Considering Risks: Defendable not Defensive Arboriculture

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Introduction

This paper considers the terms 'defendable' and 'defensive'. In doing so it attempts to review some of the issues relating to tree risk management, particularly the implications of proactive and reactive arboricultural practice. The law provides a framework for judging whether a duty of care is being met. Given the vast number of trees requiring management for public safety, it is not surprising that the arboricultural profession has at its disposal methods for assessing and managing risks from trees. The law in general operates on a test of reasonableness, which is ascertained in different ways under different provisions, and functions through precedent with reference to industry and statutory standards.

Every year there are cases where trees structurally fail. This should be expected as trees are living things and subject to inevitable and natural interactions between climatic events, gravity and changes in the mechanical properties of wood. In specific cases the failure of trees results in serious injury or death. Though very rare events, such circumstances are subject to investigation to establish whether or not the harm caused was reasonably foreseeable and whether accepted industry management standards have been met. If it is shown that there has been a deficiency in the provision of professional advice or operational care, then it will be difficult to defend a legal action that may ensue as a result of an incident.

Given that an assumption of reasonableness operates in law and that there are established means of assessing and controlling tree related risks, on the face of it, there should be good grounds for confidence that professional behaviour need not be disproportionate in either safety management or resource allocation. However it is arguable that, in common with many professions, arboricultural practitioners currently operate in a risk-averse social climate, a 'blame culture', which places individuals and organisations responsible for trees in a position of being not only concerned about risks from trees but also risks arising from professional exposure to litigation. Being 'socially-bound' in this way there is a sense in which, in any profession, there will be a tension between, on the one hand, fulfilling the minimum reasonable expected standards and, on the other, operating in a self-protective manner. However it is argued that the current tendency has shifted the balance of professional priorities away from the basic requirements of managing risk as low as reasonably practicable in a direction that is unnecessarily defensive. If this is so, then this could have potentially damaging consequences for the nation's trees.

A Brief History of Risk

The effects of scientific activity may also result in threats and risks to personal health and security (chemical additives, contamination, pollution, state of rivers, the sea allergy prevalence etc). As a result public perceptions veer towards scepticism that science may solve the problems it causes. As such, scientifically based risk management may also be associated with adverse perceptions of scientific solutions to risk assessment and management (Granger & Morgan, 19990). Risk regulation in the United Kingdom can be traced as far back as 1273, when London enacted the first environmental health legislation in the smoke abatement law, which prohibited the use of coal, being 'prejudicial to health'. Subsequently, in 1306 a Royal Proclamation Edward III prohibited craftsmen from furnace-use of sea coal for similar reasons (Gimpel, 1976).

In 1863 the first environmental regulatory agency was founded with the passing of the Alkali, etc. Works Regulation Act. This established an inspectorate to regulate acid fume-emissions from the alkali industry. This emerging regulation in the mid and late nineteenth century reflected aspects of laissez-faire capitalism, seeking to *balance the powers of the industrialists with emerging public interests*, also reflecting a view that *regulation should be as flexible as possible*.

In 1842 the government introduced the principle of *best practice* in pollution control laws (Ashby & Anderson, 1981). This favoured a consensual approach to dealing with industry with regulation being determined on a case-by-case basis (Bouder, 2004). However, this is not to say that regulatory bodies did not emerge to control the management of hazards in environmental and food health[1]. In this climate of self-regulation, underpinned by a notion of flexibility, the concept that hazards should be controlled by means of *reasonable* and *best practice* began to emerge. The second Alkali, etc. Works Regulation (1906) Act is a crucial statutory landmark in risk legislation, as, in seeking to prevent discharge of noxious or offensive gases from scheduled works, the method of control in the act involved the concept of risk management by *best practicable means*.

Concept of Reasonableness in Risk Management (ALARP) and the Value of Safety

The Robens Committee (1972) established the philosophical basis for the Health & Safety at Work Act 1974 (HSWA) arguing that the responsibility for the control of a risk should reside with the body that creates it. This is because it was held that the body directly associated with its origin would also be best placed to understand that risk. Furthermore the HSWA established a key principle for UK safety regulation in the notion that risk control should seek to attain a level *as low as reasonably practicable*, conventionally referred to as the ALARP principle. The notion of self regulation as described by the Health and Safety Executive (HSE) was to "set out the objectives to be achieved" and "gives considerable choice to duty holders as to the measures they should put in place to meet these objectives" (HSE, 2001).

