widely adopted in the late 19th and early 20th centuries in particular, because of their advantages from the perspective of agricultural societies: they provided a regular income, unlike forest trees, and were less of a nuisance. Here, too, there is considerable variation from one country to another, however.

> *In the second half of the 18th century, Empress Maria Theresa of Austria encouraged the planting of avenues of fruit trees in order to boost fiscal revenues, because cider served in public was taxed. In eastern France in the 19th century the* Conseil Général *of Haute-Marne ordered that all non-fruit trees should be cut down and that cider apple trees should be planted. Even though they represented 50% of trees planted in the region in 1920, they have virtually disappeared today, unlike the avenue of apple trees at Asknäs in Sweden, which was planted in 1887 and still standing in 1997.*


Figure 43: Fruit tree planting was substantially expanded in Luxembourg in the 1870s. One of the aims was to combat alcoholism by producing cider. **Figure 44:** Rows of mirabelle plum trees, traditionally identified with the Lorraine region of France.

Architecture of the landscape within the landscape

Tree-lined roads are distinctive features of a landscape. In contrast to contemporary design strategies based on blending infrastructures with the landscape, tree-lined roads elegantly accent these infrastructures, conferring an extra dimension on them both from the road itself and from the outside: the dimension of volume which a winding road on its own cannot possess.

In other words tree-lined roads structure the space of a landscape. This is true of the countryside, but it is particularly evident in towns, where the volumes created vary according to the shape of the trees selected and the way they are arranged – in the middle of the roadway or to the sides, for example.

Figures 45, 46 and 47: A distinctive presence in French and Swedish landscapes.

Figure 48: An arrangement in the spirit of the Dutch “Sustainable Safety” programme: trees are used to keep pedestrian walkways separate from cars. **Figure 49:** A double row on a central reservation in Barcelona.

In fact the road and the rows of trees accompanying it constitute an architectural feature, with a beginning and end, height, width, rhythm, proportions, and an arrangement that is a square or a quincunx. It is a living form of architecture, with the advantage over traditional architecture that it improves over time. Furthermore, the arch formed when the upper branches meet above the road is often described as a “green tunnel” or “archway”; the term “cathedral” is used in this connection as early as 1794. This description is all the more apt because the succession of trunks is naturally reminiscent of a colonnade and where the trees are planted in double rows the classically recommended proportions are the same as those for naves and side aisles. This kind of feature is architectural not only for its shape but also for the way light falls through it, creating a very distinctive ambience which changes with the passing hours and seasons.

Figure 50: A very old, majestic avenue of plane trees in Luxembourg. **Figure 51:** The iconic *allée* at Övedskloster in Sweden. In 1776 Count Hans Ramel imported 4,000 lime trees to plant the roads of his estate.

Figures 52 and 53: Tunnel or cathedral? Tree-lined roads in Belgium and Poland (Warmia-Masuria).

Figures 54, 55, 56 and 57: Light effects in Latvia, Poland, France and Sweden.

Tree-lined roads also give shape to the landscape, creating sometimes a rhythmic effect, sometimes a unity. Travellers along a road lined with trees see the landscape as a dynamic succession of images framed by the tree-trunks, which function as “windows” (another architectural term). The landscape is neither closed off (as it is by unbroken hedgerows) nor so wide open that the gaze gets lost in it: the space is framed and displayed to best effect.

Figures 58 and 59: The landscape is revealed in a succession of images or at the end of the avenue (France and Belgium).


Figures 60 and 61: The landscape is unified by the row of trees. Disparate buildings merge together behind the regular screen formed by the tree-trunks; alternatively, the tree-trunks stand out against the darker backdrop of the forest, creating a distinctive mellow effect.

Rows of trees also provide a clue to reading the landscape. During the First World War, for example, tree-lined roads were a key feature in the iconography of the battlefields. On a more mundane level, the way trees are arranged and presented effectively signposts an urban environment or the approach to a built-up area: trees are more effective and attractive than other forms of signage.

> *In 1916, the British writer R. Farrer described the approach to the battlefield of the Somme, to the north of Paris: "Along the voluminous velvety roads one rolls under plumy avenues of trees. And then the road becomes less velvety, and the avenues by degrees less plumy, till at once they are only stark skeletons, gap-toothed and shell-shattered in their rows"* (Gough, 1998).


Figure 62: A double row of trees set in a low clipped hedge signals the approach to a built-up area in Luxembourg. **Figure 63:** Alongside the Seine, near Paris, a sequence of clipped lime trees takes the place of free-growing plane trees. The change visually signals an intersection, is aesthetic, and also acts as a safety barrier to stop disease spreading in the event of an outbreak of canker stain.

A cultural landscape

The “macro” history of tree-lined roads within our wider culture is overlaid by the individual “micro” history of each particular road: each one has its own story and memories, enriched by the many myths attached to the trees themselves.

The idea that tree-lined roadways have a memory function, that they are bearers of history, becomes clear, for example, when we consider the tree avenues which survive even though the château or manor house they led to has disappeared; the Latvian term for this, “memorial *allée*”, is an

expressive one. The idea also surfaces in the proposal made by the English writer A.D. Gillespie, who was an officer in the First World War, that an avenue of trees should be planted connecting the Vosges region to the sea, to commemorate the horrors of the Great War. The idea was warmly received in the press but was not carried out.

Figure 64: The beeches of Château de Bertangles (France) bear blurred inscriptions, traces of passing German soldiers in 1941. **Figure 65:** The avenue of lime trees at Villers-aux-Erables (France) is all that remains of the first château built here in 1680; the château was subsequently rebuilt and then completely destroyed in the First World War.

Artists have of course been aware of the emotive associations of tree avenues as an inextricable element of their beauty. They have inspired writers such as Theodor Fontane, Hjalmar Söderberg and August Strindberg (his poem *Esplanadsystemet* was published in 1883), painters such as Pissarro, Sisley, Van Gogh, Klimt, Munch and Esther Almqvist, and sculptors, including Christo, who wrapped an avenue of trees in Switzerland in 1998.

An everyday landscape

Tree-lined roads certainly no longer serve one of their original purposes, timber production, as Europe no longer suffers a shortage in this respect. Yet they make a more vital contribution than ever to the public well-being: through their beauty and their calming effect, of course, but also for certain very practical functions which were already appreciated in former times.

With climate change and the decline of fossil fuels, trees' role in providing shelter from wind and sun is bound to attract increased interest. The process of evapotranspiration effectively makes them atmospheric air-conditioners, limiting the impact of extreme temperatures, while the Venturi effect operating between the ground and the tree's crown prevents snow drifts building up in the winter. Furthermore, roadside trees help reduce peak run-off flows, a vital factor; this also counters erosion and reduces the risk of landslides.

Figure 66: The cooling effect of trees is estimated at 4°C to 10°C in a heat wave while some studies report an energy saving of 10% in the surrounding habitat. The sign in the photograph says "Shade".

Arguments put forward to justify the urban planting policies of the 19th century highlighted trees' contribution to protecting us from dust particles, depolluting the atmosphere and producing oxygen. These arguments are now more pertinent than ever if we consider the significant number of premature deaths linked to traffic pollution in Europe.

Research has shown the impact of trees on dust fall (between 20% and 70%, depending on the study), on reducing concentrations of No_x, CO_2, ozone and PCB, and releasing oxygen. The shade they cast on vehicles' fuel tanks also prevents the evaporation of Volatile Organic Compounds. These effects should be set alongside the number of premature deaths due to dust particles, a form of pollution that is evident in all countries; Europe's CAFE programme estimated the number of deaths in Germany, for example, at 65,000.

Biodiversity "support system"

In urban environments where stone generally predominates over vegetation it goes without saying that tree-lined roads play a vital role for plant and animal life. Yet their role is also a crucial one outside towns and cities. The lighting conditions they provide, a subtle mix of light and shade that is different from a forest, make them unique biotopes, even in woodland regions. When the trees remain by the roadside beyond the level of forestry maturity, they can develop their role in the landscape to the full, reaching ages which make them irreplaceable. As a result they harbour many insects, providing unique hunting grounds for bats and birds and vital ecological corridors in open landscapes. Compared with roadside hedgerows they have the advantage of encouraging birds and bats to fly higher when their paths cross roads, which stops them colliding with vehicles.

Figure 67: Along unsurfaced pathways and roads, such as can be seen in Sweden and Latvia, for example, the dust that is stirred up encourages the formation of lichens which are endangered elsewhere.

