Exploring the role of street trees in the improvement and expansion of green networks

Abstract

One of the most important social benefits associated with green spaces and street trees, the building blocks of green networks, is their capacity to generate social action among local community members. Evidence also shows that formal community and stakeholder engagement is required for the effective and sustainable implementation of urban greening initiatives, such as the development of green networks. This paper examines the potential relationships between these two forms of social action. We consider the definition and composition of green networks, and their place in planning frameworks. We then describe the evidence relating to the social and cultural values of green spaces and street trees, focusing particularly on social action. In our discussion we think through how street trees might be used to 'pull people in' to participate in the expansion and improvement of green networks.

Keywords:

green infrastructure, social action, social values, urban forests

Introduction

Evidence suggests that one of the key benefits associated with green spaces and street trees, the building blocks of 'green networks', is their capacity to generate social interaction (Dandy, 2010; Stewart *et al*., 2010). This is argued to derive primarily from the greater use of public areas by community members when trees are present and/or otherwise 'green': meaning that individuals are more likely to meet one another and utilise the space for outdoor activities and events. While this type of social action might be considered largely *ad hoc* and informal, research has linked it to the development of stronger, more stable, communities. Research and practice also shows that more formal or focused community and stakeholder engagement is vital for the successful implementation of urban greening initiatives in general. This paper explores the potential relationships between these two forms of social action, by thinking through how the social action generated by street trees might transform, or be transformed, into social action focused on the improvement and expansion of the green networks of which they are a part.

Green networks have emerged as an important element of planning policies across the UK and Europe, presenting a number of new challenges to land managers, planners and researchers, particularly those working in urban contexts. Perhaps one of the most important challenges is maximising community and stakeholder engagement with, and use of, green networks. While considerable knowledge and advice is available relating to engagement around individual green spaces and greening initiatives, there is far less evidence regarding how people and communities engage with more holistic entities such as green networks. Given the likely (default) focus on engagement through individual components of networks, such as street trees, it is of particular importance to understand if, how, when and where social action around these individual components might transform, or be transformed, into social action relating to the wider network.

We begin this paper by considering the definition and composition of green networks, their relationship with current planning policies, and the limited evidence on their capacity to 'pull people in' to participate and use them. We then describe the evidence relating to the social and cultural values of the components of green networks (i.e. green spaces and street trees) and provide practical examples of street tree projects. This section has a particular focus on the generation of social action. In our discussion we use street trees to think through how

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individual components of green networks might be used to 'pull people in' to participate in their expansion and development, and whether this approach maximises engagement with them.

Green networks

What is a 'green network'?

There are a number of definitions of the term 'green network' and this is further complicated by those definitions of 'green infrastructure' which incorporate concepts such as inter-relationships and landscape connectivity. These terms are often used interchangeably (Moseley and Marzano, in review). Tzoulas *et al*. (2007: 169) define green *infrastructure* as 'all natural, semi-natural and artificial networks of multifunctional ecological systems with, around and between urban areas, at all spatial scales', although this emphasises ecological, not social, networks. Forest Research (2010: 9) defines green infrastructure as 'the combined structure, position, connectivity and types of green spaces which together enable delivery of multiple benefits as goods and services'. This is being clearly echoed in green infrastructure strategies, for example Leeds City Region (LCR) defines green infrastructure as 'a combination of environmental assets and man-made features that have a semi-natural component' (LCR, 2010: 7), and these definitions have clear connotations of a *network*. In this paper we prefer the term *green network*, and wish to emphasise the idea that components encourage movement of, and provide environmental benefits for, both people and wildlife. Considering both ecological and social dimensions of green networks is crucial for effective planning and management. While ecological connectivity depends primarily on the juxtaposition of physical green spaces, obtaining the social benefits of green networks is also contingent upon the connectivity not only between physical features but also between these and the users of networks and their social institutions and practices (see Forest Research, 2010).