The ALARP concept is fundamental to considering and managing risks in arboriculture. Its understanding is essential and should provide a basis for non-defensive risk management under the HSWA thereby avoiding unnecessary, self-protective professional behaviour. The meaning of "reasonably practicable" is well established in English case law and was clarified in a case that preceded the HSWA. Judge Asquith in Edwards v. National Coal Board defined reasonably practicable as being a narrower term than "physically possible". He said that the term implies that "a computation must be made by the owner in which the quantum of risk is placed on one scale and the sacrifice, involved in the measures necessary for averting the risk (whether in money, time or trouble) is placed in the other; and that, if it be shown that there is a gross disproportion between them - the risk being insignificant in relation to the sacrifice - the defendants discharge the onus on them."[2].

The ALARP principle as framed by Lord Asquith enshrines the assessment of *costs and benefits* as being essential to risk management. This *cost-benefit assessment* (CBA) refers to the costs involved in reducing risks to an acceptable level and the benefits gained in terms of risk reduction. This interpretation of the ALARP concept implies that a balancing exercise is required to determine the value of risk reduction weighted against the costs of the control measures; in a case where the benefits of risk reduction are significantly outweighed by the costs the test of reasonable practicability is satisfied.

[1] The Sanitary Act (1866) created sanitary authorities to take action in cases of smoke nuisances. The Public Health Act (1875) controlling smoke abatement.
[2] Edwards v. National Coal Board, All England Law Reports Vol. 1, p. 747 (1949)

From this it is my understanding that in introducing the terms and notions of *cost-benefit*, *physically possible, gross disproportion* and *reasonable practicability* Lord Asquith has indicated certain boundaries. At the extreme there is no expectation in law that all that is possible to be done should be done. That raises the question when applying a cost-benefit computation method (being a quantification) how does one arrive at a computation (and what measures are to be used), and when implementing this method, how does one determine the measure of gross disproportion?

Having established that risk reduction measures should be implemented as long as this complies with reasonably practicable assessments of cost effectiveness, Government policies seek to balance the marginal benefits from additional risk reduction against incremental costs of implementing these. .The HSE resolve this in part in outlining policy rules for assessing the relationship between costs and benefits of occupational health and safety measures, acknowledging that computations can be done without explicit valuation systems, by reliance on common sense judgement.

Risk policy guidelines tend to be based on measures of practicality as standards or criteria for comparison, and this is estimated through research such as that obtained from market choices involved when calculating trade-off, risk-decisions that ordinary people make - e.g. such as those derived from the risks in which we place ourselves and the benefits of the exposure to danger implied in our chosen activities (e.g. drinking, driving, sport etc).

Value of Life and Other Values from Trees

Health and Safety Executive apply a convention for evaluating benefit and costs of risk reduction, the *Value of Preventing a Fatality* (VPF), equating to £1 million for all cases except those relating to the prevention of a fatality from cancer (where a value of £2 million is applied). It is used for example to compute Department for Transport (DfT) estimates of reasonable provision for reducing fatality risks (e.g. installation of traffic crossing, street lighting etc.). The current DfT guide for VPF is £1.4 million (DfT Highway Economic Note No1 2004 (HEN1))[3].

This is distinguished from *Value of a Statistical Life*, another economist's concept used to inform policy on risk reduction (usually abbreviated as 'VSL', sometimes as 'VOSL'). VSL values can be estimated to range from £0.6 million to £4 million in different industries (HSE 2002). VSL is used to assess a population's willingness-to-pay for benefits gained in reduced probability of death (Viscusi & Aldi, 2003). The VSL is a key indicator for health & safety regulatory guidance. Other terms similarly (and confusingly) used are the *cost of averting a fatality* (COAF) or the *value of spend for saving a statistical life* (VSSSL) (the latter being used in power generation and nuclear industries), describing a value for expenditure that might be expected to reduce as risks reduce, on a scale that could demonstrate that eventually there will be virtually no value gained from further risk reduction (Jackson *et al*, 2004).

Concepts such as VPF, VSL and VSSSL are integral to monetarising values in CBA estimates and are intended to establish optimum use of resources to manage risks as low as reasonably practicable as they provide economic values for a statistical life or for saving a life (or preventing a fatality). However, as such values are the subject of recurring and ongoing revaluation and reappraisal, methods of calculation are by no means comprehensively accepted (Viscusi & Aldi, 2003).