In Germany, an avenue of oak trees that is nearly 450 years old in the Gustow estate (Schleswig-Holstein) harbours 41 beetles from the red list of endangered species while a 300-year-old avenue of limes at Ascheberg harbours 34.

Beneficial for road safety

Although some people call for trees to be removed, or placed at a greater distance from the road itself, often in the emotional aftermath of an accident, this is not an effective road safety measure. In fact, removing trees from the roadside does not eliminate the risk, it simply displaces it.

In France, the département *of Meuse, where barely 7,000 trees have escaped the wholesale roadside fellings, has a road risk level 20% higher than Meurthe-et-Moselle, which has 10 times more roadside trees. In fact, in France over the past 30 years, as trees have been cut down the number of accident victims colliding with solid objects other than trees has increased two- or three-fold.*

A compromise is sometimes proposed, which involves combining tree-felling with replanting beyond the so-called “safety” zone. Whatever the distance involved, whether it is 4m, 7m, or more than 10m, the facts show that unfortunately run-off-the-road accidents are frequently fatal because of factors which may already have taken effect before the impact (vehicle rollover, fatal heart attack, etc.). The idea of planting beyond the ditch does not make any difference: except on a small number of major roads, none of these ditches are designed to mitigate the effect of run-off-the-road accidents. Nor does erecting crash barriers solve the problem: installing them is impossible given the proximity of the trees to the road in most cases, and trees either side of driveway junctions would have to be cut down. Moreover barriers are unattractive and obstruct roadside maintenance, while they too constitute a roadside obstacle which takes its own toll of crash victims every year.

Figures 68 and 69: The ditch exposed after cutting down this double row of plane trees is not designed to mitigate accidents. In France, ditches, along with embankments and rock faces, constitute the solid obstacle accounting for the largest number of serious injuries and the second largest number of road deaths.

Those who call for the removal of roadside trees are in fact overlooking the positive role they play in terms of road safety. Yet of course it is always difficult to put a precise figure on the number of accidents which have been avoided due to their presence.

Rows of trees along a road contribute to safety by signalling bends, crossroads and the approach to built-up areas more effectively than road signs. They make it easier for drivers to read the road ahead, a key factor in helping them anticipate and adapt their driving to their environment, both in normal weather and even more so in snow or fog, or at night.

Figures 70 and 71: The intersection and the bend in the road are clearly visible from afar.

Figure 72: In fog, when there are no road markings, trees provide valuable assistance. **Figure 73**: Norway's roads department highlights the vital role played by tree avenues in a country with snowy winters.

The trees filing past help drivers maintain awareness of their speed without looking at their speedometer. By channelling lateral vision they also encourage prudence, whereas an open roadway reduces vigilance and encourages speed. Finally it should be noted that research has demonstrated a link between the beauty of a road and higher levels of road safety.

> *An audit of local road safety policies in France revealed that one stretch of a Route Nationale (A-road equivalent) with high traffic levels and a particularly close-set avenue of trees records fewer accidents than other sections of road because the tunnel effect encourages drivers to slow down.*

Amenities, local development and asset value

The entire tree-related sector – particularly nursery operators, arborists and arboriculture consultants – stands to benefit from policies promoting tree-lined roads, which also provide employment for low-qualified personnel: collecting dead leaves and fruit, watering, etc. are local jobs that anyone can do. Luxembourg, for example, runs a scheme in which unemployed people assist with the management of roadside trees.

Tourism also benefits. At the far end of the spectrum from "Vision Zero"-style roads where drivers are interested in nothing except arriving at their destination and getting there within a particular time, with no room for any emotional response, tree-lined roads extend an invitation to explore and discover the countryside they cross: in this respect they enhance the area's attractiveness.

Figures 74 and 75: Two philosophies of travel – one mechanistic, the other hedonist.

> Motorrad Online*, a specialist German biker magazine, invites its readers to enjoy Luxembourg's tree-lined roads because "magnificent '*allées*' like this one have become rare on the other side of the border"* (Motorrad Online, 2007)*. It is also because of the image created by these roads that tourists choose destinations such as Masuria, known as Poland's "green lung", or Brandenburg and Mecklenburg in Germany.*

This fact prompted Germany's ADAC (automobile association), the German National Tourist Board and various other partners to collaborate in a unifying tourist initiative around, the "Deutsche Alleenstraße", a 2,900-km route linking tree-lined roads from the island of Rügen in northern Germany to Lake Constance in the south. Every year some 20,000 holidaymakers looking for ideas download descriptions of the route; its success encouraged the Nordrhein-Westfalen to join the scheme in 2008.

Permanent residents benefit, too: trees always have a positive impact on property values, adding an extra 5 to 20%, according to research in America.

> *Trees of any sort have a positive impact on household consumption: research has demonstrated that holiday homes located in surroundings crisscrossed by trees have occupation rates 30% higher than those in open countryside, while household expenditure is 11% higher in shopping centres with trees.*

Figure 76: An avenue of plane trees in Milan**. Figure 77:** The Deutsche Alleenstraße running through Brandenburg.

Even though roadside-trees are no longer needed to supply timber, their economic value is far from negligible. The amenities they provide – landscape enhancement and improved well-being – are assets with a quantifiable value that increases over the years, unlike the depreciating value of other road equipment. Various formulas are used to determine a tree's value, based on the species, its state of health, its size and its aesthetic benefit. Bringing together the various estimates accepted by insurers leads us to a value of around €1 million per km for two complete rows of adult trees in good condition, with the trees spaced at an average distance of 12 m. This significant value should be stated as an asset in the public accounts in just the same way as buildings and other tangible assets. This would make the substantial richness of this heritage visible to everyone, citizens and decision-makers, and would provide a useful point of reference for effective budgetary decision-making. It should be noted, however, that this value is still an underestimate, because it does not take account of the trees' role in combating pollution and promoting biodiversity.

WHAT IS TO BE DONE?

Tree-lined roads have their origins in the art of painting, with the concept of perspective; created by the great gardeners and engineers of past centuries and accompanying the work of the great architects, they are the living legacy of a multifaceted culture. It is unthinkable that the trees and the creative genius that inspired tree-lined roads should be allowed to disappear.

In 2005, Denmark's roads department observed that "tree-lined roads constitute […] an important element of our culture and our environment and merit special conservation as elements of our culture and landscape" – an opinion shared by the Swedish roads department.


Figures 78 and 79: Both country roads and hidden byways deserve to retain the trees that adorn them (Netherlands and Poland)

Consolidate widespread public support

Tree felling is often justified with reference to "popular support". How accurate is this?

Road accidents understandably arouse grief and anger. Every individual responds in a personal way to the ordeal of bereavement and this must be respected. Some families and relatives call for trees to be cut down after an accident while others do not, because they are aware that the tree did not cause the accident.

In fact the population in general has a strong attachment to roadside trees, based partly on a natural response to their beauty and partly on the strong sense of familiarity they inspire due to their longevity. This is evident from the protests aroused by tree felling plans when these become known. The public outcry in Germany, for example, was so strong that the ADAC (German automobile association) responded to pressure from its members in 1992 by starting its "*Rettet die Alleen*" ("save tree avenues") campaign, launching a telephone hotline the public could use to report tree-felling plans.

The newspaper De Telegraaf *recently reported that an 83-year-old Croatian committed suicide after a 100-year-old tree was cut down as part of a road-widening scheme to the north of Zagreb.*

The conclusions of the citizens' panel organised in 2006 by the *Conseil Général* of Meurthe-et-Moselle, which manages the roads in this *département* in eastern France, provide a case in point. The panel members, who were selected at random, had to give their view on the value of retaining roadside trees, taking traffic accidents into account. Having questioned various experts (regional planning, road safety, etc), they had no hesitation in supporting the retention of roadside trees and the expansion of this heritage. The Automobile Club of Lorraine polled its members shortly before this with similar results.

84% of 1,650 German drivers questioned in 2003 stated their support for retaining roadside trees. In 2007, vehement protests by local residents and representatives of the local tourist industry

prevented the felling of 1,000 trees and led to the development of a management plan for them on the island of Rügen in the far north-east of Germany.

