TreeAZ: An International Framework for tree assessment

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A new method of tree assessment called TreeAZ is described that has been developed in the UK but is applicable internationally. TreeAZ is based on a systematic analysis of factors that make trees unsuitable for retention rather than the traditional approach of considering their benefits to assess importance. The most important trees are categorised A and the less important trees as Z. Its starting point is that all trees are worthy of retention unless there are justifiable reasons to prove otherwise. Category A trees must pass a series of tests designed to expose their vulnerability to justifiable removal. Category Z trees are individuals that could be removed because of local policy reasons, they present an unacceptable risk, they cause an intolerable nuisance or they inhibit good husbandry. This categorisation informs the management process, with A trees given a high priority for attention and Z trees discounted. The TreeAZ framework can be applied internationally to all tree management scenarios, although the detail will vary at the local level. TreeAZ is an evolving method that is regularly reviewed in the context of feedback from field use. Its development can be tracked through the web based TreeAZ User Group.

INTRODUCTION

Barrell Tree Consultancy is an arboricultural practice in southern England specialising in urban tree management. Their experience focuses around solving tree problems on construction sites, advising on legal tree protection and developing management systems for urban tree populations. This paper sets out what they believe is current good practice for making tree management decisions, guided by their experience rather than academic research. This has resulted in a new framework for tree assessment called 'the A/Z method of assessing trees' or 'TreeAZ' for short.

A fundamental starting point in any urban tree management scenario is whether a tree is sufficiently important to be worthy of retention. If it is important, then there is an obvious presumption to keep it and management is concentrated on optimising the benefits in relation to the cost of retention. Alternatively, if a tree is unimportant, then it does not merit significant weight in any management decisions. TreeAZ focuses on systematically identifying trees that can be justifiably removed and categorises them as unimportant, calling them Z trees. All trees left at the end of the process are categorised important by default and called A trees. TreeAZ facilitates a standardised and structured approach to tree assessment, allowing managers to record and explain the reasoning behind their decisions. It can be applied to all common tree management scenarios including construction sites, tree preservation, gardens/parks and highways.

British Standard 5837 (BSI 1980) was the first nationally recognised tree assessment guidance in the UK. It specifically related to construction sites and advocated four categories (A, B, C & D) with criteria including visual merit, screening, rarity and historic value, categorising the best trees as A. At the other end of the scale, trees that are a high risk through poor health or defects are categorised as D. This document was updated in 1991 (BSI 1991) but the tree survey section remained materially unchanged from the first edition. In 1993, Barrell (1993) published a more detailed methodology for tree assessment based on safe useful life expectancy (SULE). Several years later (Barrell 1995), this was updated to provide a comprehensive alternative to the British Standard method. SULE has five categories (1–5) and advocates that importance is related to the length of time a tree can be retained with tolerable levels of risk, inconvenience and cost. Category 1 trees with the potential to be retained the longest have the highest ranking. Category 4 trees are ranked the lowest with the shortest SULE. Category 5 (small or young trees) are a special case on construction sites because they could be easily replaced or moved, reducing their importance in the context of the wider setting. In contrast to this detail, Matheney and Clark (1998) offer a more general assessment method based on 'suitability for preservation', with subjective rankings of good, moderate and poor. Their emphasis is on broadly describing issues to be considered in tree assessment rather than setting out the detail of a systematic approach.

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TreeAZ was conceived in 2000 in response to the emerging practical demands from developers and councils relating to trees on UK construction sites. Both SULE and the British Standard methods were proving too complex and not effectively meeting the needs of the modern planning scenario. Practical experience had exposed some fundamental flaws in the British Standard method; it failed to take proper account of small trees and it relied heavily on the visual attributes of trees as the primary assessment criterion (Barrell 2003). Furthermore, both methods had multiple categories, which confused the non-tree professionals that had to interpret the information. Developers and councils alike wanted clear advice on which trees were suitable for retention, presented in a way that was quick and easy to understand. In their capacity as consultants to both the public and private sectors, Barrell Tree Consultancy were ideally placed to develop a more streamlined and effective method of tree assessment. Following its conception, TreeAZ was extensively field tested by them before being launched to the wider Profession in September 2002 at the Arboricultural Association Conference in Cambridge. This release made TreeAZ freely available to arboriculturists on an extended field-trial basis. At the same time, it was posted on the internet and feedback invited through the web-based TreeAZ User Group. Since 2000, TreeAZ has been field-tested on over 800 separate sites and situations across a wide range of tree management scenarios. Whilst this paper is confined to setting out its basic principles, work on detailed evolutions for construction sites, tree preservation, gardens/parks and highways is on-going, and will be the subject of further papers.

Tree assessment is a complex web of interacting issues and there are some significant benefits from using a structured method of considering each element individually in a systematic way to arrive at a final decision. An important practical advantage of TreeAZ is that all the issues are listed to reduce the risk of accidental omissions, an essential reminder with such a complex set of considerations. More importantly, as these judgements are often subjected to public scrutiny and may end up in legal proceedings, there is a traceable and defensible trail explaining the final decision. A reliable cornerstone of defending actions in negligence is to demonstrate that an effective method was applied to the decision making process and that method can be scrutinised. TreeAZ comprehensibly provides this safeguard by identifying and recording the process for each assessment decision.