[3] Whilst this level of VPF is adopted for HSE guidance, different industries provide a wide range of monetary calculations e.g. relating to risks from cancer from carcinogenic chemicals (£2.9m) and from consequence of nuclear accident (£14.3m). (Lofstedt 1997).

Irrespective of how monetarist calculation of life value ultimately is resolved and applied through established methods of quantified risk assessment (HSE, 1989), the HSE does not necessarily expect risk management processes to adopt mathematical computation of cost and benefit values to justify reasonable, risk decision-making practice. There is however an expectation that the processes employed should demonstrate understanding of the ALARP principle and compliance with good industry practice; that risk decision making procedure is demonstrably rational, transparent, and accountable, while intrinsically takes account of the cost-benefit philosophy (weighing or balancing the costs of risk against the costs of controlling the risk).

The benefits that trees offer to places where people live, work and play is increasingly being researched and the findings are gradually working their way into the public debate and informing common perceptions. Trees have been documented to provide a range of important benefits. These include health (Nowak, 1999), well-being (Seddon, 2002), (Wagner, 2003), noise abatement (Dobson and Ryan, 2000), carbon sequestration (Rodell, 1991), biodiversity (Read, 2000), and countryside enjoyment etc. Environmental concerns are an aspect of public risk perception, specifically when issues such as climate change results in fear for personal survival and the well-being of our dependants (Adams, 1995). As societal concerns influence public safety expectations and litigation, so it is reasonable to expect similar responses will result from concerns about climate change and the value of trees.

While an occupier or tree manager may have a strict responsibility for public safety, in policy terms the management of trees has to consider not only public safety but also the protection of the trees themselves according to other potential policy objectives. Currently, there appears to be no clear fundamental methodology for accounting for the multiple benefits that trees provide within risk decision making and computation methods. This is an irony in the context of modern arboriculture and the generation of its internalised 'risk industry' as clearly it will be an expectation of the public and future generations and should be taken into consideration by the courts. Perhaps one could foresee a time when in the future when there will be a VPF calculated for the tree as well as for a human, which could conceivably be comparable values.

The Risk Industry: Managing Risk with a Sense of Proportion

The Robens Committee, in arguing for a system of self-regulation, implied that "appropriate responsibilities at all levels within industry and commerce" be accepted and exercised to ensure that there are better systems of safety organisation and improved management initiatives, and that this involves those in the work place (considered stakeholders in today's terminology) (Robens 1972).

Since the HSWA and the formation of the Health and Safety Executive there has been a coherent legal framework for managing and regulating risk arising from workplace activity. The requirement in the Act to protect those affected by work activities (whether they be employees or not) clarified the responsibility of the *duty-holder* to protect those who may be affected by his/her undertakings. This obligation has parallels with that of the responsibilities of the occupier under the Occupiers' Liability Acts (1957 and 1984) who has a duty of care to those who visit a property. These provisions for the public safety have been clearly beneficial in raising awareness of industry related risks. While they provide an intellectual basis for health and safety considerations there is an argument that the "relentless pursuit of risk reduction has made safety an enormous industry" (Adams, 1995).

One of the implications of self-regulation is the possible consequence of ungoverned diversity, particularly as the essence of risk has a deceptively subjective quality (which quantification attempts to define). Different industry sectors have had a tendency to promote patented systems

customised to their parochial requirements; the arboricultural profession is no exception in this and this tendency has tacitly formed an embryonic '*arboricultural risk industry*' all of its very own. This has shown a fragmented somewhat inward-looking approach. The inherent flexibility engendered by HSWA has driven the evolution of a risk industry, which has fostered developments in risk methodologies (at a theoretical, academic and commercial level). The wide spectrum of standards between and within industry sectors can push defensiveness, running contrary to the intention of the Robens Committee and the 1974 Act (which sought to clarify rather than confuse the responsibility of the duty-holder).

Against this background the arboricultural industry has been professionally innovative with important developments and publications to assist in defining good practice in tree risk assessment and management (Lonsdale, 1999), guidance on up-to-date methodologies for tree inspection (Mattheck, 1995) and tree risk quantification (Matheny & Clark, 1994, Ellison, 2005). While these developments have been important for clarification of assessment and decision making methodologies, the industry remains somewhat internally reflective at an early stage in the formulation of coherent agreement on fundamental risk decision making principles and their management implications.