Rethink road safety

Public support for the tree heritage is no excuse for abandoning road safety initiatives, which can be combined with pro-tree policies. It is just a question of making sure that these initiatives choose the right targets. It is worth repeating, as Gila Altmann, Germany's secretary of state for the environment noted in a speech in 2002, that "*the trees are not the cause of the road accidents. The trees are predictable, they stay in the same place; cars can avoid them if they are driven appropriately*" (Altmann, 2002). Highway codes in all countries stipulate that drivers should be in control of their vehicle and adapt their driving to the circumstances. This requirement of controlling the vehicle stands in stark contrast to "forgiving roadsides" policies which take no account of the fact that driver error can lead to the death of other road users.

For France's Académie des Sciences Morales et Politiques [Academy of Moral and Political Sciences] "it would be […] absurd to cut down the trees, as some have proposed, in order to improve road safety. […] Incriminating the trees, however, remains typical of a certain perception of the road in France, where external elements are held responsible for disastrous consequences more often than driver behaviour" (Académie des Sciences Morales et Politiques, 2003).

Figures 80 and 81: Contrasting perceptions of road safety and aesthetics: in France, a sign tells drivers to beware of the trees; in Germany, an image highlighting the beauty of the preserved tree avenue invites drivers to opt for safety and decrease their speed.

Conserving tree-lined roads calls for us to rethink road safety programmes in order to aim for individual prudence and responsibility. It means moving from "forgiving roadsides" – which absolve drivers of responsibility – to a concept of "calm driving".

In an audit of local road safety policies the French authorities recognised the need for a new approach: "Past policies of systematically cutting down rows of trees lining roads, which are still practised at times in some départements*, must make way for genuine safety policies for the road environment, incorporating the new concept of calm driving and a respect for our natural heritage"* (Inspection Générale de l'Administration, Conseil Général des Ponts et Chaussées, Inspection de la Gendarmerie Nationale, Inspection de la Police Nationale, 2007).

Various measures are necessary here: speed reduction over tree-lined sections of road, combined with consciousness-raising campaigns and speed checks; no-overtaking zones; including driving on tree-lined roads as part of learner tuition and testing; plus a range of initiatives to reduce risk exposure (developing alternative transport offers to ensure that young people do not drive home from clubs, etc).

These measures enabled Mecklenburg, for example, to cut the number of people killed in accidents involving collisions with trees by nearly 75% between 1991 and 2007, while at the same time improving road safety on all other fronts, outperforming some German states with fewer tree-lined roads. These measures are also entirely compatible with sustainable development, leading to a significant reduction in fuel consumption and the associated emissions.

Communicate

Communicating the importance of sustaining and expanding our heritage of tree-lined roads, and also of the fact that preserving this heritage is compatible with road safety, is all the more important because the reasons for choosing to preserve our tree heritage cannot be explained effectively in the emotional aftermath of an accident.

> *A directive from Germany's Federal Ministry of Transport states the ministry's objective as follows: "protecting tree-lined roads and as far as possible ensuring that this cultural heritage is sustained into the future"* (Bundesministerium für Verkehr, 1992)*. In 2003, Brandenburg's environment minister Birthler confirmed that "results obtained to date in Brandenburg have shown that we can improve road safety on tree-lined roads while preserving this heritage"* (Birthler, 2003)*. Bundestag deputy Cornelia Behm made a similar statement in 2004: "Road safety is an issue of fundamental importance for us. It can also be guaranteed on tree-lined roads if all road users behave in a responsible way. Using it as an argument against roadside trees would show powerlessness and a lack of imagination."* (Behm, 2004)

In order to be effective this communication needs to be consistent. Yet it is not unusual to read in one and the same text that tree-lined roads "*are a distinctive and valuable element of our landscape*" but that trees must be "*cut down and replanted*" (Vestjællands Amt, 1999); or else, that accidents involving collision with fixed obstacles or trees are "*typically caused by driving too fast*" and that "*in practice, narrowing a road decreases speed and, as a result, the severity of accidents can be lower* " but then straight after this: "*In practice though changing the location of trees along the roads seems to be the only reasonable solution in spite of some protests by environmentalists*" (Tracz, 2006).

In fact what we see is that the roadside tree has come to symbolise a range of negative associations for governments and administrations. It is very often used to illustrate or symbolise road accidents in general or at least accidents involving a single vehicle; this despite the fact that accident victims from collisions with trees are never in the majority. These presentations and images overlook the historic, cultural, landscape, environmental and economic value of tree-lined roads and their positive role in terms of road safety; they convey a false image, incompatible with a policy of sustaining and optimising our heritage and with a policy of promoting driver responsibility. They must be corrected as a matter of urgency.

> *The symbol used in Belgium to represent single vehicle accidents in the statistics is a tree* (Observatoire pour la Sécurité Routière, 2008)*. In Luxembourg, the National Road Safety Charter signed by various ministers in 2007 is illustrated by a tree as a roadside shrine. In Denmark, the only accident photo in a guide on roadside obstacles shows a car that has collided with a tree; five out of eight images of obstacles in the document show .... trees, even though more road deaths are caused by other roadside objects than by trees in Denmark. In Sweden, the flyleaf of a 2004 report on road safety in Scania shows a tree-lined road after an accident, even though there are nine times more road deaths from other road accidents than from collisions with trees (at the same time alcohol-related accidents have been increasing steadily since 1997 and represent one third of all fatal accidents).*

Stop tree felling as a matter of absolute urgency

The most urgent priority is to stop tree felling and to retain existing trees for their own sake, without reference to timber production policies: our current timber supply needs are already largely covered by existing forests. Moreover the trees' function as a unique biotope makes it important to retain trees of all ages, and ancient trees in particular. These can be regenerated through appropriate treatment (pruning). They must be kept within their rows as long as the overall aesthetic impact is not affected, while ensuring that there is no risk of trees falling onto the road.

Figures 82 and 83: In Sweden, where tree-lined roads are protected as biotopes, the trees are retained *in situ*, taking care to ensure their stability, or else they are cut and driven into the ground close to younger trees or on nearby surplus land, as here.

Aesthetics as the absolute guiding principle

Aesthetic considerations have always governed the destiny of tree-lined paths and roads, in gardens, urban environments and in open countryside. A vital reason for keeping fellings to the minimum is that this beauty, which can be easily destroyed in a matter of hours with a chainsaw, takes decades to come into being and much longer still to reach its peak.

> *In 1909, Auguste Charles Delbeke, Belgium's Minister of Public Works, declared: "I would add that first and foremost I protect the trees for their beauty. […] Am I a timber merchant? No! I'm in charge of the country's roads and as such I must demand that the country's roads retain their ornaments. What? Here is a tree which has survived in its early years all the dangers to which it was exposed, from our vehicles and from the malevolence and brutality of passers-by, and now that it is flourishing in all its majesty, I should kill it? […] No! This is not how I see my role as protector and governor of our roads"* (Poncelet, M., 2006).

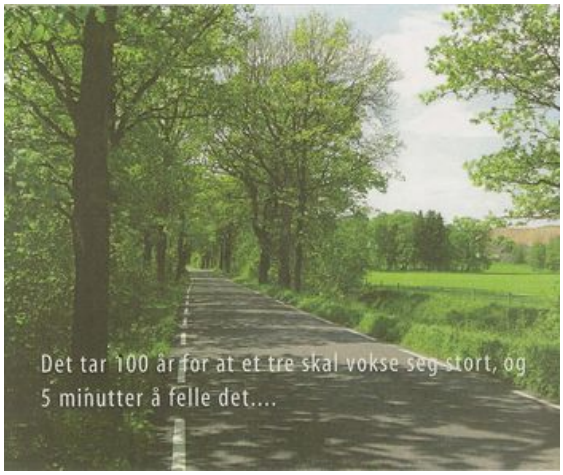

Figure 84: This brochure from Norway's roads department reminds us that it takes 100 years to make a tree but just five minutes to cut it down.

Alternative solutions for changing needs

Road infrastructures are evolving and our towns and cities are changing: traffic levels are increasing, soft modes of transport like the bicycle are becoming more popular, as are light rail systems. Yet this in no way conflicts with the aim of sustaining tree-lined roads in the urban environment or in the countryside. The first question to be asked, as a Prussian edict dating from far back as 1841 points out, is whether new developments are really necessary: only a small number of routes generally carry large volumes of traffic, so is it necessary to incur significant expense to widen or straighten roads serving local traffic needs? Would it not be better to educate drivers on road sharing issues, which will improve safety for all road users everywhere?