SUMMARY OF THE TreeAZ METHOD OF TREE ASSESSMENT

TreeAZ is a systematic method of assessing whether individual trees are important and how much weight they should be given in management considerations. It has the following distinctive features:

- **Two tree categories:** Category A trees are important and worthy of significant weight in management decisions. Category Z trees are not important and unworthy of significant weight.
- **Focus on undesirable tree characteristics:** The initial assessment emphasis is on what is undesirable about a specific tree as opposed to its more obvious desirable characteristics.
- **Colour coded categories:** Category A trees are coded green and category Z trees are coded blue.
- **Subcategories:** Both categories can be divided into subcategories depending on the tree management scenario and local requirements.
- **Categorisation tests:** The basic test for categorisation is whether the subject tree could be removed for justifiable reasons, i.e. it is not suitable for legal protection, in the context of the prevailing social and legal climate.
- **Systematic method:** Each tree to be assessed is systematically and sequentially considered against a standard list of tree removal tests. If a tree fails any of these tests, it is categorised as Z and further analysis stops. If it passes all the tests, it is categorised A.
- **Customisation:** TreeAZ is a basic framework of principles to be used as a starting point for more detailed customisation in the context of specific local management objectives and requirements.

A visual summary of the TreeAZ method is set out in the 'yes/no' flow diagram (Figure 1). This shows the structure of the decision-making pathways for each tree to be assessed. It provides a simplistic overview with the caveat that each test can only be properly assessed by a person with extensive arboricultural knowledge, experience and understanding. Each test requires a specific issue to be considered in the form of a question and a 'yes/no' decision to be made. If the decision is 'no', then the next test is assessed and so on until the end. If, at any stage, the decision is 'yes', then removal is assessed as justifiable, the tree is categorised Z and the process for that tree stops

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there. If a tree passes all the tests, then there are no justifiable reasons for removal; it is considered important by default and categorised A. How it is managed from that point onwards is detail beyond the scope of this paper.

More specifically, TreeAZ should be applied to individual trees separately, irrespective of whether they are isolated or within a group. Each tree should be considered in the context of its present setting and systematically assessed against the following tests in the order shown in Figure 1:

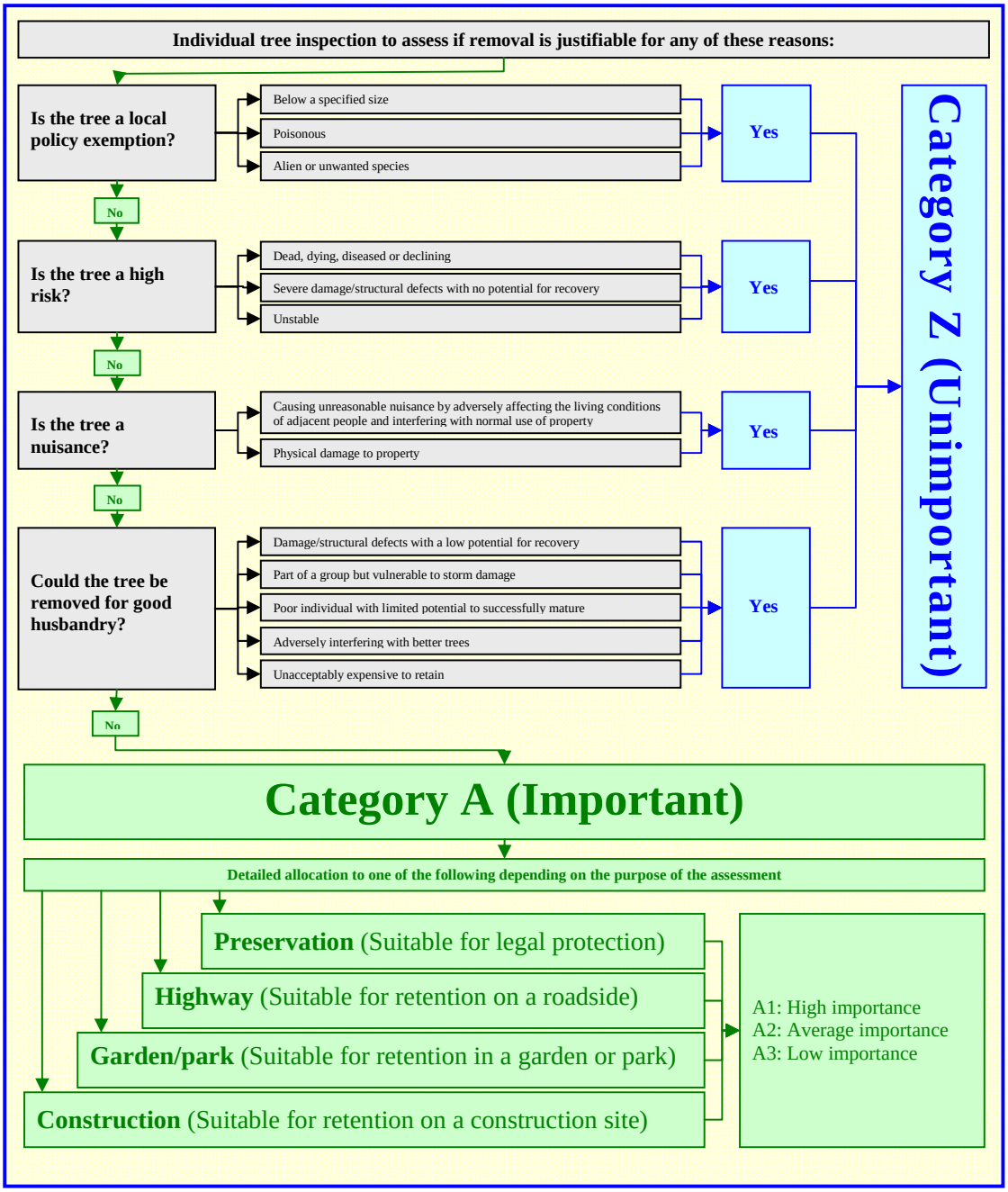

Figure 1: TreeAZ: an international framework for tree assessment based on the principle of negative selection, using justifiable reasons for removal as the selection criteria

- **Local policy exemptions:** This is a broad group of reasons to remove trees that are less to do with tree condition and more about the political/social climate that prevails at the assessment location. Typical examples include; alien/undesirable species that have an adverse impact on native ecology; poisonous trees that present a high risk to people and animals; and small trees that fall below the local threshold of legal protection. These are likely to vary on a regional/national level and may not be limited to the examples listed above.
- **Risk:** Establishing whether trees need to be removed for reasons of risk has been well researched and documented at an international level so these criteria are likely to be similar throughout the world. Obvious reasons include dead, dying, diseased, severe damage, severe structural defects and instability, where there is no realistic potential for the tree to recover or improve. There is a wide range of methods to assess risk that are beyond the scope of this paper to discuss in detail.
- **Nuisance:** Inconvenience and anxiety caused by trees is a mild form of nuisance. It can include issues of daylighting, falling debris, chemical staining and general overbearing through size and proximity. More severe nuisance arises from structural damage caused by branch encroachment and/or root activity. These broad groups of nuisance are likely to be similar internationally although the thresholds for action may vary at the regional/national level.
- **Good husbandry:** Specific tree management objectives are driven by cultural and silvicultural requirements, so can vary greatly down to the local level. However, broad principles remain similar internationally and include sustaining the resource, maintaining good quality and controlling costs. Common examples of good husbandry include replacing trees with low potential for improvement or recovery, removing trees adversely interfering with better individuals and replacing trees that are expensive to retain.

Trees that fail any of these tests and categorised Z are given low weight in any management considerations. Trees that pass all these tests are categorised A and significant weight is given to their retention in any subsequent management. Figure 1 shows the four most common management scenarios as construction, tree preservation, gardens/parks and highways. Whilst the detail of these situations is beyond the scope of this paper, in general terms it is possible to divide A trees into high, medium and low subcategories of importance to inform the management process. This is often useful in situations where choices have to be made about which trees to keep when there is competition for space from other land uses or funding has to be prioritised.

PRINCIPLES AND ISSUES RELEVANT TO TreeAZ

The measure of importance

There is no obvious or simple measure of how good a tree has to be to cross the threshold between unimportant and important. One of the most striking benefits of trees is the visual amenity they offer through their size and textural qualities. Subservient to this primary quality are a whole host of other less tangible benefits including provision of habitat, buffering pollutants, sequestration of carbon, production of oxygen, filtration of air and psychological well-being (Anon 2000). There has been extensive research into assigning a monetary value to tree amenity, which is one way of determining the level of importance a tree has (Flook 1996, Helliwell 2003 and Moore 1991). However, Watson (2002) showed in an analysis of five different methods that there can be considerable differences in the values from each, with the highest value being at least seven times the lowest. Although monetary value can be used to determine tree importance, experience has shown it is complicated and unreliable.

Rather than assessing importance using monetary value with all its inherent problems, TreeAZ approaches the issue from a different perspective, using suitability for legal protection as the starting point. In broad terms, if society considers trees to be of importance, then laws will be evolved to protect them. In practice, this is seen on a nationally uniform level in the UK through the Town and Country Planning Act (HMSO 1990) and, more variably on a local level, with tree protection ordinances in other parts of the world (City of Sydney 2004, City of Plantation 2004). TreeAZ adopts the approach that if a tree has attributes that can be protected by law, then it is important. If it cannot be protected or is exempt for a defensible reason, then it is obviously less important. This does not mean automatic condemnation but it does confer a lower ranking than protectable trees. This approach neatly sidesteps the difficulties with assigning precise tree value, replacing it with a judgement on suitability for legal protection.

