

TOWARDS REASONABLE TREE RISK DECISION-MAKING?

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Summary

While we are all continuously exposed to risks the legal expectation is that risks need not be removed but rather should be reasonably controlled. For tree risk management to be defensible it is important to be able to review how risk decisions are made (how risks are identified, appraised and controlled). Though these activities form the basis of risk management, in the event of an accident, any relevant records may be used to establish whether duty of care has been met. Defensible risk regulation draws on industry guidelines and is specifically based on the presumption that the time, money and effort expended in meeting risk reduction should not be grossly disproportionate to the improvement in safety obtained.

When risks are of such a low order that they are regarded as insignificant they are considered 'broadly acceptable'. A reasonable framework for risk decision-making would probably regard intervention to reduce broadly acceptable risks as unwarranted. Average annual tree related deaths from structural failure in the UK are so few that there could be an argument that any expenditure targeted to avoid such risks is unnecessary, given the limited benefit in risk reduction likely to be achieved. Yet, when harm arises from tree failure, those responsible for trees carry the weight of potential investigation by the police and the Health and Safety Executive, not to mention from civil litigation. When a tree related death occurs a disproportionately high level of media interest tends to follow and sometimes this is also accompanied by a landmark legal case. While such circumstances are in some respects understandable (as rarity influences public interest) this can have an unreasonable influence on expectations of routine tree inspection standards, expenditure on management and have undesirable implications for the nation's mature tree stock (loss of habitat, amenity, wilderness, carbon sink etc.). To counter such *defensive* behaviour an important role exists for the arboricultural industry - to work with other stakeholders to influence more rational outcomes. Such an initiative would make possible a more confident, defensible, professional stance for the benefit of sensible risk management policies and would contribute to the long term sustainability of the nation's trees and the ecosystem more widely.

Risk aversion and balancing the legal complexities in meeting professional duties

The English legal framework relating to trees draws from wide ranging statute and common law and is complex (Mynors, 2002). 'The Law of Trees, Forests and Hedgerows' was written in response to a need for the disparate body of English law relating to trees to be contained in a single reference source. In regard to hazards from trees, the author notes that when a tree structurally fails causing harm it is likely to result in litigation. As the tree is a naturally growing thing its condition is not necessarily the fault of the person responsible, though that person needs to "be aware of its state and should take action if it is, or seems to be, dangerous". While the law offers simple guidance, the interpretation and necessary actions for fulfilling duty of care depend on basing good practice on relevant current knowledge.

According to HSE Sector Information Minute (SIM) 'Management of Risks from Falling Trees', statistics of tree related deaths in public spaces are so low (1:20,000,000) (HSE, 2007) that the risk could be considered insignificant; lower in risk terms than being struck by lightning (1:18,700,000)¹ and certainly far lower than being killed in a car accident (1 in 16,800)².

While it might be said that landmark legal cases serve to clarify standards there is also a tendency to raise the levels of expected input from professionals and sometimes to confuse expectations. In the recent *Poll v Viscount Asquith* case³, where a motorcyclist collided with a fallen tree, it was found that the defendant landowner was in breach of a duty of care to the claimant as the level of tree inspection undertaken and competence of the inspector was found to be insufficient. In summing up, Judge MacDuff referred to levels 1 and 2 inspectors (see Davis et al, 2000), pointing out that the expert witnesses agreed that "in the case in question a prudent landowner should have employed what they [the expert witnesses] called a level 2 inspector to oversee the safety of the trees". From the court deliberations a level 2 inspector would presumably have identified the presence of an obvious structural defect (a coppice stem with weak basal fork) and a concealed fungal defect (unknown species on the underside of the fallen stem). Furthermore such an inspector, it was assumed on the balance of probabilities, would be able to identify the significance of an internal fungal growth in combination with the weak fork sufficient to determine whether this would be dangerous in high winds.

Perception of hazards in trees is a complex issue and is informed by knowledge of tree-fungi interactions and wood decay strategies, biomechanics, tree statics and tree dynamics. The UK Research for Amenity Trees series provides reference texts on Visual Tree Assessment (VTA) and mechanical failure criteria (Mattheck & Breloer, 1994) and the principles guiding hazard identification (Lonsdale, 1999). Knowledge of tree hazard assessment is fundamental to risk decision making. However, as instrumentation become more sophisticated (e.g. for mapping the internal trunk condition), it is equally important to improve capacity for interpreting information derived from such device-based investigation.