Management of risk, when considered in isolation, abstracted from requirements for the range of other values that trees provide, leaves key drivers of management stranded and unlinked to the sphere of risk decision making. Whilst there is increasing recognition of the multiple values of trees, there is a fuzzy logic when it comes to attempting to integrate risk management objectives with other priority objectives; so that this becomes a 'disconnect' in the principles of tree risk assessment and management without a clear means of integration to account for and balance risks with benefits of risk reduction *and* the benefits from trees for human beings.

While these circumstances persist there is a sense in which the very practice of *defensive arboriculture* could be said to threaten or compromise tree survival. An aspect of this arises as a consequence of the social, economic and legal context in which arboriculture operates. Occasionally intervention and tree removal occurs that is reactive and on a scale that would not normally be warranted if guided by more reasonable proactive management practice.

Defendable behaviour implies rational behaviour that is positive, reflecting the adoption of a planned approach to anticipated risks. This stance is based on clarity of policy objectives so that risk decision making is strategic and operates with a considered sense of proportion. This provides a basis for behaviour that is neither excessive nor over-reactive. This definition assumes that the law operates through intellectual understanding of relevant factors as opposed to being based on emotive irrational reaction to circumstances. Thus complying with this approach should be adequate and reasonable if tested in law.

When a landmark case occurs involving serious injury or death from tree failure, there is often a tendency for professional behaviour to become self-protective, the symptoms of which can be detected in over-specification. Clearly it is natural for arboricultural practitioners to seek to defend themselves and their clients against the prospect of being found wanting if placed under scrutiny; but over-reaction also affects the non-professional with responsibility for trees. These circumstances suggest that there may be a lack of appropriate professional leadership resulting in over-simplified decisions which in turn is resolved by the maxim 'where there is doubt removing trees removes liability' - even where the loss of valued amenity and habitat is the inevitable result.

Defensive behaviour is aimed at resisting the prospect of attack[4]. In this sense such behaviour is cautious and disproportionate, beyond reasonable judgement and operates negatively,

[4] The New Shorter Oxford Dictionary

presupposing a necessity to guard against anticipated, randomised aggression or attack, and being emotively-based is informed through rational judgement. As the prime motivation for defensive behaviour is self-protection this overarching influence on conduct can undermine objectivity by assuming precedence over all other activity and objectives, including the fundamental professional purpose.

The arboricultural profession needs to establish a basis for confidence so that practitioners can appreciate that the judicious use of established tree hazard assessment informed by accepted industry risk assessment methods should be sufficient to provide security to the practitioner that duty of care is being met.

The means to achieve defendable, non-defensive arboriculture lies in the understanding of the ALARP principle and the Tolerability of Risk framework (TOR).

Framework for Assessing Risk Tolerance

As a result of its investigations and as a consequence of certain industrial accidents, the HSE underpinned its position on risk evaluation and control with the concept of the Tolerability of Risk framework (TOR). The TOR framework takes into consideration 'the willingness of society as a whole, to live with a risk so as to secure certain benefits in the confidence that the risk is the one that is worth taking and that is being properly controlled.' (HSE 2001).