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Positive and negative selection

Traditionally, the allocation of trees to categories has been based on the more obvious beneficial characteristics such as good health and structural stability (Matheney & Clark 1998) or good condition, form and screening (BSI 1991). These visual assets are the first to be considered and form the starting point for tree assessment in each method, with risk and good husbandry analysed later in the process. Superficially, visual qualities like size, prominence or good form seem obvious criteria for assessing tree importance, but they do not always take proper account of the many other tree benefits. Indeed, O'Callaghan (2003) observes that, in the UK planning system, councils are often guilty of being focused on visual amenity rather than amenity in its wider sense. Despite the limited scope of visual amenity as a complete measure, its historical use as the basis for tree assessment confirms that there is a strong intuitive case for believing the largest and healthiest trees are the best. This principle of categorisation by positive selection is so attractive that it has remained unchallenged for many years as a fundamental assumption in tree management decision making.

However, closer analysis reveals that visual amenity is not a reliable primary criterion for categorisation. In practice, safety and nuisance issues have to be given a higher priority and will serve to downgrade even the largest tree if it is a high risk or an intolerable nuisance. This exposes a fundamental flaw in using visual amenity as a primary decision making criterion, which is further complicated by extremely variable and awkward factors such as how much of a tree can be seen and by how many people and from where. These difficulties make visual amenity unsuitable as a primary assessment criteria and provide a compelling case that it should be relegated to being a secondary consideration behind the principal issues of risk and nuisance. Indeed, experience has shown (Barrell 1993 & 1995) that a categorisation process based on these characteristics is cumbersome, complicated to organise and extremely difficult to understand.

In the UK, the statutory basis establishing the status of trees is set out in the Town & Country Planning Act (HMSO 1990). Section 197(a) places a statutory duty on councils to ensure that when granting planning permission, they make adequate provision for the "preservation and planting of trees". It then goes on in Section 197(b) to provide councils with the power to "make such orders under section 198 as appear to the authority to be necessary in the connection with the grant of such permission". These are powerful and effective mechanisms that give trees significant status by law. Government guidance (DETR 2000) sets out that this status can be applied where "The trees, or at least part of them, should therefore normally be visible from a public place, such as a road or a footpath, although, exceptionally, the inclusion of other trees may be justified. The benefit may be present or future". However, these inclusive statements are qualified by various caveats setting out that, *inter alia*, it would be inappropriate to protect dead, dying or dangerous trees, and hedges. In a planning context, DETR (2000) confirms that "the effect of a proposed development on trees and other landscape features is a material consideration". This view is emphasised by Mynors (2002) with "The presence of trees and woodlands has always been recognised as an important material consideration". Although there will be obvious exceptions such as trees that are never likely to be publicly visible, UK law and government guidance provides a clear lead that the majority of trees are likely to be suitable for protection if the need arises. On this basis, a general presumption that all trees are important unless there are good reasons to the contrary seems a reasonable and defensible starting position.

Irrespective of the legal justifications, the contention that trees are valuable is widely accepted and does not need to be formally proved to be credible. TreeAZ uses this as the starting point, presuming all trees are important unless proved otherwise. Although counterintuitive to the traditional tree assessment theme of looking for what is desirable, focusing on undesirable characteristics has some distinct advantages. The varied and often intangible benefits provided by trees makes it very difficult to reliably factor them all into the decision making process. In practical terms, it is much simpler to consider what is wrong with a tree than what is right because the difficulties of evaluating the multiple benefits are avoided. Negative selection is the process of identifying and discounting the lower ranked trees, which results in the higher ranked trees being selected by default.

The length of time a tree should be retainable before it is suitable for legal protection

In principle, all but the highest risk trees can be retained for short periods but that does not automatically make them important. Implicit in the meaning of importance is an expectation that the tree will be retainable for a minimum length of time. There is no definitive answer to where the length of time threshold lies but some help can be drawn from UK references and legislation. The UK tree preservation order (TPO) legislation uses visual

amenity as a primary indicator of the importance of trees in the environment (DETR 2000). Wilson (1983) suggested that for a tree to be suitable for inclusion in a TPO, it should have a life expectancy of at least 10 years. This has generally been accepted as a reasonable benchmark, more because it has a common sense appeal than for any technical merit. Most people can relate to a time interval of 10 years because it is within their experience memory and it can be realistically imagined.

This matter has been investigated in a non-scientific manner through sounding out opinion at three recent gatherings of professional arboriculturists at the UK Midland Tree Officers Group (2002), the UK Arboricultural Association Conference (2002) and a Construction Site Workshop in New Zealand (2004). Delegates were asked what they thought was the minimum length of time a tree should be retainable for before it was worth protecting by legislation. A simple poll of hands using five-year increments produced the results shown in Figure 2. Out of 186 responses from the three events, 151 (81%) believed the threshold should lie between 5 and 15 years. Despite the informal nature of the poll, this provides a powerful indicator that a figure of 10 years is likely to gain widespread acceptance from the professional community. On this basis, TreeAZ sets the arbitrary threshold at 10 years; a tree with a SULE of less than 10 years will be lower ranked than one with a SULE of more than 10 years. This does not have to be rigidly applied and there may be situations where a different threshold is more appropriate. However, for most scenarios, 10 years is likely to be a realistic and justifiable figure.