There are also conflicts between methodologies for determining structural stability in trees. Developments from Germany focusing on tree static assessment (Sinn & Wessolly, 1989) evolved from earlier UK forestry influences (Bell *et al*, 1990). These have not comfortably dovetailed with the biomechanical school. Tree structure and health being influenced by fungal activity requires knowledge of this dynamic relationship. Research in this field has been important for understanding the significance of how fungal interactions affect the wood decay process and influence propensities for tree failure (Schwarze *et al*, 2000). This is further complicated when one considers potential contributions of fungal colonisation for tree health and defence (Rayner, 1993).

A risk-averse culture fosters an increasing dependency on device-based methods to provide printout readings as potential evidence - fostering a tendency to believe that if it is on paper therefore it is a fact. Decay detection devices, in offering the means to confirm the presence of 'defects', provide justification for management actions. This is a growth area. Nationally a large investment is made in technological appliances for decay detection. This proliferation of device-based investigation can result in the same tree being diagnosed for removal or for retention

¹ 'Around 3 people are killed each year by trees in public spaces...the risk per person is about one in 20 million', HSE Field Operations Directorate, Sector Information Minute, SIM 01/2007/05,

² <http://www.hse.gov.uk/education/statistics.htm>

³ *Poll v Viscount Asquith of Morley* [2006] All ER D 158

depending on the knowledge and perspective of the practitioner. Either way it is an expensive process and a good understanding of the limitations of such devices is necessary, as is an adequate knowledge of how to interpret information derived from their use.

Defensive arboriculture can result in the presumption that non-use of technical devices in support of tree inspections is somehow inadequate so that without their use there could be an accusation of negligent practice (as there would be an absence of evidence if challenged).

Quantified Tree Risk Assessment (QTRA) (Ellison, 2005) has been an important development and is refreshing in that, while knowledge of the legal framework and hazard assessment is valuable, this is often insufficient. A rational risk evaluation methodology for cost-effective prioritised management is perhaps one of the most valuable tools to enable a practitioner to be confident that he/she is meeting their duty of care.

Such systems are valuable when appropriately used. However, it is important to understand what the law expects and not to be excessively 'law-driven' in risk analysis procedure; otherwise the tendency leans towards over-defensive, potentially grossly disproportionate use of risk management resources. Whatever systems are used to inform risk decision making the focus should be on simply doing the job properly; the law expects no more than the making of good decisions aimed at achieving the maximum societal benefit.

Despite this wide ranging professional knowledge, the arboricultural profession appears to lack a coherent strategy capable of influencing public opinion about the *actual* risks from falling trees. Properly assessing public opinion is a sophisticated process that will require specialised expertise from other disciplines. An important aspect of this to discover what society's view of trees is and to compare this with known benefits from trees (health, wellbeing, environmental etc) to be able to establish how these are threatened when policy is driven by risk-averse priorities.

The profession has been quick to home in on the implications regarding levels of inspector competence and the type of appropriate survey required to meet duty of care. As with Tomlinson v. Congleton Borough Council (overturned twice), a judgement can be wrong, and could lead to grossly disproportionate investment in resources deployed towards risk avoidance measures. The problem is that even a level 3 inspector now will be concerned that he or she may be found wanting if a combination of features is not identified as a significant hazard if it is judged to cause harm. The tendency is clear - if this is the type of professional conclusion being made higher levels of inspection will be deemed necessary⁴ and trees will be subject to greater levels of remedial work or even felled as a precaution against the prospect of the inspector being found professionally wanting. The consequences of such judgements have potential environmental impacts with high financial cost implications for the nation.

Judge MacDuff said that a level 2 inspector should have been employed to *oversee* the safety of the trees [my emphasis] - not necessarily to carry this out. Yet, there has been a rush to invest in training courses leading to a form of qualification that could equate to a level 2 inspector⁵. Furthermore, in reflecting on levels of risk the judge comments that in all available systems there is "an element of subjectivity" and that high risks "should have been dealt with and the hazard removed". The question then is whether there is a clear definition of what a high risk is other

⁴ For example, following this case what are the implications for a level 1, 2 or 3 inspector confronted with mile upon mile of road bounded by mature trees covered with ivy up to the first branch, as so many now are?

⁵ See Landscape Training courses: Lantra Professional *Tree Inspection Course Rationale*: 'The need for the course has arisen out recent high profile cases where fallen trees with a foreseeable defect(s) have resulted in the deaths of a number of persons'

than the circular logic of one that could have led to the failure that caused the breach of duty. The judge further acknowledges the value of professional judgement and comments that systems of risk quantification “are no substitute for intelligent evaluation by an experienced arboriculturist”.