Figure 85: Many country roads can cope with moderate levels of traffic, with features which are already sufficient for the purpose, as here in Sweden. **Figure 86:** This photograph from the Dutch CROW guide no. 259 "*Plattelandswegen mooi en veilig*" (roads in the open countryside: beautiful and safe) shows that sustaining trees and historic road surfaces is compatible with contemporary government and a policy of "Sustainable Safety". The use of different coloured paving stones creates the illusion that this is a single traffic lane, making users more vigilant and careful.

On the island of Rügen (Germany), the authorities abandoned the concept of standardising roads to conform to typical cross-sections in 2008, in order to conserve roadside trees and, with them, the island's tourist resources.

When traffic levels and the road's function require it, one potential solution is to create a new parallel roadway and to divert onto it all or part of the road's traffic (either traffic flowing in one direction or a particular type of vehicle).

Figure 87: This historic road in Mecklenburg, retaining its original paving and its trees, is used for local traffic. Through traffic has been diverted onto a new road which runs parallel to the old one (on the left in the photo). **Figure 88:** On this Route Nationale (main road) in northern France, heavy goods vehicles travelling uphill use a parallel lane located beyond the avenue of tall beech trees.

Figures 89 and 90: Tracks running alongside the road, sheltered by the trees, can be used by cyclists or agricultural machinery.

Transplantation is another option, providing this does not open the door to ill-considered projects which treat trees as objects that can be moved about at will. Making use of modern resources, this technique can be completely successful for some species and for trees with diameters of 40 to 50cm – or even as much as 100cm. Success depends on careful preparation and meticulous aftercare (watering in particular). The costs are much lower than the asset value of the trees, which would be negated altogether if the trees were felled.

Already 30 years ago, a technical manual issued by the French Ministry of Transport called for "substantial utilisation of the […] transplantation options facilitated by present-day technical resources" (Direction des Routes et de la Circulation Routière, 1979). *Transplantations were carried out well before this date: it was a standard procedure in Paris around 1855. In 1937, four rows of 302 plane trees on the Avenue de la Grande Armée were transplanted, 235 remaining on*

the same site. In Sweden, when the road between Kyrkheddinge and Hemmeslöv was widened in 1919 the decision was taken to transplant the roadside trees.

Figures 91: Luxembourg has transplanted 1,000 trees in recent years with a long-term success rate of 99%. One of the examples presented in the brochure "*Straße und Umwelt in Luxemburg*" (roads and the environment in Luxembourg) shows a road-widening scheme in which one row of trees is transplanted.

Plant

While the first priority is to protect existing trees, planting more trees is also vital to ensure that this heritage survives into the future. This fundamental truth, which was recognised in the past, is all the more important where vandalism is an issue, as countries facing this problem have shown.

In 1756, the Intendant (general administrator) of Etigny in southern France, gave the order that "new trees should be planted to replace all those that die, with penalties payable for failing to do so" (Reverdy, 1997)*. In 1802, D. Depradt suggested that two trees should be planted for every one cut down – a requirement already enforced in some countries.*

Gap filling

It seems natural to start by filling the gaps between trees resulting from years of neglect. Only an effective policy of "gap-filling" can guarantee the conservation of tree-lined roads. Otherwise as the trees disappear one by one whole avenues will be erased from our memory and so replanting at a later date will require that much more will and effort. A policy of gap-filling also has the advantage of re-creating a continuity between trees of different ages, which is necessary in terms of biodiversity. Finally it avoids the traumatic impact of a sudden bareness in the landscape.

Baudrillart, in 1823, expressed his feelings of distress: "Along the road from Paris to Saint-Denis there was a magnificent avenue of tall trees; apparently their great age prompted the decision to cut them down and replace them with a new plantation. The bareness stunned me; it's all the more distressing because it will take more than ten years not only to offer a modicum of shade to travellers but also to create the appearance of an avenue" (Baudrillart, 1823).

Figures 92, 93, 94 and 95: The practice of gap-filling is systematic in towns and cities and in parks, where significant effort is expended to maintain a high-quality environment. The variation in size becomes less obvious over time and is less stark in appearance than an avenue punctuated by ever larger gaps. Three examples of gap-filling roadside plantations: North-Brabant, Scania and Brandenburg.

Creating long tree avenues

Restoring the heritage to its full glory also involves planting complete roadside avenues, in order to compensate for tree fellings where these become necessary and also to make up for past destruction which has left entire routes stripped of trees.

> *An inter-ministerial circular on planting tree-lined roads in Mecklenburg states that "protecting tree-avenues includes maintenance and development, for example by planting new tree avenues"* (Umweltministerium, Wirtschaftsministerium, 2002)*. Ebnet, in his successive roles as Mecklenburg's Minister of Economics and then Minister of Transport says the same thing in 2007 as he did in 2005: "We want to have more tree-lined roads"* (Ebnet, 2007)*.*

Figure 96: This double row of wild cherry trees in France is about 20 years old. **Figure 97:** Even though it is still young this new plantation in Luxembourg already creates a presence in the landscape.

Figure 98: A young plantation in Sweden. **Figure 99**: This new plantation, extending over nearly 3 kilometres, is made up of hornbeams planted close together and close to the road, already creating a visible 'avenue' effect. The German state of Mecklenburg has lined 1,750 km of roads in this way since 1990.

Correct spacing

Planting distances are determined by the space available: in an urban environment, façades and utility networks (overground and underground) restrict the possible locations and crown development; in open countryside, space availability is often determined by the fact that the road operator generally owns only a narrow strip of land, unless costly acquisitions are undertaken.

Planting distances are also linked to aesthetic effect desired: achieving a partial or total "arch" effect over the longer term is impossible when rows of trees are planted too far apart, in particular when planting schemes are designed to apply the so-called "safety" zone (which is in fact not "safe" at all). The regular spacing between the trees in a single row should be appropriate to the avenue as a whole: by their nature, tree-lined roads are not a succession of solitary trees but a structure in which each individual tree contributes to the overall effect.

The French technical manual of 1979 recognised that for tree-lined roads "locating the trees on the verge is the only location which gives them their true character" (Direction des Routes et de la Circulation Routière, 1979). *In 2005, the Danish roads department admitted that replanting trees at a greater distance from the road "will strongly alter the character of the road while also being very expensive due to the land acquisitions required"* (Vejdirektoratet, 2005a).
A circular from the Ministry of the Environment and the Ministry of Transport in the German state of Mecklenburg specifies planting distances relative to the road edge for regional roads (Landesstraßen) varying from 1.5m for traffic levels below 2,500 veh/day to 3.5m for traffic levels

higher than 5,000 veh/day. The upper limit was initially 4.5m but was reduced to 3.5m precisely because of the land acquisition problems encountered when the planting distance was too great.

Figures 100 and 101: Where fields or other restrictions limit the space available there is only one thing to do: plant close to the road edge, particularly when the new tree is filling a gap as in the left-hand photo. In any case the rows of trees must be kept relatively close to one another in order to achieve an "arch" effect.

Figure 102: Young pear trees spaced at distances gradually reducing from 15m to 10m to signal the approach towards a village.

Appropriate species

The choice of species should take account of the tree's environment and biology, its physiognomy (shape, texture, colour), the impacts of climate change, history and specific regional circumstances. It will vary according to whether the location is urban, on the outskirts of a village, in agricultural landscape, or in a key area for environmental protection. To prevent the risk of seeing a mono-species heritage decimated by disease or pests, it is wise to opt for some diversity, without overdoing it. Local species and crops should be preferred – including fruit trees. In Luxembourg, for example, the traditional avenues of fruit trees supplying local distilleries and nut markets are regularly supplemented by new plantations.

Respect the tree as a living being

Creating a proper tree-lined road involves more than just planting the trees. Appropriate tree care, conforming to arboricultural best practice, is vital at all stages of the trees' life cycle and must be specified in all contracts. This is vital for sustaining the heritage in an economically efficient way.

Nurseries are the first link in the process of creating a successful plantation. Plants must be selected for quality at the nursery and tagged. Some operators run their own nurseries. When this is not the case, growing contracts can provide for future needs, trees generally being between five and ten or even up to 20 years old when they are planted out. Providing for future needs in this way avoids the need for crisis management and greatly enhances quality; however, it does call for financial commitment over the long term on the part of the road authorities. Other key factors in a successful plantation are transport conditions, planting pits, soil quality, staking, mulching or hoe-weeding, watering and finally formative pruning to create a balanced structure and gradually raise the crown.