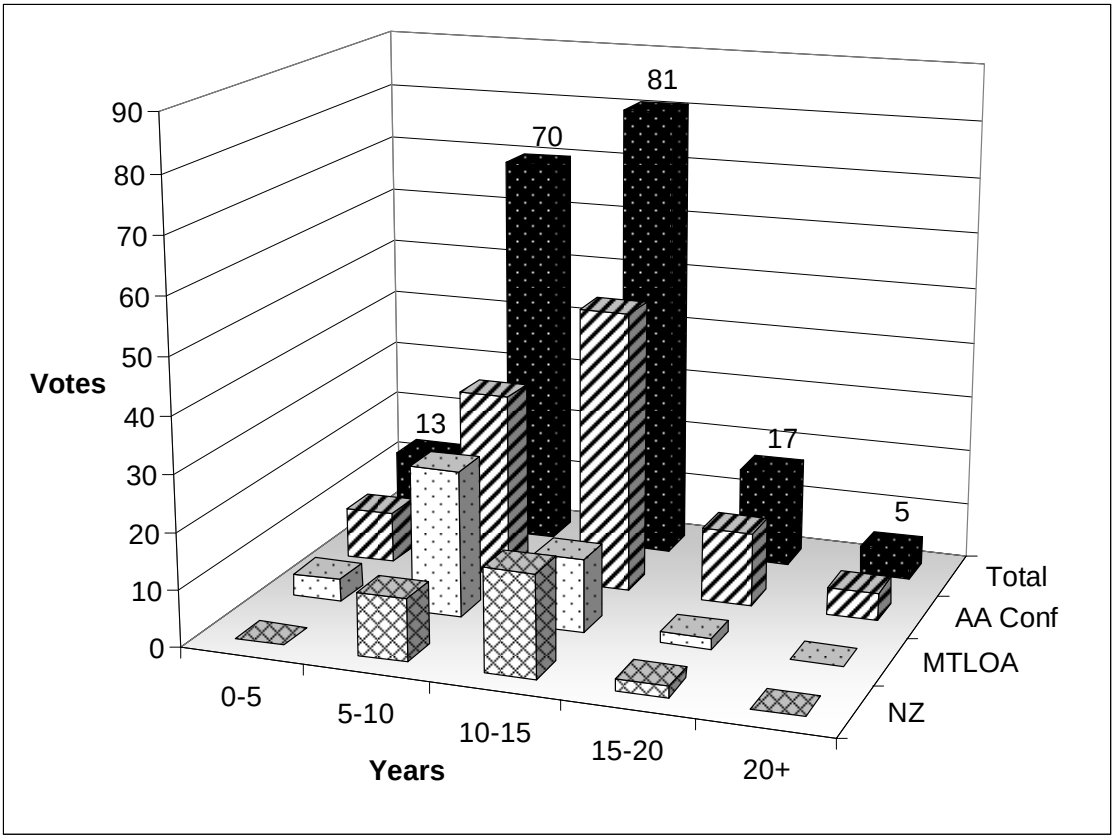
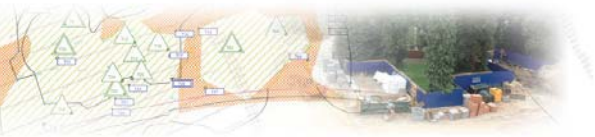


Figure 2: Informal poll results of arboriculturists from three separate venues on the issue of the length of time a tree should be retainable before it is suitable for legal protection. 81% of those polled (vertical axis) believed that a tree should be retainable for at least 5–15 years (horizontal axis) before it was worth legally protecting.



Colour

Colour is a very useful means of differentiation because it dramatically enhances the speed of comprehension. It has been traditionally used as a means of presenting tree information on plans with the universal convention of green for good and red for bad (BSI 1991). However, for colour-blind people, both these colours are hard to separate and this is not helpful. Red/green colour blindness is the most common type; it is estimated that 5–8% of men and 0.5% of women suffer from it (McIntyre 2002). UK traffic lights address this issue by light sequences and orientation but there are no such clues on a flat plan, so this convention causes problems for the colour-blind. In contrast, green and blue are easily discernible, so TreeAZ denotes category A trees green and category Z trees blue.