Clearly, the profession needs to have sense of proportion about interpreting judgements. The judge in the Poll case acknowledges that if there is a ‘medium level of risk’ there would have been no other obligation than to monitor. Is there a case for professionally challenging the outcome of a case, not from the point of view of challenging its justice but from an attempt to establish a balance within the legal framework that bears upon arboricultural professional behaviour; so that it might be possible to establish a ‘joined-up’ approach to hazard evaluation and risk decision making? How do expectations from civil litigation cases correspond to the regulatory guidance from HSE? The HSE SIM confirms that the average risk from trees to be ‘firmly in the “broadly acceptable” category’ (HSE, 2007). However, the SIM qualifies the certainty of this position on the basis that societal risk perception, following an incident, will be the determining factor in the logic of any investigation. This implies that risk management is not about managing *real risks* but rather about managing *perceived risks* - not a reliable standard to be advocated by the HSE.

In theory, managing risk should be aimed to reduce risks as low as reasonably practicable (ALARP), taking costs and benefits of risk reduction into consideration. The law requires that occupiers⁶ and duty holders⁷ are reasonable in the circumstances in their management of risks. If there are ambiguities or imbalances in regulatory guidance and common law precedent then it seems clear that the arboricultural profession needs to take an initiative to ensure that a rational basis for risk decision making neither entails grossly disproportionate risk avoidance measures nor unnecessary costly defensive professional behaviour.

The Veteran Trees Initiative (VTI)⁸ is an example of the how a multi-disciplinary partnership can achieve changes in societal perspectives and professional standards. Between 1996 and 2000 the VTI operated to raise awareness of the habitat values of veteran trees and influence management. A series of publications result from this initiative - this included comprehensive guidance on good management (Read, 2000), a systematic survey methodology system (Fay & de Berker, 1997), and guidance on veteran tree risk management (Davis, Fay, & Mynors, 2000). The partnership was based on stakeholder consultation⁹ and lead to important developments in British arboriculture. The VTI generated new tree management perceptions and propagated conservation techniques to the extent that certain of these ideas and developments have influenced or are now incorporated in new British Standards e.g. BS5837 (British Standards Institution, 2005), planning guidelines for biodiversity and geology conservation (ODPM, 2006) and the Natural Environment and Rural Communities Act (2006). This multi-disciplinary approach is a model of how the principles for non-defensive arboriculture might develop if the tree industry is to be able to influence future public perceptions of risks from falling trees.

⁶ The person with sufficient control of premises / land to appreciate the significance of any dangers to take appropriate action to ensure safety of visitor (Occupiers’ Liability Acts 1957 and 1984).

⁷ Responsible for the health and safety of employees and those who may be affected by their undertakings (Health and Safety at Work Act 1974)

⁸ Since October 2006 known as ‘Natural England’ - statutory organisation responsible for “nature conservation, biodiversity, landscape, access and recreation” (English Nature website August 2006)

⁹ Stakeholders included non governmental and governmental organisation (some of which now exist under different titles) and comprised the Ancient Tree Forum (NGO), Corporation of London, , English Heritage, English Nature, Farming and Rural Conservation Agency, Forestry Commission, National Trust, The Countryside Agency.

Actual and Perceived Risk - How reasonable is “reasonably practicable”?

The arboricultural profession has been informed for some time how to distinguish hazard from risk (Lonsdale, 1999; Davis et al 2000; Ellison 2005)¹⁰, however it is only recently that the profession has begun to accommodate the wider implications of tree risk theory, particularly in relation to risk significance / insignificance (Ellison, 2005 and 2006).

In its Sector Information Minute (HSE, 2007), the HSE acknowledges that, on the basis of how unlikely the public is to be exposed to the risk of fatality from falling trees, tree inspection need not be an onerous obligation for the duty holder. The SIM claim to advocate a minimum standard required by Section 3 Health and Safety at Work Act (HSWA) and that from a regulatory point of view ‘proactive inspection of duty holders’ systems for tree management is not envisaged’. The HSE acknowledges that not all trees are expected to be individually inspected on a regular basis and that duty holders may retain trees with ‘serious structural faults’. While such trees will require appropriate planned management to control risks, ‘duty holder should not be encouraged to fell or prune trees unnecessarily’ [HSE emphasis].

The principle that risks should be controlled *as low as reasonably practicable*, ALARP is embodied in the HSWA: implying a balancing exercise between risks and their control measures (cost-benefit) - so that the test as to whether the practicability criterion is met depends on whether the associated costs of doing so are grossly disproportionate. As professionals the challenge is to determine the reasonable boundaries of *gross* disproportionality. However important this exercise is it could be fraught with difficulty considering that it is a concept in itself that some risk experts argue is open to challenge.

The term ‘*reasonably practicable*’ has been defined in English case law as being a “*narrower term than "physically possible"*”¹¹; a concept that implies “a computation...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* [my emphasis] between them, the risk being insignificant in relation to the sacrifice, the defendants discharge the onus on them (Anon, 1949)”¹².