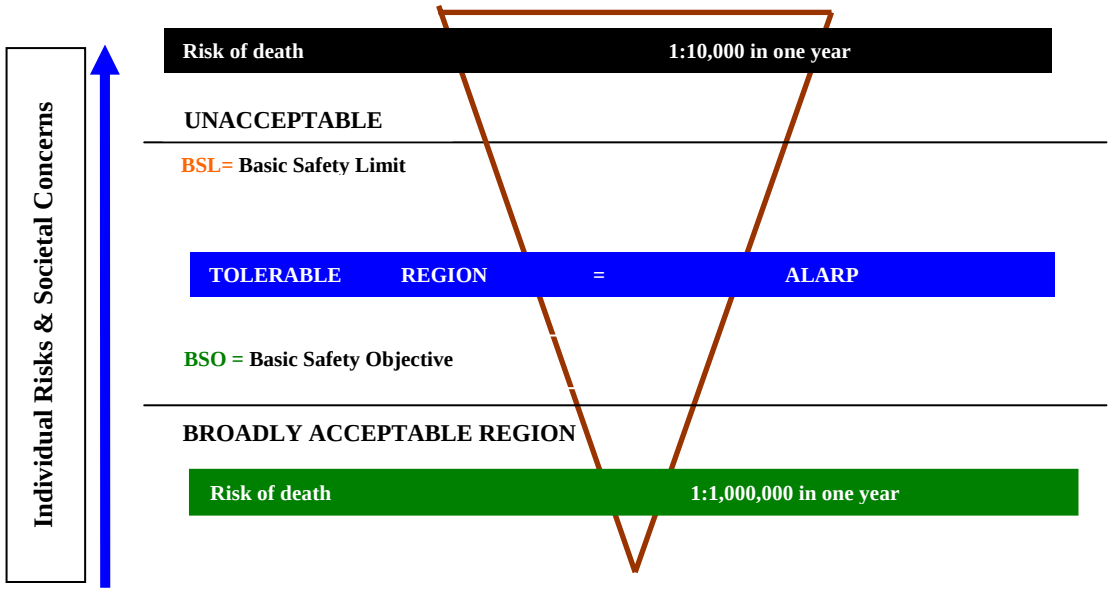

Fig 1: Tolerability of Risk Framework (HSE Reducing Risks Protecting People)

The TOR framework is equivalent to an assessment method of risks based on ALARP criteria (Ball 1995, Bouder 2004). It is diagrammatically represented by an inverted triangle with the apex at the base (Fig 1). The concept does not include the notion of zero risk. Rather, there is a *trade off* between risk toleration and the benefits that risks may provide. Risk is quantified in terms of the risk of death per head of population per annum. Risks increase from the point of the base apex, beyond which there is a generalised, *Broadly Acceptable Region* equated to risk of death of less than 1 in 1 million per annum. Progressing up the triangle, increased risk meets the *Tolerable*

Region. The boundary (termed the Basic Safety Objective (BSO)) between the Broadly Acceptable and the Tolerable Region is defined by a risks greater than 1 in 1 million[5].

Beyond the Tolerable (ALARP) Region (the top of the triangle), are *risks that are unacceptable irrespective of the benefits that may be derived from the activity*. An unacceptable level of risk is considered equivalent or greater than the annual risk of death of 1 in 10,000 per annum per head of population. Such risks may only be accepted for exceptional reasons. The costs of mitigation are likely to be high and may be grossly disproportionate but due to the unacceptable level of risk, such risks are required to be mitigated irrespective of cost-benefit considerations. The boundary between the Tolerable Region and the Unacceptable Region is defined by risks greater than 1 in 10,000 and is termed the Basic Safety Limit (BSL).

Risks are considered tolerable *if the cost of risk reduction does not grossly exceed the benefit gained*. Therefore, the cost-benefit appraisal referred to by Judge Asquith (above), has significant implications for decision making between the BSO and BSL, when devising risk control strategies. The Tolerable ALARP Region is that area of risk decision making that is influenced by cost-benefit considerations. The strategic value of this aspect of the ALARP principle lies in focusing on this area of risk in planned risk management.

A risk management strategy will need to acknowledge that unacceptable risks will be encountered and that provision will be required to account for such an eventuality. The lack of quantitative guidelines relating to risk exposure and the ALARP principles of the 1974 act have led certain industries, where societal concerns over risks appear the most strongly expressed (such as the nuclear industry, water pollution, food contamination), to develop sophisticated quantified cost-benefit analysis. The nuclear industry calculates risks greater than 1 in 10,000 per annum to be unacceptable, necessitating control irrespective of cost. Risks between 1 in 10,000 and one in a million are managed within ALARP principles. Risks less than one in a million are considered tolerable (HSE, 1988).

Assessment of Acceptable & Unacceptable Risks Posed by Trees

The legal background and the societal context in which risk control takes place is a strong influence on the determining factors affecting tree risk assessment, control and management. Such factors (estimation of levels of site use, comparability between sites, tree failure criteria, estimation of consequences from failure) that may be taken into consideration in determining the acceptability of risk may vary from one assessor to another. The scientific underpinning of arboriculture does not protect even the most qualified from reliance on interpretation of evidence and determining of conclusions. Due to the nature of the discipline (the diagnostic process, the application of information in the field and the variability of conclusions), arboriculture might be considered to be more of an art than a science (as may be argued to be the case with medicine). This reflects the fact that there is a significant subjective element in such assessments.