JUSTIFIABLE REASONS TO REMOVE TREES

The decision to fell

One of the most common, and often the most difficult, management decisions arboriculturists have to make relates to tree removal. What are valid reasons for removal, when is the right time to do it and what if a retained tree causes damage or injury? These are complex issues to manage and the decision is often based more on skilled interpretation and experience rather than any analytical process. TreeAZ organises these subjective judgements by structuring the decision making process so that all the relevant considerations are reviewed separately and in a pre-determined order. The benefits of this systematic approach are multiple; the risk of forgetting to consider an important aspect is reduced; the process is easier to understand and carry out; the likelihood of different assessors arriving at the same decision is increased; and it provides the essential paper trail to explain the decision and defend the action in the event of a legal challenge.

Local policy exemptions

Trees that are not suitable for legal protection are given a lower ranking in TreeAZ than those that can be protected. In practice, there are many local exemptions that exclude trees from protection for technical or policy reasons rather than any feature of their physical condition. In the UK, urban hedges cannot be protected, presumably because they are not intended to become large trees and it would be unreasonable to hinder their normal and accepted management of regular pruning. In the US (City of Plantation 2004), Australia (City of Sydney 2004) and New Zealand (North Shore City 2002), it is common to find local ordinances that only protect trees over a certain size, presumably because small trees make no significant contribution to society and can be easily replaced. It is also common to identify poisonous tree species for active removal, excluding them from legal protection. In New Zealand and Australia, many alien species are damaging the native ecology so the emphasis is on removal rather than protection, irrespective of their visual benefits. Such trees are all policy exemptions because local people have decided they do not want them protected by law. These reasons vary from place to place and are the first set of tests to be considered in a TreeAZ assessment.

Risk

In the UK, the Health and Safety Executive (2003) describe ‘hazard’ as “anything that can cause harm” and ‘risk’ as “the chance, high or low, that somebody will be harmed by the hazard”. Where people and property meet, establishing and maintaining acceptable levels of risk is an obvious priority, above tree amenity and maintenance costs. The measure for action is hazard potential, which is related to tree size, tree structure and the number or value of targets that could be hit (Matheney & Clark 1994). As trees grow bigger, as structural defects become more severe and as the number or value of targets increases, so the potential for harm increases. Reducing risk can be achieved through tree removal, tree management or removing the targets.

Not surprisingly, risk assessment in tree management is given a high priority because the consequences of tree failure can be spectacular and traumatic. This high potential for trees to cause severe injury and damage has driven the research emphasis on quantifying these risks, resulting in a number of sophisticated methodologies. Notably, the elements of size, defect and targets set out by Matheney and Clark (1994) have endured as the mainstays of hazard assessment. Mattheck and Breloer (1994) provide extensive explanation of the bio-mechanical aspects based on visual indicators of failure. More recently, Lonsdale (1999) focuses on describing hazards and practical strategies for managing risk, whilst Ellison (2005) approaches the subject from a probability perspective, detailing a method for quantative assessment.

However, none of these texts effectively set hazard and risk in the broader tree management context. Whilst safety is undeniably fundamental in any tree management system, it is not the only issue and matters of sustaining amenity, costs and nuisance, although of lower profile, are very important secondary considerations. TreeAZ seeks to incorporate all of these elements into a structured decision making framework, where each is given appropriate consideration and none is ignored.

Nuisance

In addition to risk being a justifiable reason for removal, TreeAZ also recognises that trees are frequently removed because of problems that arise from proximity. Nuisance occurs when trees are so close that they disrupt property owner's normal activities and interfere with the authorised use of land. This can be in the form of roots disrupting landscaping and hard surfacing, parts of trees physically preventing land use, tree debris such as leaves and fruit falling and tree crowns causing unacceptable light restrictions. As the disruption to normal use increases, the property owner's tolerance of the tree problems decreases to a point where action becomes unavoidable. Nuisance is a justifiable reason for tree removal and should be integrated into the decision making process.

Whatever the cause, establishing the threshold for when a nuisance becomes intolerable and unreasonable is difficult because there is no precise or objective measure. These thresholds for action are not as well researched or documented as those associated with risk. However, there are reference points within national legal and planning systems, where responsible decisions on these issues are made on a regular basis. Generally, there is a broad consensus within society that the benefits from trees are significant and some level of nuisance to individuals is unavoidable if those benefits are to be enjoyed by the wider population. Court, tribunal and planning decisions can provide useful references where informed judgements have been made on specific cases. These decisions deal with the range of nuisance issues, providing a benchmark to judge where the government sets the thresholds of acceptability on behalf of society. Of course, every case is different, so direct comparisons may not always be appropriate, but these decisions do represent an evolving body of opinion that can be useful in setting the broad boundaries in these matters.

In practice, weighing the benefit to the community against the inconvenience suffered by the individual is essentially a subjective judgement, tempered by experience and common sense. For example, a tree shading a lawn and preventing grass growing may be acceptable where the garden is large and there are other lawn areas to use. In contrast, this may be unacceptable where it is the only area of lawn in a small garden. Similarly, regular and severe leachate staining to a swimming pool surround caused by fallen debris may be unacceptable because the stark contrast in colours creates a dirty impression. In a different location, identical staining on a path surface may be less obtrusive and not justify tree removal. Where severe nuisance in the form of damage occurs from root growth, then court judgements on liability help to focus on what level of individual suffering through nuisance is deemed tolerable by society. TreeAZ identifies nuisance as a justifiable reason to remove trees and allows it to be properly considered in the decision making process.