What makes up a green network? Green networks encompass multifunctional green spaces, but often also consider other (non-green) civic spaces. For many local authorities green network planning is still in its early stages and the precise composition of green networks may differ between individual local authorities reflecting the types of green space present. Within Scotland, the PAN 65 typologies relating to open space (Scottish Government, 2008) are used, ranging from formal areas such as public and private parks and gardens, amenity green spaces, playspaces and sport areas, to more natural areas such as woodlands, riparian routes and green access routes. Natural England (2009) defines five broad categories within a green infrastructure typology: parks and gardens; amenity greenspace; natural and semi-natural urban green spaces; green corridors; and an 'other' category covering allotments, community gardens, city farms, cemeteries and churchyards.

Green spaces can vary in size from large woodlands to small areas of amenity green space; all play a part in the connectivity of the green network. When examining the extent of a green network, it is easy to perceive that some areas appear to lack green spaces. However, closer examination may reveal that there are fingers of green reaching into the community; tree-lined avenues linking bigger green spaces to residential areas. Iconic large or old individual trees can provide focal points in addition to the more formal green space areas. Although street trees are often mentioned as contributing towards tree cover or the amount of green space, they are often not mapped as a component of the green network.

All these components contribute to the green network, although some may provide a greater range of benefits to a larger number of people. In order to maximise their individual contribution to the network, large (core) areas of green space providing a wide range of benefits should be protected and expanded; linkages to these core areas such as green corridors alongside rivers and disused railways, paths and cycleways should be maintained and improved; smaller areas of green space, such as street trees, which may not be currently linked to a network can provide stepping stones for species and people to access other parts of the green network and provide a focus for further improvement for its extent and connectivity. This may be undertaken through the planting of street trees and management of brownfield sites. Indeed, brownfield sites are increasingly being recognised explicitly as important parts of green networks; for example, 'areas of waste ground on former industrial sites can often be seen to perform a great many green infrastructure functions and are highly valued by the people that live in close proximity to them...' (LCR, 2010: 7).

Each of the green space types provides different functionalities and there will be variation in quality between sites (e.g. structural diversity of habitats, provision of play equipment, etc.) which can be captured through surveys and audits and used to plan and improve green networks. It is important that the quality as well as the quantity of the green spaces are improved. This may take the form of additional facilities or simply the greening of an area and its access routes by tree planting projects. The development of

a green network might also involve increasing public accessibility and engagement through the provision of paths or the creation of areas of open space to promote health and wellbeing. These open spaces can also provide habitat for a range of wildlife species, help reduce flood risk and improve the economic status of an area, by making it a more attractive place to live and work. By spatially targeting where these activities are undertaken, linkages will be created, reducing habitat fragmentation and isolation, and extending the green network into local communities.

Green networks and planning

Reference to green networks appears throughout planning documents, from National Planning Guidance to local plans, covering all types of green space and its functions for people, biodiversity and the environment. Within Scotland, *Scottish Planning Policy* (Scottish Government, 2010) supports green network development. Within England, guidance on undertaking green space audits, often a precursor for a green infrastructure strategy, is provided by Planning Policy Guidance 17 (PPG 17) *Planning for Open Space, Sport and Recreation* (CLG, 2002). In Scotland, the development of green networks has been championed by the Scottish Government and Regional Planning Authorities. For example, *National Planning Framework 2* has a vision 'to create a Central Scotland Green Network (CSGN) capable of delivering a step change in the quality of the environment for the benefit of people, landscape and nature' (Scottish Government, 2009: 33, paragraph 95). Launching the Edinburgh and Lothians Forest Habitat Network Partnership, the then Environment Minister, Michael Russell, stressed the importance of street trees in green networks. Having said this, the generally low profile of street trees within urban planning policies and definitions of green networks points to the fact that their current and future contribution, both ecologically and socially, to green networks appears to be vastly underestimated.

'Pulling people in' to urban green networks

Published evidence identifying which components of green networks act to 'pull people in' (i.e. generate use and participation), and how, is very limited. However, some evidence relating to expressed reasons for using green spaces holds some suggestions, although longitudinal studies are needed to monitor and evaluate these aspects of green networks. Over half the UK population (approximately 33 million people) make a total of 2.5 billion visits to urban green spaces annually (Wooley *et al.,* 2004). How green spaces are used depends on individual preferences, needs and personal experience as well as age, ethnicity and gender (Cohen *et al*., 2007; Tyrväinen *et al*., 2007). Greenspace Scotland (2008) record use for a range of different activities including walking (49%), taking children out to play (26%), dog-walking (16%), relaxing (11%), exercise (9%), spending time with the family (8%), to pass through (5%), socialising with friends (3%) and having contact with other people (1%). The repeat survey in 2009 found that the primary uses of green space remain to go for a walk (49%) and a place for the children to play (27%). Pikora *et al.* (2003) note the key determinants influencing walking outdoors include aesthetics, safety and presence of destination.