All excessive or over-vigorous pruning and tree topping must be outlawed, in favour of gentle pruning operations only, undertaken by trained arborists who climb the trees. This technique, which is mandatory in some French *départements* and in Wallonia for outstanding tree rows, is the only way arborists can enter the crown to remove dead wood and improve airflow among the upper branches, giving the tree improved transparency and greater stability in high winds. Special types of pruning may be practised if they reflect historic or local traditions, such as willow pollarding in south-east Sweden.

Figures 103 and 104: In Luxembourg, posters are regularly supplied to companies and distributed on building sites. Specialist forestry officers act as consultants in the planning of road works.

In order to ensure that the efforts devoted to tree planting and maintenance are not wasted, it is vital to ensure that the tree is protected from all sources of potentially fatal damage. Cleaning tools after working on one tree before moving on to the next is basic plant health good practice to help prevent the spread of disease. Rules to be observed during works programmes must be contractually specified, whether this takes the form of standards or technical manuals as in Germany, or charters as in some towns and regions in France. These must be combined with financial penalties for non-compliance, the level of the penalties reflecting the asset value involved.

> *The French Ministry of Transport's technical manual of 1979 states that "when existing pipelines obstruct [….] the creation of new plantations, before seeking any other solution the licensee or concession holder should be invited to relocate the pipeline"* (Direction des Routes et de la Circulation Routière, 1979)*. The occupant is liable for the costs of this lawful relocation. Felling is not permitted unless no other solution is possible. The trees should then be re-planted at the applicant's expense.*

Figure 105: This double row of trees from 1830 (Rathlousdals Allé in Denmark) borders a roadway that is 5.1m wide, with traffic levels of 5,000 veh/day. It has been protected since 1979, and this is supplemented by a prohibition on winter salting, as is also the case in Freiburg in Germany. Elsewhere in Denmark screens are used to protect trees from the salt.

Figure 106: Posts used to protect trees from damage in France. If the trees had been planted on the verge, between the roadway and the ditch, the risk of impact damage would have been minimised while at the same time restricting root growth in the direction of the cultivated land. **Figure 107:** A strip of fallow land – here in Sweden – provides protection against impacts and soil compression.

Manage responsibly

Whether the aim is to defer fellings, plant trees or sustain existing trees, a sustainable policy is inconceivable without a management plan for anticipating and scheduling future interventions. Trees are a living heritage and so without a coherent plan, authorities will find themselves having to crisis manage the effects of tree ageing, felling trees unnecessarily to forestall tree-fall or branch-fall without having the resources to replace them.

An accurate quantitative and qualitative inventory, undertaken by proven experts in the field, and including geographic and plant health data along with environmental and cultural information, is vital as the basis for this plan. It should be supplemented by a management plan defining objectives, the criteria for evaluating these objectives, timings and budgetary provision.

The inventory should be updated on an ongoing basis and all interventions should be recorded; otherwise the inventory will quickly become outdated and it will be impossible to capitalise on information and expertise that can be transmitted to successive management teams throughout the trees' lifecycle.

REGULATORY PROTECTION: THE KEY TO SUCCESS

Is it enough to know that trees should not be cut down, and that we need to plant, manage, communicate, and promote road safety in order to ensure that this heritage survives? Can the future of tree-lined roads depend solely on the goodwill, cultural sensitivity and commitment of managers or elected officers whose career paths and mandates obey timescales very different to the lifespan of these trees themselves? Should this future be dictated, ad-hoc, by changing pressures and requirements even though we know that a tree cannot be "rebuilt" – unlike buildings, which may at times have been saved from disappearing altogether in this way?

Figure 108: Tree-lined roads in France do not benefit from general protection. The result is clear: two *départements*, two different approaches. After the tree fellings of the 1990s a tree avenue which once lined the whole road now stops at the "border".

In response to these questions some countries have decided that regulatory tools are necessary.[5] Comparing these regulations and setting them side by side with the state of the heritage in the areas they cover demonstrates the positive impact and crucial importance of well-designed protective measures.

In order to achieve its aim this protection must apply to all tree-lined roads – comprising single or double rows of trees, complete or fragmentary, public or private, without restrictive criteria relating to the number of trees, their spacing or their age. It must be based on all the characteristics which make tree-lined roads important: their historic and cultural value, landscape value, environmental value, and their contribution to road safety.

The first consequence of regulatory protection is the sharing of prerogatives between the owner or manager of the tree-lined road and the department in charge of applying the regulation (generally the department of the environment). A collective decision-making system should be put in place, also involving the public (associations), in the spirit of the European Landscape Convention and similar to the system practised in Mecklenburg.

[5] See Annex

In Wallonia, even when urgent decisions are required for reasons of mechanical stability and public safety, an official from the department of the environment collaborates with the road operator to verify the necessity of felling.
In the canton of Geneva, pruning and felling operations are subject to a planning permission process which is open to the public – any citizen or group of citizens can lodge an objection.
In Mecklenburg, the environment administration collaborates with approved protection groups in undertaking annual heritage tours during which any necessary consolidation measures or fellings are agreed. It is also legally authorised to issue instructions to companies entrusted with tree maintenance and to monitor their work.

The next immediate consequence is a prohibition on tree felling, with dispensation only for reasons relating to the tree's mechanical stability. This prohibition should also encompass all measures which would, over time, endanger the tree's survival or modify its appearance; in short, anything which would impair its value as a heritage asset.

This protection must be combined with an obligation to undertake the maintenance and planting without which this living heritage will eventually disappear.

The avenue of Château d'Arry in northern France, a double row of lime trees protected since 1925, was cut down in 1967 following a car accident. Some fifteen years later a new double row of trees was planted: alternating green and purple maples. The effect is unsightly and lacks any historic justification. Moreover, nearly 30 years after being planted the trees are still stunted due to a lack of appropriate care.

Finally, flouting the regulations must result in sanctions, in the form of fines heavy enough to act as a deterrent, particularly in urban environments where major property development schemes are involved. These should be supplemented by compensatory measures, which should also apply in cases of dispensation. They should be sufficient to compensate for the losses incurred and must therefore be based on the asset value of the tree rows.

Figure 109: Near Neufchâteau in Belgium, a 750m double row comprising 247 beech trees with a heritage value of €2 million was cut down without authorisation. The case will be going to court. **Figure 110:** Opposite stands the matching section of the tree avenue that was destroyed.

From around 1920 onwards, the Paris parks and gardens department claimed compensation from the parties responsible for damage to tree-lined roads and public promenades. "This regulation, applied with moderation, does not cause difficulties and by its nature very effectively instils in the public the concept of the trees' value, which is so often underestimated by our fellow citizens" (Leroy, 1953).
Mecklenburg has an interesting compensation scheme: based on the asset value of the trees destroyed, compensation can be set at a ratio of up to 3.5:1, with part allocated to replanting and part paid into a special fund.

WHAT RESOURCES?

Is regulation alone sufficient to guarantee the survival of our heritage? Here, too, comparing different countries and regions shows, not surprisingly, that human and financial investments are necessary to ensure that the regulations are more than just empty words.

People

Sustaining and managing tree-lined roads involves a significant number of players: the decision-makers (owners, managers and developers), the operators on the ground (nursery operators, arborists, road services departments), third parties concerned (farmers, utility companies, civil engineering companies) and, finally, the public (residents, tourists, associations).

Denmark's roads department put the lack of new plantations down to the fact that there was "*a multitude of more exciting tasks to be undertaken*" and to "*the low prestige attached to road planting schemes*" (Vejregelrådet, 2004). Indeed more or less everywhere some decision-makers have lost interest in this kind of plantation, regarding tree-lined roads as too formal and their homogenous appearance – which is in fact the key to their attraction – as rather dull. Such judgements reveal a deep ignorance of our heritage and a flagrant lack of cultural awareness.

> *In 1928, the Swedish newspaper* Skånska aftonbladet *directed particular criticism at the lack of aesthetic awareness in road-widening schemes. "The taste, cultural awareness and aesthetic sensibility of the engineer or developer have a very important role to play in this respect"* (Leroy, 1953).

Awareness of the heritage is a pre-requisite for re-creating a culture of tree-lined roads. There is still a shortage of studies in this area and research should be encouraged. There are numerous potential fields of investigation – history, landscape, ecology, etc. – and all of these can be multiplied by the various scales on which they are applied: to particular routes, regions, countries, or the whole of Europe. This research will make everyone aware of the huge value of this heritage, giving it tangible definition and supplying the keys to treating it with sensitivity and respect. In turn this awareness of the heritage will generate renewed interest among engineers, encouraging them to re-align themselves with this prestigious tradition.