Good husbandry

TreeAZ also recognises that removing trees for good husbandry is a frequent occurrence and must be included in any comprehensive management system. Sustained amenity is an arboricultural evolution of two well-established forestry concepts. Sustained yield is concerned with regulating the flow of forest products through managing age class distribution within a forest area. (Matthews 2001). Continuous cover silviculture is a management philosophy that avoids clear felling when trees reach a pre-determined age, again with an emphasis on age class distribution (Yorke 1998). Sustained amenity is an arboricultural evolution of both these concepts, which embodies the principle of growing trees of all ages in the same area with continual removal and replacement for the multiple benefits that delivers. The most important of these is that the visual amenity of the tree population as a whole is less prone to extreme fluctuation.

In common with many forestry situations, large proportions of urban tree populations are often of a similar size or age. One obvious implication of this is that many trees will reach maturity and need removing at about the same time, resulting in sudden and sever visual changes to the landscape. It is inevitable that as trees mature they will need removing and replacing; sustainable management should seek to spread these operations over long periods, thus reducing

the number and impact of removals at any one time. Sustained amenity is fostered by establishing a range of age classes within a local population; from new planting right through to mature trees. An effective way of doing this is to remove trees not performing well because they are not suited to the site or they are interfering with better trees. Whilst more subtle than the issues of risk and nuisance, TreeAZ recognises that removing trees to achieve a desirable age class distribution, is nonetheless an essential element of long term tree population management.

Managing groups of trees where individuals are closely spaced and contribute to amenity as a distinct unit is more demanding than for isolated trees, but it is still possible to make systematic and reasoned assessments. Each tree within the group must be considered individually and subjected to the same systematic process outlined in Figure 1. The same exclusion criteria apply so trees can be removed because they are a high risk, an excessive nuisance or for good husbandry reasons. Taking the issue of risk, a significant consideration with groups is that the assessments are made in the context of the other adjacent trees. Common features of trees within groups are that they are individually tall and thin or unbalanced although the group as a whole may be well proportioned. These characteristics are often so extreme that if the trees were isolated, there would be no option but to remove them. However, in a group situation, the shelter of the adjacent trees often reduces the level of risk to the extent that the poorly proportioned trees can be retained and are often essential for the stability of the whole group.

In terms of sustaining amenity, a tree destructively interfering with a better neighbour or a poor tree occupying space a new one could use to better advantage are candidates for removal. In the context of groups, the long term benefit of removal needs to be balanced against the disadvantages that the loss might have on the group. For example, in a simple scenario of two trees in a group, if the removal of one compromises the retention of the other, then the implications are far reaching and need to be carefully weighed up. However, if the removal of one tree will not adversely impact on the other, then removal could be justified if it rectified destructive interference or made space available for new trees. A common characteristic of groups is that most of the individuals have developed with mutual shelter and rely on each other for stability. There is often little scope for the removal of trees from intact groups because of the adverse impact on those retained, especially if the group is mature. However, as groups begin to lose individuals and become more fragmented, the opportunities for management to move towards establishing an uneven age class structure through phased removals and new planting are greatly increased.

Tree ‘form’ is another concept with obvious forestry origins. Traditional forest management was understandably focused on producing good quality timber, which led to a very strong bias towards well-balanced crowns on single, straight stems. In the absence of a formalised tree selection strategy, modern arboriculture seems to have embraced this concept with a resulting mindset pre-occupied with these qualities at the expense of imbalance and multiple stems. Indeed, tree selection based on ‘good form’ is a dominant theme in BS 5837 (1991), with Helliwell (2003), Moore (1991) and Flook (1996) rating it sufficiently important to make it a key criterion for assessing tree value.

Historically, ‘good form’ has been perceived as an attractive measure of tree quality but this is not borne out by emerging research in the UK (Flanagan 2005) or observations of urban tree populations. When investigating public preferences between pollarded and non-pollarded trees, Flanagan (2005) has noted that ‘the various physical attributes of trees measured by Arboriculturists for “visual amenity” has little relevance to non-professionals.’ This idea that the professionals may have misjudged the importance of the components of visual amenity is given significant weight by simple observations of many tree populations. A quick scan of any group of trees will confirm it is common for a significant proportion (sometimes up to 60–70%) to have asymmetrical crowns, multiple stems or some defects that would be considered attributes of poor form under traditional conventions. In practice, the boundaries between good and bad are blurred because they are intangible attributes meaning different things to different people. What the formal garden enthusiast sees as an eyesore in a severely unbalanced tree can be seen as the complete opposite by the creative gardener looking for interest in the landscape. These contradictions make form extremely unreliable as a primary criterion for assessing trees and it is not used in the TreeAZ assessment.