Borst *et al*. (2008) reveal a positive relationship between the presence of street trees and preferred walking routes for elderly people, although a later study (Borst *et al*., 2009) did not show a significant relationship. Giles-Corti *et al.* (2005: 170) suggest that the attributes of 'public open spaces' influence how it is used and by whom. These include perceived proximity, accessibility, aesthetic features (presence of trees, water and wildlife), maintenance, and availability of amenities such as paths for walking. However, more work has been done on why people might *not* visit urban green spaces. Reasons include the presence of other users, including undesirable characters, and environmental quality issues (Dunnett *et al*., 2002: 11).

Aspects of this evidence seem to militate against the notion that green spaces can increase social action and interaction – especially expressed concern about encountering 'others'. However, it is likely that the problem here is with the research method and approach. 'Generating social action' is unlikely to appear on a survey of activities in, or reasons for using, green space, and is unlikely to be among explicit direct motivations for users. Building local capacity and a sense of ownership is, however, essential for ensuring the sustainability of any green network initiatives (Weldon and Bailey, 2007).

The social values of urban green spaces and street trees

Green spaces

There is now a substantial literature exploring the social benefits and values of urban green spaces. Overall, evidence suggests that they can provide numerous environmental, economic and social benefits to urban societies: and are thus very valuable. Much of this evidence has been generated by survey methods; however, evidence from wider sociological and anthropological qualitative studies is also valuable. For example, Venkatesh's (2006: 63–87) description

and analysis of the importance of an urban park to a poor community in Chicago, and the substantial efforts community members will make to ensure the safety of its users despite its extremely poor quality 'facilities', is instructive. This section reviews the social benefits of urban green spaces in general then moves on to explore street trees in more depth. We focus particularly on the capacity of green spaces and street trees to generate social action.

Social benefits that can be derived from urban green spaces are varied. They include providing valuable assets for education and learning activities which can help people to connect with nature and enhance their appreciation and value for natural spaces (Konijnendijk, 2008; Lovell *et al*., 2010). Green spaces offer numerous opportunities for recreational activities and some studies have found associations between access to green space and greater levels of physical activity, which ultimately leads to improved health (Giles-Corti *et al*., 2005; de Vries *et al*., 2011). It would appear that there is stronger evidence to support an association between green spaces and improved mental wellbeing through psychologically and physiologically restorative experiences which help enhance mood, and reduce stress and mental fatigue (Croucher *et al*., 2007; O'Brien *et al*., 2010; Stewart and O'Brien, 2010). These effects may be achievable not only through use of green spaces but also simply through access to views of green areas. The existence of green spaces and networks in urban areas also provides benefits in terms of improvements in the aesthetics of the urban landscape, with vegetation making areas more pleasant to live and work in as well as visit (Ellis *et al*., 2006; Chen and Jim, 2008). This can help people feel pride for their local area.

There is now a growing body of evidence that green spaces can help to facilitate social interaction and address issues of social inclusion, cohesion and community empowerment (Bell *et al*., 2008; Stewart *et al*., 2010; Stewart and O'Brien, 2010). They can act as platforms to help bring communities together and encourage people from different backgrounds and cultures to interact (Ravenscroft and Markwell, 2000; Bell *et al*., 2008; Seeland *et al*., 2009: 10). Green spaces, and in particular those with trees, have been shown to promote higher levels of use, social activity and interaction than non-green spaces (Coley *et al*., 1997; Sullivan *et al*., 2004). Moreover, evidence implies that individuals using green spaces often enjoy a stronger sense of community and perceive that they have greater social ties than those individuals who do not use the same green spaces (Kweon *et al*., 1998). Place attachment of this kind and strong community cohesion and interaction can encourage not only social but also political engagement and may lead to local residents becoming involved in the preservation, improvement and expansion of such spaces.