As outlined above, in the context of UK safety regulation, tree risk assessment and management needs to be informed by a notion of what is best practice in the profession. The control of the risk posed by tree hazards should take the ALARP principle of attaining risk levels as low as

[5] Ball points out that the Royal Society Study Group on Risk argues that 'Few people would commit their own resources to reduce an annual risk of death as low as 1 in 100,000 and even fewer would take action at an annual level of 1 in a million' (Ball 1995). Furthermore, whether financial resources are invested in mitigating one type of risk, compared with another, in specific work areas will depend on a number of factors, many of which are subjective. For example, a Health & Safety Executive study of London Underground showed that 80% of safety expenditure was directed to study fire hazard, which represents only 3% of the actual risks (Lofstedt 1997).

reasonably practicable. The underlying principle of self-regulation, derived from the Robens Committee and the 1974 Act is that 'appropriate responsibilities at all levels' be adopted within the industry and profession. Clearly, the legal framework in statute and common law affecting those responsible for trees will determine the expectations for levels and standards of practice.

The level of concern of those responsible for the management of trees has been significantly increased in the wake of a number of nationally important cases, where serious injury and death have arisen from tree failure[6]. The profile of such incidents, while tragic in themselves, is strongly influenced by the level of public and media interest. Media coverage of court judgements has led to concern and debate within the arboricultural profession, often focused on the potential exposure of individuals, local authorities and other responsible personnel within the chain of command. Since the nationally significant Health & Safety Executive prosecution of Birmingham City Council in 2003 under Section 3 (1) of the 1974 Act, there has been a heightened level of concern and activity among local authority tree officers and corporate tree managers. Even though the inquest into the death of a child at Ashtead Primary School held at Staines County Court recorded a verdict of accidental death (2004) on the basis that the failure of the tree in question could not have been reasonably foreseen by a suitably competent tree inspector, the HSE nonetheless served an improvement notice on the County Council due to perceived deficiencies in risk management systems. Such cases inevitably lead to a sense of greater exposure to litigation should general arboricultural practice, including tree surveys and management systems, be tested and found deficient.

Professionally, arboricultural practitioners responsible for the assessment and management of tree risk are in the position of necessarily reviewing their levels of competence and standards of practice. As advisors to occupiers with common law obligations and statutory duty of care[7], the arboriculturist needs to ensure that the information collected on trees and provided to the client is sufficient to make appropriate judgements to manage foreseeable risks posed by trees under their care (Mynors 2002). Earlier work to quantify risks posed by tree hazards (Matheny & Clark, 1994, Helliwell, 1991) were important steps in the formulation of risk decision-making systems. The more recent Quantified Tree Risk Assessment method (QTRA) for determining the probabilistic value of tree risks provides a significant advance in this field as it has the potential to provide an underpinning standard for defendable arboriculture (Ellison,2000).

Arboriculture, as in many disciplines over recent decades, has been subject to the influence of applied technology. This has resulted in a range of device-based applications available to assist with diagnosis of structural condition and mechanical properties of wood. These tools, together with innovations such as the QTRA, are only as good as the technical competence and judgement of the individual applying them. Relevant experience should not be undervalued and the use of technology relevant to the purpose for which it is applied needs to be carefully evaluated. Furthermore where subjectivity is part of the methodology this needs to be acknowledged and made explicit; an experienced subjective view should be recognised for the value it has.

Defendability without Defensiveness: The Tree Risk Management Policy (TRMP) & Strategy (TRMS)

Zero risk is not a reasonable expectation in law. The requirement to remove trees on the basis that they pose a risk is only meaningful where the risk is unacceptable and tree removal is the only reasonable way of mitigating that risk as low as reasonably practicable. Such management priorities will be dictated by policy objectives. Policy needs to take account of subsidiary or

[6] These include cases involving Birmingham City Council (2002), Ashtead Primary School (2003) and Richmond Park, Surrey (2003).
[7] Occupiers' Liability Acts 1957 and 1984

complimentary objectives that a tree policy may need to incorporate. If diligently executed a proactive Tree Risk Management Policy (TRMP) provides the basis for an acceptable defence in the event of tree failure causing harm. The formulation of a TRMP is an important pre-requisite for ensuring that the implementation of the risk management process will satisfy reasonable, defendable criteria. It is argued that this should not be a particularly onerous or distracting process. It does however need to engage those who might be involved or affected by its implementation (stakeholders) and particularly needs to provide a framework for auditing (whether external or internal) with a review process where the participants who have adopted, or are subject to, the policy may contribute to its further improvement.