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CONCLUSIONS

TreeAZ is unique as a tree assessment method because it categorises trees based on their less desirable attributes rather than what is good about them. It was developed in response to the practical arboricultural needs in the UK and is continuing to evolve through on-going field-testing and feedback. Despite its UK origin, TreeAZ has underlying themes that are familiar to tree management around the world. In practice, the detail will vary on a local level but the general principles are common to many countries. These similarities lend themselves to a systematic approach to management that can be applied across national boundaries, making TreeAZ particularly suitable for adoption as an international method. More information on TreeAZ is available at www.barrelltreecare.co.uk, where there is also the facility for feedback through the TreeAZ User Group interface.

LITERATURE CITED

- Anon. 2000. Guide for Plant Appraisal (9th ed.), pp 1–7. International Society of Arboriculture, Champaign, IL.
- Barrell, J.D. 1993. Pre-planning Tree Surveys: Safe Useful Life Expectancy (SULE) is the Natural Progression. Arboric.J. 17: 33–46.
- Barrell, J.D. 1995. Pre-development Tree Assessment. Proceedings of an International Workshop on Trees and Building, pp 132–142. International Society of Arboriculture, Champaign, IL.
- Barrell, J.D. 2003. Tree assessment on development sites: The future of the Profession in the balance. Short article in essentialARB Issue 8, pp 6–10. CMP Information Ltd, Sovereign House, Sovereign Way, Tonbridge, Kent, TN9 1RW.
- British Standard Institution. 1980. British Standard 5837: Code of practice for trees in relation to construction. BSI, Linford Wood, Milton Keynes, MK14 6LE.
- British Standard Institution. 1991. British Standard 5837: Guide for trees in relation to construction. BSI, Linford Wood, Milton Keynes, MK14 6LE. 36 pp.
- City of Sydney Street Tree Master Plan. 2004. www.cityofsydney.nsw.gov.au.
- Code of Ordinances of Plantation, Florida. 2004. Chapter 13: Landscaping. www.plantation.org/ordinances/chap13.pdf. 37 pp.
- Department of the Environment, Transport and the Regions. 2000. Tree Preservation Orders: A Guide to the Law and Good Practice. HMSO, London, UK. 103 pp.
- Ellison, M.J. 2005. Quantified tree risk assessment used in the management of amenity trees. J.Arboric. 31(2): 57–65.
- Flannigan, J. 2005. An evaluation of the residents' attitudes to street trees in southwest England. Arboric.J. 28: 219–241.
- Flook, R. 1996. A Standard Tree Evaluation Method (STEM). Ron Flook, Tahunanui, Nelson, New Zealand.
- Health and Safety Executive. 2003. Five steps to risk assessment. HSE Books, Sudbury, Suffolk, UK. 12 pp.
- Helliwell, D.R. 2003. Visual Amenity Valuation of Trees and Woodlands. Arboricultural Association, Ampfield House, Ampfield, Romsey, Hampshire, SO51 9PA. 40 pp.
- Lonsdale, D. 1999. Principles of Tree Hazard Assessment. HMSO, London, UK. 388 pp.
- McIntyre, D. 2002. Colour Blindness: Causes and Effects. www.daltonism.org.uk.
- Matheny, N.P. & Clark, J.R. 1994. A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas (2nd ed.). International Society of Arboriculture, Champaign, IL. 85 pp.
- Matheny, N.P. & Clark, J.R. 1998. Trees and Development: A Technical Guide to Preservation of Trees During Land Development, pp 69–71. International Society of Arboriculture, Champaign, IL.
- Mattheck, C. and Breloer, H. 1994. The Body Language of Trees. HMSO, London, UK. 241 pp.
- Moore, G.M. 1991. Amenity tree evaluation: A revised method, pp 166–171. In The Scientific Management of Plants in the Urban Environment. Proceedings of the Burnley Centenary Conference, Centre for Urban Horticulture, Melbourne, Australia.
- Matthews, J.D. 2001. Silvicultural Systems, pp 51–52. Oxford University Press, Great Clarendon Street, Oxford, OX2 6DP.
- Mynors, C. 2002. The Law of Trees, Forests and Hedgerows, pp 395–396. Sweet & Maxwell Ltd, 100 Avenue Road, Swiss Cottage, London, UK.

- North Shore City District Plan. 2002. Section 8: Natural Environment. www.northshorecity.govt.nz. 123 pp.
- O'Callaghan, D.P. 2003. The Challenges of Planning for Sustainable Environments in the UK. Arboric.J. 27: 93–116.
- Town and Country Planning Act. 1990. HMSO, London, UK. 358 pp.
- Watson, G. 2002. Comparing Formula Methods of Tree Appraisal. J.Arboric. 28(1): 11–18.
- Wilson, D. 1983. Tree Protection. Journal of Planning & Environmental Law, pp 83–96.
- Yorke, M. 1998. Continuous Cover Silviculture; An Alternative to Clear Felling. Tyddyn-Bach, Llanegryn, Tywyn, Gwynedd LL36 9UF. 50 pp.