In wider terms, information and training are vital to ensure that elected representatives, owners and managers, as well as developers are aware of the technical aspects of tree conservation and understand the importance of employing specialist personnel and the need to integrate the management of tree-lined roads and streets in a way that preserves them and optimises their value.

The requirement for collective decision-making resulting from protective regulations will act as a boost, forging links between players in different specialist fields and paving the way for mutual enrichment in terms of best practice. In Scania, for example, a permanent working group has been in place since 2001. It comprises representatives of the Swedish roads department (manager), of the local authorities (in charge of protecting biotopes), of the regional museum (specialists in the historic/cultural aspects) and arboriculture specialists. This working group jointly defines and schedules priorities for fellings, new plantations and re-planting schemes, as well as organising ongoing training in order to develop its expertise.

Working groups are not the only vehicle for sharing and disseminating expertise. Many other options are available and some are already in use: magazines, books, seminars, courses, talks, websites and so on. A diverse range of stakeholders can contribute to these initiatives, including public authorities, universities, associations, landscape and arboriculture professionals, etc.

> *Many seminars and conferences have already taken place, mainly in Germany (Friedrich Ebert Stiftung seminars; Verkehrsgerichtstag 2003, a conference for experts in transport and transport law; Osnabrück 2006; Arnsberger Umweltgespräche, 2006) but also in other countries (Riga,*

Latvia, 2007, with presentations from France and Germany; Pisz, Poland, 2008, with presentations from Germany; Cernier, Switzerland, 2008, again with presentations from Germany).

Figure 111: Research and consciousness-raising work is already under way in some countries. For more information please see the appended Bibliography.

Trees mutilated by inappropriate pruning, young plantations that are stunted or dying, trees withering after years of damage caused by mowing equipment or falling because their roots have been removed during excavations, etc.: all these phenomena point to a lack of awareness, a loss of expertise and a shortage of appropriate know-how on the part of many workers and third parties on the ground. Caring for trees is a profession in its own right, it is not something you can make up as you go along: all works programmes must be sensitively carried out by personnel with the appropriate training. It is the decision-makers' duty to recognise these requirements and act upon them. This sector also represents a major source of skilled employment for the local workforce.

Figure 112: In Sweden, training courses covering historic, biological and technical issues have been provided since 1996 for private landowners, many of them farmers, and for the roads department, which invites businesses to take part. **Figure 113:** Nursery tour organised for road specialists and public officials in Luxembourg.

Figure 114: Gentle pruning undertaken by professional climbing arborists has two qualities: it preserves the tree's vitality and it is unobtrusive. It is a good idea to stage consciousness-raising tours for specifiers to ensure that this unobtrusiveness does not lead them to think they have spent money on "nothing".

Finally, raising public awareness is a key priority for the European Landscape Convention. This is a crucial issue for any landscape policy and consciousness-raising initiatives can take on an almost limitless array of forms. Germany and Sweden provide us with many examples.

A few examples of consciousness-raising and information initiatives undertaken by public authorities and also by associations, which have been especially dynamic in this respect:

- *Dedicated website (Federal Environment Ministry, Germany)*
- *Exhibitions, with tourist organisations and museums (Regionmuseet Kristianstad, Sweden)*
- *Photographic competition (Fonds Suisse pour le Paysage [Swiss landscape fund]; Federal Environment Ministry, Germany)*
- *Promotion and sponsorship campaigns (Federal Environment Ministry, Germany; BUND Friends of the Earth, Germany; Fonds Suisse pour le paysage)*

- *Avenue plantations attended by many government representatives (the German President, the Bundestag President, federal ministers) and the media, in particular marking "Tree Day" or what is now designated as "Avenues Day" in Germany, 20 October (Luxembourg has also decided to hold an "Avenues Day" from 2009)*
- *Explanatory signs by newly planted trees (Lyon region, France)*
- *Cycling events ("Tour d'Allée", Rügen, Germany)*
- *Production of posters, calendars, postcards (Landesgemeinschaft Naturschutz und Umwelt; Federal Environment Ministry, Germany)*
- *Initiatives to raise awareness among schoolchildren: interactive DVDs, quizzes, planting campaigns (Germany)*

Figure 115: A new section of the "Deutsche Alleenstraße" tourist route is planted in 2008, as part of Nordrhein-Westfalen's "*Hundert neue Alleen*" (100 new tree avenues) campaign. Many prominent figures took part, including the state's Environment Minister Eckhard Uhlenberg, the President of the Deutsche Alleenstraße consortium Christoph Rullmann, and its Vice-President, Erwin Pfeiffer, who is also director of the tourism and marketing department of the ADAC (German automobile association).

Finance

A policy of conservation, i.e. of sustaining and replanting, necessarily requires a budget. Without a dedicated budget provision, for maintenance and for investment, experience shows that all the available money will be taken up by other road-related requirements (surface repairs, bridges, etc).

Even where concrete figures are available, direct comparisons are usually difficult to make. Nonetheless the cost of planting and maintenance is very low compared to the costs of road construction and maintenance. Moreover, tree maintenance is concentrated in the early and late phases of the trees' life cycle.

Financial benefits

The cost of a conservation policy must be set against the ongoing increase in the asset value of the tree rows and the benefits this policy accrues, in particular by enhancing attractiveness in the real-estate and tourism sectors and by improving public health.

> *The important role roadside trees play in capturing dust and pollutants should be set against the cost of mortality and morbidity arising from traffic-related pollution, which is not confined to urban environments. In France this cost was estimated at nearly €22 billion in 1999.*

Rationalising expenditure

Effective cost management is, in one respect, a primary and crucial source of financing. Substantial sources of savings are often under-utilised:

- In terms of road safety, “calm driving” and consciousness-raising initiatives are less expensive than removing roadside obstacles, and achieve better results;

In France, official studies state that in 2004 €1 million invested in safety measures focusing primarily on reducing roadside obstacles reportedly save less than one life, whereas €1 million spent on additional communications relating to road safety reportedly help to prevent 14 deaths.

- Choosing small-diameter trees is economically effective for two reasons: they are cheaper to buy and they generally have a better chance of recovery; large-diameter trees can be reserved for specific cases, for sites where vandalism is a problem or for highly prestigious projects;

- High-quality plants, planting and aftercare can ensure a high success rate for plantations;

- Tensiometric measurements can yield significant water savings by limiting watering to what is strictly necessary;

- High-quality maintenance and protection from damage of all kinds throughout the trees’ life cycle maximise their lifespan and optimise the “profit” from the investment;

- Not undertaking any stubbing back not only extends the trees’ lifespan but represents a direct source of substantial savings in itself;

At the end of a 60-year period, the cost of a tree managed by successive stubbing back prunings is estimated at twice that of a tree managed by minimal pruning. It should be added that stubbing back also entails a loss of value in terms of the tree’s appearance and a significant reduction in terms of longevity.

- Restructuring a tree by pruning rather than cutting it down extends its lifespan and costs less, as Mecklenburg’s experience demonstrates.

Sources of financing

For farmers, the subsidies granted for sustaining and maintaining natural and cultural environments under the European Union’s Common Agricultural Policy also apply to rows of trees along private roads.

Building on the European funding programme, Sweden has provided support for the sustenance of private tree avenues since 1996. 164,000 trees are covered by these measures, which are linked with compulsory training provision. Similar subsidies are also available in Finland.

Private sources of financing can also be sought, in the form of corporate sponsorship (nursery operators, landscape architects and landscape contractors for the campaign by the Fonds Suisse pour le Paysage (Swiss landscape fund), for example) and private sponsorship (Germany’s Federal Environment Ministry offers sponsorship packages and gift vouchers for tree avenues). The offsetting of greenhouse gas emissions also opens up a new channel of business-sourced financing.

At the start of the millennium, the Deutscher Städte- und Gemeindebund, an association representing 14,000 localities in Germany, and the Bund Deutscher Baumschulen, an association of nursery operators, launched various initiatives relating to tree-lined roads, including planting schemes financed by corporate and private sponsorship. In 2008, companies in Laval (France) financed the planting of trees on a roundabout to offset the greenhouse gas emissions of an event organised in the town.

Compensatory measures and fines for trees that are cut down or damaged during roadworks for example, or through inappropriate pruning, clearly constitute the main source of financing. This is the approach taken by Mecklenburg, which has an array of compensatory measures including both tree

planting and payments into a special fund for managing and renewing all the state's roadside trees, private as well as public. Schleswig-Holstein is already planning to follow this model.