The Robens Committee considered that responsibility for the control of a risk should reside not with the regulator but with the body that creates the risk (in our case, the arboriculturist and conceivably the occupier/land owner) as the originator would be best placed to understand and control risks.¹³ As a regulator, the HSE avoids being over-prescriptive within particular industry sectors so that by means of self-regulation, risk control within a sector is based on generally accepted industry standards. Therefore standards vary between and within industry sectors reflecting the intention of the Robens Committee for flexibility in the way the HSWA promotes risk decision making.

Societal risk concern is influential from the HSE’s point of view (perceived aversion to particular hazards). However, it could be argued that in general trees do not invoke much in the way of societal concern, apart from the rare occasion following a tree related death. Clearly it would be

¹⁰ A *hazard* is distinguished from a *risk*: hazard being the disposition of a thing to cause harm and risk is the likelihood or probability of harm occurring.

¹¹ By Judge Asquith; *Edwards v National Coal Board* (1949)

¹² Lord Asquith goes on to conclude that “the computation falls to be made by the owner at a point antecedent to the accident” implying that this is concerned with proactive assessing and controlling risks rather than post-accident assessment.

¹³ This was in the belief that “appropriate responsibilities at all levels within industry and commerce” if accepted and exercised would ensure better systems of safety organisation and improved management initiatives and involvement of those in the work place. This has equivalence to current notions of ‘stakeholder involvement’ (Robens, 1972).

significant if there were a loss of confidence in the institutions of public protection following an accident, reflecting loss of “trust in regulators and duty holders”. HSE guidance points out that, when accounting for risk impacts, societal concern needs to be taken into consideration (as with the SIM). But even so this should not involve changing a sensible risk management strategy, which anyway should be optimised in the public interest. There is an assumption that societal concern will be greater for accidents resulting in multiple deaths (societal risk) than multiple incidents each with a single death (HSE, 2001). Thus a tree falling on a bus resulting in multiple injuries would by this argument have greater significance than the same number of injuries from individual tree failure incidents.

Certain sectors (e.g. off-shore industry, fishing, roads and railways) have the capacity for creating a large number of deaths in one event or in one year. These are subject to specific HSE policy investigation and guidance. Investigations into specific health and safety issues have also been instigated in industry sectors where, there has been a high level of public interest without necessarily being supported by corresponding evidence e.g. risks to children at play. Tolerance of accidents to children tends to be low and concern tends to be high, even when the actual risk of harm has been found to be small (Ball, 2002).

The HSE, as the regulatory and enforcing body under the HSWA, requires its staff to judge whether the measures employed by the duty holder for risk control are sufficient. Its guidance, in referring to the Edwards case, underlines this legal direction in clarifying the requirements of ALARP. The case underpinned the centrality of cost-benefit analysis to risk decision making¹⁴

How flexible is the legal process?

HSE theory and guidance should be sufficient to provide sufficient clarity for unambiguous risk decision making. However, while all controls considered necessary under ALARP are normally required to be implemented, it is worth noting that the concept of gross disproportion is not universally or comprehensively accepted among risk decision-making experts. By some it is viewed as being “past its sell-by date” (Prof. David Ball, pers. comm. also Prof Andrew Evans, UCL London). The critique relates to the nature of the Asquith definition leads to an overstatement of the measures required to bring risks within acceptable limits in the face of more contemporary, refined appreciation of health and safety issues. This view regards gross disproportion to lead to an imbalance in cost-benefit analysis. Accordingly, if cost-benefit calculations derive from an out-of-date gross-disproportion test risk decision making will be unreasonable and lead to excessive, unnecessary and defensive risk management. If this critique has foundation and there is an inherent imbalance in the sector standards for tree risk management. The question is whether it is possible to alter the HSE’s position on gross proportionality by engaging in open debate?

Court decisions operate within the context of very complex sets of cultural values and while seeking to achieve high levels of integrity, outcomes may be neither objective nor scientific. In the case of *Tomlinson v. Congleton Borough Council* the Law Lords made a landmark decision where occupiers’ liability appeared to be both clarified and restricted in scope (House of Lords, 2003). The circumstances of this case relate to the serious injury of a young person who dived

¹⁴ In working through the implications of the Edwards case, the HSE argues that the ability to afford ALARP risk control measures needs to be considered against the background of whether the cost, in comparison to the benefit in risk reduction, satisfies the gross disproportion test, also contending that this calculation needs to relate to the particular circumstances of the case, and be determined by comparable circumstances, either elsewhere or in that particular industry sector.

into a lake in a quarry in Brereton Heath Country Park, owned by Congleton Borough Council. The judgement determined that “it will be extremely rare for an occupier of land to be under a duty to prevent people from taking risks which are inherent in the activities they freely choose to undertake [my emphasis]”.