The principles for establishing a risk management policy include the need to commit to 'effective risk communication' in the risk management process, by all parties who may be affected. Furthermore, as risk assessment may be both intuitive and complex, a key policy strand should include transparency in the formulation and communication of relevant issues, sufficient to ensure that policy, regulatory or other decisions can be equitably taken (Defra, 2002). The criterion of transparency is fundamental to a defendable system; this includes clarity in risk assessment implementation and recording. Such systems, whether paper-based or electronic, need to be independently traceable (not merely associated with the author), capable of updating and archiving.

The TRMP will need to establish the criteria for the levels of competence appropriate to the task and identify organisational hierarchy and communication systems involved in the chain of command in risk management procedures. Communication procedures need to be open and traceable. The appraisal of competence criteria will identify the internal training needs and the requirements for outsourcing of survey and management skills. The policy will take account of other policy statements that may impinge upon the management of trees and public safety. These may include statements associated with training, Local Biodiversity Action Plans, social inclusion, public access and planning guidance. The eventual formulation of the TRMP will propose to balance these other values within the context of managing risk and inevitably will include a basis for balancing costs and benefits. The policy will also provide a time line for its implementation, including establishing the basis, if applicable, for upgrading current practice from a reactive to a proactive system. The cost implications of such a procedure will determine whether it is possible to achieve a proactive system within the foreseeable future, or whether this may take a significant number of years to achieve.

The Tree Risk Management Strategy (TRMS) essentially is the translation of the TRMP into practice and will define the method of survey, recording, prioritisation techniques and skill levels. The application of information technology and resourcing of the survey process will be determined through the consultation and resourcing, under the auspices of the policy. The TRMS will define all the procedures up to the detail of implementation, monitoring and review of works and cataloguing the quality of the tree stock and the history of tree failure. As such, the TRMS procedures ideally would be able to inform the level to which future tree risk management costs will be reduced by effective proactive treatment. In certain instances a component of such vision is the establishment of long-term Individual Tree Management Plans (ITMPs), which would provide the basis for managing future risk and improving tree stock. These would identify the objectives of the management of trees in the stock record, such that trees may be tracked in the course of their life history.

C**onclusion**

The requirements of reasonable tree risk decision making need not place particularly onerous demands on those responsible for and advising on trees. The history of UK legislation in risk regulation is long established dating back as far as the thirteenth century. 'Reasonableness' is fundamental to the legal framework within which practitioners are involved in managing trees in the context of common law. This entails that suitable systems are in place to ensure that trees are inspected at appropriate levels and frequency and that risk management takes into consideration available resources when determining measures and priorities for maintaining risks as low as reasonably practicable.

The concepts of what is *reasonable*, *practicable* and *proportionate* are inherent in the expectations of risk control and cost-benefit appraisal in the interests of managing risks within tolerable limits. The HSWA assumes that the body responsible for causing a risk is best placed to control it; thus self-regulation is a fundamental tenet of risk management process. With regard to tree safety, the body (or the party) creating risk in an important sense includes the occupier, duty-holder, arboricultural practitioner and the profession as a whole, and therefore greater awareness may be necessary regarding the understanding of the principles that inform non-defensive, defendable management.

The arboricultural industry and profession has been proactive in certain aspects of raising awareness of hazard and risk issues. This includes training initiatives, tree hazard assessment and management guidance. Such advice reflects the importance of stakeholder review. A wide range of techniques, including device-based applications, are available to practitioners to assist in diagnosis of structural integrity in trees, and the means of evaluating quantified tree risks provides a sound basis for reasonable decision making. Such devices and techniques require enhanced skill levels among those who use them, particularly in relation to the interpretation of results and conclusions relevant to risk mitigation.

The formulation of an effective tree risk management policy (TRMP) and a reasonable strategy (TRMS) for its implementation can play a key role if modern arboriculture is to operate in a defendable and not unnecessarily defensive manner. While, diligent arboricultural risk management practice based on accepted industry standards should be defendable in all circumstances, the fear of prosecution or litigation from having failed to meet a duty of care has the potential to impact on the quality of professional advice.

It is reasonable for practitioners to operate in a defendable manner. However, expressions of media-dictated risk aversion will naturally tend to drive professional behaviour in the direction of defensive practice. Where this occurs, professional responses have a tendency to lack objectivity and be reactive when considering mitigation of assessed risks; reactive-based responses can lead to grossly disproportionate risk control measures that are potentially beyond the expectation of accepted health and safety requirements for managing risks according to the HSWA ALARP principle.

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