Figure 116: Roadside trees are not just for small country roads. This avenue is in the Netherlands.

CONCLUSIONS / RECOMMENDATIONS

Following the golden age of tree-lined roads in the 19th and early 20th centuries, a significant proportion of the trees growing alongside Europe's roads and streets – as much as 90% in some regions – has disappeared due to a natural ageing process or as a result of epidemics or pests, but above all because of road schemes and misjudged road-safety policies.

Replantings have by no means compensated for these losses, due to the introduction of planting distances which are incompatible with land ownership realities, through a loss of interest on the part of the relevant managers and through the lack of dedicated budgetary provision.

Mistreatment and inappropriate practice are accelerating the decline of the remaining trees.

However, tree-lined roads and streets constitute an important shared heritage in the history of Europe. Drawing on a 500-year tradition, they help to define and enhance the specificity and unique identity of each individual region. They give the landscape a noble, living architecture which has been a continual source of inspiration to painters, writers and indeed the general public. They bear witness to local history, they play an important role in terms of climate, pollution and biodiversity and they contribute to road safety. Overall these qualities endow them with a heritage asset value which is recognised by insurance companies but generally disregarded by other players and which is in any case substantially under-estimated.

A well thought-out management policy benefits the entire tree-related sector, the tourist industry, real estate, the low-qualified workforce and the health and well-being of the entire population.

Taking these factors into consideration, we make the following recommendations:

- That governments and public authorities should recognise tree-lined roads and streets as a form of cultural identity which is inextricably linked to their inherent environmental and road safety functions and must therefore be safeguarded.

- That the pre-eminence of aesthetic considerations as the guiding principle of past and future planting schemes should be reminded;

- That this recognition should be enshrined in a body of regulations;

- That conservation requires retaining existing trees, restructuring them through pruning as necessary in order to prevent any risk of mechanical failure;

- That conservation also requires restoring the heritage, both by systematic gap filling and by planting complete new avenues to compensate for past fellings;

- That this conservation should no longer be based on the use of wood for construction purposes or heating, but on the recognition of shared cultural and environmental values and on tree-lined roads' contribution to the landscape, to road safety, and to general well-being;

- That this also includes single rows of trees and all roadside trees, whatever the distance between them and the roadway;

- That this should not include any regulation stipulating minimum planting distances;

- That account should be taken of all operations which damage the asset value of tree avenues (felling, all kinds of mistreatment including earthworks, lowering water tables, etc.);

- That regulations should be introduced to set compensation levels for all tree fellings or for damage to the appearance or physical integrity of the trees, these regulations being based on the asset value of the ensemble;

- That these compensation rules should comprise a planting element and a contribution to an ad-hoc fund;

- Finally, that the conservation should be delivered by a collective organisation bringing together owners and managers, the authority responsible for upholding the protection regulations and other environmental groups.

It is a matter of urgency that state governments and public authorities should:

- engage in policies of communication, consciousness-raising and education for the public and for all professionals involved, in order to re-establish a genuine culture of tree-lined roads and a widespread dissemination of the necessary expertise;

- discontinue all practices stigmatising roadside trees, particularly relating to road safety, instead undertaking measures to encourage responsible behaviour on the part of all road users;

- commit to presenting a positive image of tree-lined roads commensurate with their acknowledged value;

- set up appropriate management systems (inventories, follow-up, etc.);

- explore the possibilities for private and corporate financing;

- stop all tree felling until these recommendations are implemented.

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ANNEXES

A question of vocabulary

Current regulatory protection and its limits

Letter from President Georges Pompidou to his Prime Minister

A question of vocabulary

Many countries, unlike France itself, currently use the French word "*allée*" to designate a road lined on either side with trees deliberately planted at regular intervals, whether the road in question is a park avenue, an urban street or a country road. This is the case in Germany with the word "*Allee*", in Sweden with "*allé*", in Latvia with "*aleju*" or in Poland with "*aleja*". Variations on this word are used to describe particular kinds of avenues: thus we find "*parkallé*" and "*aleja parkowa*" in parks in Sweden and Poland, "*landsvägsallé*" or "*aleja przydrożna*" used for country roads, while an "*aleja dworska*" and an "*aleja wiejska*" will be found near Polish castles and villages respectively.

It is an interesting choice because on the one hand it clearly expresses the fact that all these features are related, as we have highlighted in this report, and on the other it connects this heritage with its historic source: the *allée* of baroque gardens. Some countries reserve the term for tree-lined avenues which historically belonged to a castle or manor house, even if they are located in what is today open countryside or, more generally, an urban environment. This is the case with the Danish word "*allé*" and the Dutch "*bomenalleen*".

In French-speaking countries there is some variation in usage: we find the word "*allée*" used in French-speaking Switzerland in a way that reflects the Germanic influence. Belgians use the term "*drève*", also attested in northern France, for the historic avenues of aristocratic estates. In some cases the name is still applied to the roads themselves after the trees have been lost.

In France, the country where the word "*allée*" came into being and from which it spread throughout Europe, the use of the word to designate a tree-lined road is no longer current, even though it is attested from the 17th century onwards and included in dictionaries as far back as the 18th century. Today, an "*allée*" is simply a path or a walkway. Even so, the meaning "a wide street lined with trees" is still listed in the *Trésor de la Langue Française* in 2008.

> *Allée = "two rows of trees, forming a promenade" (Jean-François Féraud: Dictionnaire Critique de la Langue Française 1787-1788); "a place suitable for walking, which extends lengthways, and is bordered with trees or greenery, without being enclosed by walls" (Dictionnaire de l'Académie Française, 1762; 1798; 1832-35; 1932-35); "roadway bordered with greenery (trees, shrubs, lawn), flowers or hedges, which provides passage, serves as a promenade or provides access in a garden, a park, a wood, or a built-up area; by extension, a wide street lined with trees" (Trésor de la Langue Française Informatisé 2008)*

The term "avenue", used by the gardener Claude Mollet in 1615, is initially not clearly differentiated from the word "allée". In 1680, Richelet defined it as follows: "a large *allée* which leads to a country house and is generally lined on both sides with trees". In English, John Evelyn is credited with the first use of "avenue" in 1654, designating the tree-lined road leading to an estate, the meaning it has retained today. In general terms the word "avenue", just like the word "boulevard", has acquired a more general meaning, designating a wide urban road or street, not necessarily lined with trees.

The question of vocabulary is an important one. Countries like France, Italy and Spain, and also English-speakers, are obliged to use circumlocutions such as "tree-lined roads". Quite apart from the fact that this expression is unclear (it does not tell us whether the road is lined on one or both sides), it is devoid of all cultural and historic meaning, which is a major handicap in terms of communication. Would Germany's environment minister have been able to launch such a popular website on the subject if he hadn't been able to call it simply www.alleenfan.de (i.e. "*allée* fan")? It is evident that we need a simple and rich vocabulary which clearly expresses the concepts involved. In French we propose that the term "*allée*" and the expression "*allée d'arbres*"[6] should be widely adopted.

[6] The choice of terminology should not in any case exclude single rows of trees from heritage conservation policies and the text of regulations should specify in all cases that single rows are covered by the protection in just the same way as double-row avenues.

Current regulatory protection and its limits

Regulatory protection already exists in some countries. Its beneficial effect is indisputable: it has effectively saved many tree-lined roads from being sacrificed to short-sighted policies. Yet without a global vision of the value of these roads the regulations often fail to provide sufficient protection, requiring adjustments as proposed in Section 5 of this study.

Regulatory protection varies greatly from country to country. Some countries (France, Luxembourg, Latvia and Belgium, for example) protect double-row avenues, for example, if they are considered to be outstanding. This type of protection is based on classification, carried out on a voluntary basis or even with the landowners' agreement, with the result that the number of avenues protected varies and is limited overall (around 60 in Latvia, for example – but nearly 900 in just the Wallonia region of Belgium, which is one quarter the size).

Figures 117 and 118: In the background we see the avenue of lime trees which extends over more than 2km in view of the Château de Commercy (France). It was planted around 1721 or 1750 and has been protected as an outstanding site since 1911. The ensemble, now partly located in an urban area, comprises nearly 500 trees, some of them more than a century old, and is regularly restored.

Figures 119 and 120: Two tree-lined roads which have been designated as outstanding and protected, one in Latvia, the other in Belgium.

Protection can also be limited to a given area, as with the "Alpilles" directive in France.