Clearly different judges reflect differing views about such things. Between the first judgement in the Tomlinson case (that the council was not liable), the Court of Appeal hearing (in which the first judgement was reversed)¹⁵ and the House of Lords judgement (which held Congleton Borough Council not to be liable), the result changed at each stage.¹⁶ In the appeal, Lord Hobhouse stated “...it is not...the policy of the law to require the protection of the foolhardy or reckless few to deprive, or interfere with, the enjoyment by the remainder of society of the liberties and amenities to which they are rightly entitled. Does the law require that all trees be cut down because some youths may climb them and fall? Does the law require the coast line and other beauty spots to be lined with warning notices? Does the law require that attractive water side picnic spots be destroyed because of a few foolhardy individuals who choose to ignore warning notices and indulge in activities dangerous only to themselves? The answer to all these questions is, of course, no [my emphasis].”

The House of Lords Select Committee on Economic Affairs took the view that, while it is accepted that “blame or concern for the well-being of the very young or elderly may influence public opinion concerning appropriate levels of expenditure on accident prevention”, a disproportionate response is not warranted [my italics]. This is because social science research appears to show that even though “the scale of the loss of life in a single incident per se and the undoubted press media attention that a large scale accident inevitably generates”, the public response when tested, operates contrary to the expected view (Anon., 2006); and presumably also contrary to those views contained in the HSE own guidance on ALARP (HSE, 2001b).

Resource allocation on trees

The essence of good arboriculture is the conservation and sustainable management of individual trees and populations of trees. The arboricultural industry spends a considerable proportion of national resources allocated for tree management for the benefit public safety, often carried out without clear strategic planning and without being based on long term sustainability objectives.

Based on Department for Transport figures (2004) of the total national road length (392,407 kilometres (km)) and assuming ten trees per km, it is estimated, conservatively, that there are 4 million highway trees¹⁷. A major investment in tree management relates to the risks posed by trees within range of highways and sites where there is a high volume of traffic (pedestrian and vehicular).

Provisional estimates from the Trees in Towns II study of England’s urban trees and woodlands¹⁸ indicates that in 2003 - 2004 Local Authority total tree expenditure amounted to about £106 million¹⁹ spread over the 389 Local Authorities, with average expenditure on trees

¹⁵ It was additionally held that the appellant was partially responsible

¹⁶ In clarification the House of Lords referred to there being three parts to a test for liability under the 1984 Occupiers’ Liability Act: the first being knowledge or foresight of the danger, the second being knowledge or foresight of the presence of visitors and the third part of the test being “whether it was reasonable for the claimant to expect protection” [under the Act].

¹⁷ Km lengths for road types: Motorways (3,472), Trunk (11,725), Principal (34,825) and minor roads (342,385). A TEP study into tree risk for Cheshire County Council indicated 8.8 trees per km road length.

¹⁸ Carried out by Myerscough College & ADAS (originally commissioned by the Office of the Deputy Prime Minister)

¹⁹ £5,568,235

approximating to £1.75 per head of population (Dr. Mark Johnson, pers. comm.). It is reasonable to assume a significant proportion of the £105 million is allocated to managing tree risks, though what proportion is not known at the time of writing, but it would be expected to represent over 70% of this budget. While this is a considerable sum of money spent on the nation's municipal tree resource, it is nonetheless equivalent to 3.7 miles of motorway construction²⁰.

According to one's perspective, a considerable amount of the nation's resources is allocated to managing risks from trees²¹. The question is how to optimise resources while managing risks within the ALARP principle, through sensible policies to take account of resources and multiple values in trees.

Possible influences from other sectors on arboriculture

Public concern for the consequences of accidents varies between industry sectors and is influenced by the media, interest groups and recent 'public memory' of events. The nuclear industry is a potential generator of a serious accident, which is reflected in it being directly represented within the Health & Safety Commission advisory committee structure (the Safety of Nuclear Installations committee). Since the Chernobyl nuclear accident in 1986 the nuclear industry has had to respond to concerns in the public mind of hazards that are capable of transcending national borders (World Health Organisation, 2006; Greenpeace, 2006).²²

Motor car use has resulted in an average of nine deaths per day, averaging 3,426 deaths per year (Department for Transport, 2005), while between 1998 - 2003 deaths from structural tree failure averaged six a year (Forbes-Laird, 2003). In the past decade the railway industry has produced incidents with 31 deaths in a single event (Ladbroke Grove, Paddington 1999) (Health & Safety Commission, 2001). Trees on the other hand in the worst recorded single incident in recent years (Birmingham, 1999) have caused the death of three people from structural failure (Anon, 2002).

From the arboricultural professions point of view an accident involving a tree failure that causes multiple fatalities to children or the elderly (e.g. a tree falling on a bus) would be a major tree disaster. The prospect of such an incident is a driver of precautionary tree surveying and management priorities. In a risk-averse society fears of those responsible for trees will exceed *objective* expectations of accidents. However the prospect of such an event influences the expenditure on defensive tree management and how trees are professionally cared for. One of the consequences of over-reaction to an incident where a tree causes significant harm is unwarranted, irrational culling of trees; inevitably detrimental to the natural heritage. If as a nation we are disproportionately spending tree management resources influenced by risk aversion then one might conclude that the agenda for reasonable proactive risk management is being led from outside the profession or driven by policies and practices that the profession and industry have not taken control of.

²⁰ "The average cost of constructing a mile of three lane motorway was £28.4 million per mile and for constructing a mile of dual carriageway was £15.3 million per mile, based on prices at the end of 2005". Dr Stephen Ladyman, Minister of State for Transport in answer to question from Mr. Carmichael, M.P. (Hansard 4 May 2006 : Column 1737W)

²¹ In addition to the above estimates money is spent on reducing risks from trees on property associated with railways, motorways, Forestry Commission, National Trust, English Heritage, Woodland Trust and other landowners. According to the SIM, total tree stock may be in the order of 900 million.

²² Examples of mortality calculations for the Chernobyl disaster range from 4,000 to 100,000

Tolerability of Risk: a sensible framework for a tree risk policy and strategy?

The tree world has so far failed to notice and work with a well established risk analysis profession, perhaps because, as an industry, arboriculture is often doing its best to make optimum use of constrained resources in the face of limited maintenance budgets and changing societal concerns. Against this background when the occasional incident occurs as it must, where a member of the public suffers harm from tree failure, the tendency to a disproportionate response leads to reactive management decisions that are not strictly based on ‘reasonable’ control of risks experienced by the public. Where reactions are influenced by the media and public reaction they are not driven by strictly professional knowledge. To avoid this it is necessary to base tree risk management policy on genuine risk analysis and decision making guidance.

Below the Tolerability of Risk framework (Figure 1) outlines the HSE *Reducing Risks Protecting People* basis for assessing risk regulation. While it is argued that this is a conceptual model it is nonetheless widely applied by different sectors and could be useful when considering tree related risks illustrates the increasing level of ‘risk’ for a particular hazardous activity (e.g. the risk from falling trees). The inverted triangle reflects the increasing effort required to control risks the higher they are. The unacceptable region at the top is regarded to be unacceptable irrespective of benefits from the tree or the cost in risk reduction) and risks must be abated to within the Tolerable Region.

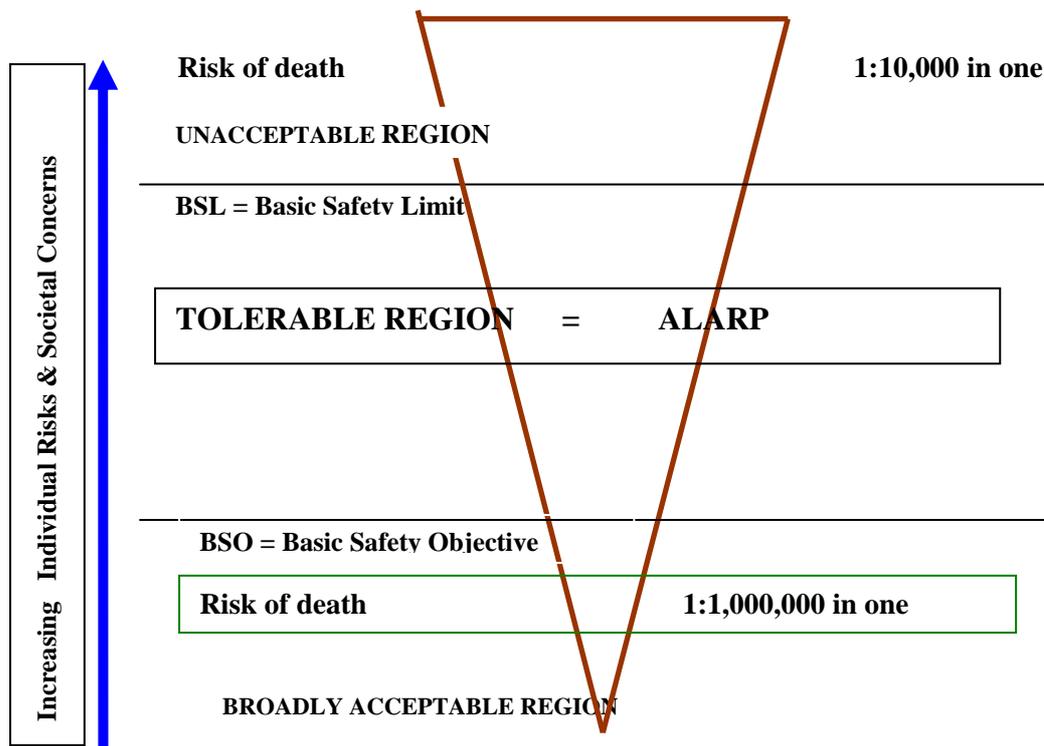


Figure 1: Tolerability of Risk Framework:

Based on *Reducing Risks Protecting People* Figure 1 ‘Framework for the tolerability of risk (HSE, 2001)

The zone between the unacceptable and broadly acceptable regions is the tolerable region with risks typically tolerated to secure benefits. This region is subject to risk assessment and control measures. Risks are expected to be maintained as low as reasonably practicable (the ALARP principle).

Risk is more than the chance of an event occurring; it accounts for the severity of consequences from the occurrence. Where circumstances lend themselves to measurement it is possible to base decisions on quantified calculations. Risk quantification has been promoted for some time by the HSE (HSE 1989) and is increasingly in widespread use in arboriculture (Ellison, 2005). However, this is a very imprecise science and precision certainly is not expected from the HSE (HSE 2007). Acknowledging that there is a subjective component to risk decision making is important when exploring cultural expectations of reasonable safety.

The Tolerability of Risk (TOR) framework (Figure 1) is a useful natural consequence of the ALARP principle. Based on the TOR framework the person responsible for risks from trees makes decisions about risk acceptability and frames action accordingly. The TOR framework incorporates cost-benefit implications (HSE, 2001a)²³. A risk of death greater than 1:10,000 per annum is in the Unacceptable Region; i.e. above the Basic Safety Limit (BSL) and is an intolerable risk. Risks in this sector require reduction measure to bring them within acceptable limits. These are not assessed on the basis of cost-benefit considerations. The need for remediation, once identified must be carried out without delay and not subject to planned budgetary consideration. Such risks might be the realistic prospect of a tree imminently failing (e.g. root plate uplifting, fork splitting etc. in high use areas).

Risks below 1:1,000,000 are below the Basic Safety Objective (BSO). Such risks are considered broadly acceptable in terms of tolerability and are not normally required to be subject to additional risk reduction costs or measures (e.g. trees in restricted areas with difficult access).

Between the BSO and the BSL is the Tolerable (ALARP) Region. Risk in the ALARP region can be assessed and subject to planned, prioritised management. *Most tree-related risks are in the broadly acceptable region.* Though some may be in the tolerable region, where there is high exposure of some target. Where they are in the tolerable region they may be reduced towards the BSO level (to be broadly acceptable), through management that is planned and amenable to prioritised / sequenced operations according to budgets (cost-benefit considerations)²⁴.

These components together are probably sufficient to inform the formulation of a defensible Tree Risk Management Policy (TRMP) to provide the basis for developing a proactive strategy. In addition to safety this needs to consider other stakeholder policy statements related to trees when formulating integrated tree management objectives. The policy will need to define who stakeholders are, how and when targets will be reviewed and how information is recorded. A Tree Risk Management Strategy (TRMS) will translate the policy objectives into operational activity with time expectations. The ALARP principle and the TOR framework provide a logical basis for considering budgets to account for prioritised management. Thus unacceptable risks above the BSL are managed without delay. The planned management within the ALARP region allows for a system of prioritisation of risk reduction (e.g. based on trees identified for treatment within one year).

²³ This originated from HSE guidance for the nuclear industry (HSE, 1988) with a philosophy for risk control that is not based on an either/or (safe/not safe) scenario but a way of perceiving risk as being allocated between the unacceptable, tolerable and broadly acceptable regions.

²⁴ Slavin (undated) refers to three key 'Domains of Risk' each affecting the other. These are *Data* (empirical, measurable, statistical, observable functions), *Framework* (policy, regulation, the framework within policy operates, legal functions) and *Behaviour* (human dimension, perception, trust, social amplification, ambivalence, uncertainty functions).

As long as there is sufficient clarity and traceability of information to meet audit trail requirements it should be possible for tree risk management to be defensible without being unreasonably costly or defensive (risk-averse). The Health and Safety Commission has spoken against 'generating useless paperwork mountains'²⁵ and the profession needs to consider how much paperwork is reasonable as, in itself, paperwork does not protect the innocent at all. A critical component of intelligent policy formulation includes a need for clarity about resource availability so that its influence on decision making can be explicit. It is also important that risk policy takes account of other relevant stakeholder interests and policy statements so that these can be incorporated in management strategy.