Other countries protect their tree-lined roads in a more general way. This is the case with Sweden, for example, which protects tree-lined roads for their biotope status in its Environmental Code. In Belgium, Wallonia not only protects specific outstanding avenues but protects all tree lines under its development, urban planning and heritage law. In Germany, protection for tree-lined roads as elements of the cultural landscape is enshrined in Federal law on protection of nature and the landscape. The federal states of Brandenburg, Mecklenburg, Schleswig-Holstein and Nordrhein-Westfalen have implemented similar government legislation.

Figures 121 and 122: The yellow mark on a tree in Sweden means that it is especially valuable in terms of biodiversity. Here the trunks have been kept in place but they could have been moved to a nearby location as is done in some cases.

Figure 123: The 777 lime trees on the road from Neufchâteau to Bertrix, in Belgium, are not protected because they are spaced more than 10m apart. **Figure 124:** This remnant of a pine avenue in Sweden is visually very interesting because of the contrast with the colours and shapes of the surrounding forest, but it is not protected and so it is not renewed. Meanwhile just a few hundred metres away whole network of deciduous tree avenues is lovingly maintained.

The scope of the protection provided is key to assessing the effectiveness of these regulations: for example, while Wallonia, Sweden and Mecklenburg all protect both single- and double-row avenues, single rows are excluded from the protection provided in Brandenburg.

Similarly, protection can be restricted to trees bordering certain types of roads (Brandenburg) or can include all tree-lined roads, private roads included (Wallonia, Sweden, Luxembourg, Mecklenburg).

Another restriction can appear in the way tree-lined roads are defined: the definition is often based on a minimum number of trees (which can vary from 3 to 20), or on a particular length, and sometimes includes criteria relating to spacing (less than 10m in Wallonia) or diameter or age. Luxembourg's approach is the most reliable in this respect, simply referring to "trees bordering paths and roads".

Finally the restrictive effect can arise from the very motive behind the protection: this is the case with Sweden's protection, for example, which relates to biotopes and so excludes conifers and avenues where mature trees are not in the majority. By contrast, Brandenburg's protection incorporates the appearance in the landscape, does not exclude any species, and also includes newly replanted double-row avenues as well as trees planted to fill gaps from the moment when the ensemble can be considered as an "*Allee*", i.e. a double row of trees closely associated with a road.

Protection includes a prohibition on felling. Dispensations may be granted, generally on a case by case basis. This requires approval by the administration responsible for applying the law and is restricted to a greater or lesser extent: in Mecklenburg, felling is not permitted except when there is no other way of improving the safety situation (such as restructuring by pruning). In Luxembourg, "*permission is refused […] when the applicant's plans are of a nature that will impair the beauty and the character of the landscape*" (Grand Duchy of Luxembourg, 2004) or where these plans will endanger the country's flora and fauna.

Depending on the reasons for the protection, it may also include a prohibition on alterations to the constitution or appearance of the avenue. Sweden's protection relating to biotopes prohibits damage to the natural environment, which includes felling, excavations, and depositing land fill, but does not prohibit stubbing back and tree topping, which can be carried out to stabilise dead or extremely old trees. In Brandenburg and Mecklenburg, anything which causes damage (to the roots in particular) is prohibited. In Wallonia permission is required only for modification to the silhouette, and even this only applies to "outstanding" tree rows.

Except in Mecklenburg, the protection is not generally combined with an obligation to maintain and plant trees. This limits the impact of the regulations in terms of heritage conservation, all the more so because we are dealing with a living heritage.

The compensatory measures stipulated are not always sufficient to repair the damage caused or to represent an adequate disincentive, particularly when it comes to major property development schemes in an urban environment.

Letter from French President Georges Pompidou to his Prime Minister, Mr Chaban-Delmas, of 17 July 1970

"My dear Prime Minister,

By the most extraordinary coincidence I have received a circular from the Ministry of Infrastructure's Roads and traffic department – of which I am forwarding you a copy.

This circular, presented as an action plan, has indeed already been communicated to many officials entrusted with its application, because it is through one of these officials that I became aware of its existence.

The circular prompted two reflections on my part:
- The first is that while the Council of Ministers is periodically captivated by minor questions such as the increase to an allowance paid to a few civil servants, important decisions are being taken by a Ministry's central departments beyond all governmental control;
- The second is that even though I have several times expressed in the Council of Ministers my intention to safeguard trees "everywhere", this circular displays the most profound indifference regarding the President of the Republic's wishes. It reveals, in fact, that felling roadside trees will become the norm, under the pretext of safety. It should be noted by contrast that the displacement of electrical and telegraph poles is envisaged only with the greatest of prudence, and mentioned merely as a possibility. This is because they have Departments to defend them. Trees, it would seem, have no-one to defend them but myself and it appears that this does not count.

France was not made solely to permit French people to travel by car and whatever the scale of the road safety problems this should not result in the disfigurement of her landscape. Moreover an enduring reduction in traffic accidents can only come about by educating drivers, and by establishing simple rules which are appropriate to the road network, whereas we seem to be witnessing an infatuation with signs and signals in all their forms. It will also come about through less feeble regulation regarding alcohol levels and in this respect I regret that the government has retreated from its initial position.

Safeguarding the trees planted along our roads – and I am thinking in particular of the magnificent roads lined with plane trees in southern France – is essential for the beauty of our country, to protect nature, and to safeguard a human environment.

I therefore request that you refer this circular to the Ponts et Chaussées, and that you give precise instructions to the Ministry of Infrastructure so as to ensure that whatever the pretext (ageing trees, requests from duped municipal councils oblivious to all aesthetic considerations, financial problems posed by maintaining trees and cutting down dead branches), they do not pursue in practice what they abandon merely in principle and to give me satisfaction in appearance only.

Modern life with its environment of concrete, asphalt and neon will increasingly create in all people a need for escape, for nature and beauty. Motorways will be used for transport where speed is the sole concern. Meanwhile the roads must become again for the late-twentieth-century driver what country lanes were for pedestrians and riders: a route that is taken without haste, and as an opportunity to see France. Let us beware of systematically destroying what makes France beautiful!"

Photo credits

Alléens Venner: Fig. 105. *CAUE 54*: Fig. 44. *CG 77, Direction des routes*: Fig. 22, 61, 71, 72, 106. *M.Cléda*: Fig. 5, 109, 110. *A.Colnot*: Fig. 114. *CROW*: Fig. 86. *M.Decker*: Fig. 9, 40, 43, 50, 62, 91, 97, 100, 102, 103, 104, 113. *B.Domżalska*: Fig. 79. *I.Erenpreiss*: Fig 23. *C.Fauché*: Fig. 24, 80. *F.Ferrini* : Fig. 26, 34, 76, 92. *R.Fischer*: Fig. 115; *V.Galmiche*: Fig. 13. *F.Jay, Musée des Beaux-Arts de Dijon*: Fig. 4. *M.Karlberg, Regionmuseet Kristianstad*: Fig. 10. *W.Knercer*: Fig 53. *Krigsarkivet, Stockholm, Topografiska kartor Sverige, Skåne XVII B : 62*: Fig. 1. *M.Lechien*: Fig. 118. *I.Liżewska*: Fig. 3, 25. *A.Machul*: Fig. 55. *C.Olsson, Regionmuseet Kristianstad*: Fig. 46. *P.Olsson, Regionmuseet Kristianstad*: Fig. 33, 112. *M.Péché*: Fig. 69. *C.Pradines*: flyleaf, Fig. 2, 7, 8, 11, 14, 18, 19, 20, 21, 27, 28, 29, 30, 31, 32, 35, 36, 37, 38, 41, 42, 45, 47, 48, 49, 51, 52, 54, 56, 58, 59, 60, 63, 66, 67, 68, 70, 74, 75, 77, 78, 81, 82, 83, 85, 87, 89, 90, 93, 94, 95, 96, 98, 99, 101, 107, 108, 111, 116, 119, 120, 121, 122, 123, 124. *Regional Centre for Historical Monument Studies and Documentation in Olsztyn*: Fig. 15. *C.Schrepfer*: Fig. 6. *Statens Vegvesen Norvège*: Fig. 73, 84. *E.Thomasson, Regionmuseet Kristianstad*: Fig. 39, 57. *F-X.Valengin*: Fig. 64, 65, 88. *Ville de Commercy*: Fig. 117. *K.A.Worobiec*: Fig. 12.

English translation: Susan Mackervoy and Ros Schwartz