One view is that risk decision making is currently reactive and incident-led in response to hazard reporting. If so the transition from reactive to proactive management will entail devising targets to achieve short and long term goals. Perhaps it is more accurate to say that the industry is not reactive, as it already does very effectively manage trees. Rather the industry is feeling pressured by external agencies who fail to understand the complexity of what is involved in managing trees (which is concerned with more than safety matters); so arguably the industry needs to better organise itself to ward off the ignorant.

Conclusion

It is unfortunate that prosecutions relating to risk regulation create a climate where special cases influence professional behaviour leading to reactive responses. Reactive defensive behaviour is more likely where there is an absence of coherent proactive systems for management. Where there is a tendency to reactive responses to litigation this is a poor basis for developing a strategic perspective and reflects the desirability of greater industry and professional leadership.

The Society for Risk Analysis Europe (SRA) refers to risk analysis involving risk assessment, risk management and risk communication (Annual Meeting 1996). Applied to the provision of a safe and sustainable tree population this would involve decision making on policy options including factors other than scientific assessment and would require that cost benefit analysis be applied for different policy options. Were the summary of the SRA Europe Meeting applied to tree risk management those responsible for trees at a national or voluntary level would engage with the public to explain the nature of the risks involved in their (the public's) enjoyment of trees: an aspect of industry-led risk communication.

Clearly, defining risk this is not a one-way process. As industry decision-makers and providers of tree maintenance for the common good, engagement with the public should provide the opportunity for feedback and discourse. Communication about the purposes of risk management is inherently interactive but is only coherently possible if there is an established means for information exchange and an ability to engage with opinion. This area of communication is currently missing from the core of the arboricultural professional agenda. Yet given recent litigation there is a strong case for arguing that this should be a highest priority. Not to do so could threaten important components of the tree populations.

Where cases arise from health and safety investigation of injury from tree-failure the court will have to rely on and interpret the evidence before it. If there is a shortfall in the cohesiveness of the industry driven policy, and if expert evidence is of dubious quality, individuals and organisations responsible for trees will be exposed to claims of negligence. While liability for

²⁵ Bill Callaghan, Chair of the Health and Safety Commission (2006), '*HSC tells health and safety pedants to "get a life"*', www.hse.gov.uk/risk

tree failure in such cases is tested on the basis of reasonableness, it is unlikely that managers and decision makers would be found negligent if placed under scrutiny where the policy for managing tree risk and public safety is strategic and proactive, and is in conformity with an industry determined rational, balanced approach. The question arises whether there is such an approach, if so whether it is sufficient to equip arboriculturists with a sound basis for non-defensive risk management?

The courts and public opinion are capable of shifting positions. If court judgements are capable of change and on occasion be based on inappropriate information there is a case for formulating an industry position to influence a climate that can support more rational interpretation of events from tree failure. Societal concerns for the risks from incidents of high potential magnitude for harm associated with industries such as nuclear power and railways can influence policy and decision making in other industry sectors. Although the tree care profession is hardly affected by such influences, it is possible that unless the social mechanisms are understood by those involved, the profession could fall victim to similar effects and would be poorly placed to respond.

There is a strong case for formulating a national tree policy based on objectives for the nation's tree stock that reasonably might include *the establishment and maintenance of a sustainable tree population that reflects the diverse interests and values that we place on trees*. It is hard to see how it would be possible to obtain this objective without operating proactively as a profession. The working environment for those in the arboricultural industry is inevitably affected by existing and pending HSE prosecutions and interventions and potential for responsible individuals to be held personally liable for failure to meet a duty of care. Management considerations are bound to be driven by the legal framework within which those responsible for trees operate. But the legal framework reflects only a one-dimensional view of what trees are really about. It is important that the industry thinks holistically when attempting to address the full range of contributions and values associated with trees.

The lack of a common 'industry' voice about the consumer benefits of trees has resulted in a less than coherent debate with the general public and the media – let alone a dialogue. Such a dialogue is necessary so that the public can engage as intelligent participants, armed with information about the benefits as well as the risks posed by trees, just as is happening with the environment in general. The question in this is where the leadership should come from to determine the value and benefits derived from trees and how best to place both the risk data derived from social perception and that derived from expert compilation. The arboricultural profession has a special role in defining principles for risk policy supported by risk decision analysis expertise. This evidence based approach would serve to refine and characterise the case for a non-defensive approach to tree risk and could be used as a basis for communication with influential interest groups capable of mediating with the public and balancing other (non-tree) interests.

As previously stated, we are all members of the public. By engaging in a public debate over issues and priorities influencing tree safety and conservation management, this will inevitably draw in contributions from those who appreciate trees the most, including members of the press and the judiciary.

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