Taking this a step further, Elmendorf (2008: 154) supports the notion that if people and communities are engaged in the decision-making, implementation and monitoring processes involved in the planning, development and delivery of green space initiatives then significant social impacts may be felt. Communities may develop improved social structures and organisation through enhanced interaction and the building of capacity. 'Engagement' in this sense could include involvement in, for example, volunteer programmes, tree-planting events or 'citizen science' activities such as biodiversity surveys. Ultimately, also, enhanced engagement and participation can improve the likelihood that the landscape meets local needs, reflects local values and is 'owned' by the local community, which should in turn improve the chances that the potential benefits of green spaces and networks can be realised, particularly in terms of social benefits.

Street trees

We have illustrated above the considerable literature on the benefits of green spaces, which has a substantial sub-focus upon urban forestry. Only a relatively small number of papers, however, address the social and cultural values of *street trees* specifically. Put simply, a 'street tree' is a tree located next to or within a public road. More precisely, a street tree is a tree located on land forming or adjacent to a 'highway' which affects, in some way, those using that highway. Street trees in the urban environment can have particular values which are being increasingly widely recognised (Read *et al*., 2009). A study by Welch (1994) indicated the structural distinctiveness of street trees from other elements of the 'urban forest', but further to this people interact with street trees in ways that can be different from how people interact with trees located elsewhere. Street trees also constitute a much larger proportion of total canopy cover in urban areas relative to rural areas. In urban areas they are, by and large, proximal to far greater numbers of people and buildings than their rural counterparts. This brings with it increased opportunities for interaction, both positive and negative. Of the published materials the vast majority of street tree-specific research has been conducted in North America, and nearly all of the studies are quantitative. A review of this limited literature identifies a number of benefits which urban communities can obtain from street trees. Attempts have been made to place economic valuations on the benefits of street trees; for example, estimates have been made that one scheme to plant a million trees in Los

Angeles will provide, over the next 35 years, between $1.33 billion and $1.95 billion of environmental and social benefits, with an average annual benefit of between $38 and $56 per tree (McPherson *et al*., 2010).

The aesthetic value of street trees has received considerable attention with research illustrating that people value street trees simply for their aesthetic attractiveness (Sommer and Sommer, 1989; Flannigan, 2005). Tree size is an important variable within this with the general preference for large, spreading, globular or round trees. Height has also been found to be an important variable (Kalmbach and Kielbaso, 1979; Williams, 2002).

It is likely that street trees have substantial restorative value. Considerable research (e.g. Kaplan and Kaplan, 1989; Kaplan, 1995) has illustrated the capacity that 'nature' has to aid recovery from mental fatigue, and this concept is extended to the urban forest (Kaplan, 2002). The positive emotions needed to recover from mental fatigue were identified in response specifically to street trees by Sheets and Manzer (1991: 301), who found that 'Our subjects reported more positive feelings when viewing tree-lined city streets; they felt friendlier, more cooperative, less sad and less depressed'. Street trees can have demonstrable effects upon other aspects of human health and wellbeing (Lovasi *et al*., 2008; see O'Brien *et al*., 2010, for a comprehensive review of the health impacts of the urban forest).

Urban green spaces with trees appear to have the potential to be safer than those without – trees may thus be considered to have a safety value. A growing number of studies have begun to challenge the perception that standing roadside trees pose only a threat to drivers, and to assert that trees can, in fact, improve driving safety in some circumstances. The main positive effect here appears to be a reduction in speed resulting from improved landscaping using trees (Naderi, 2003; Dumbaugh, 2005; Wolf and Bratton, 2006; Burden, 2008). Further to this, Wolf (2006: 56) links better driving to improved driver psychology, noting that 'Drivers seeing natural roadside views show lower levels of stress and frustration compared to those viewing built settings.'.

Certain categories of social value are contingent on trees facilitating increased *use* of community spaces. Although there is no published evidence relating directly to street trees, research has correlated the 'greenness' of urban spaces (particularly trees) and reduced crime – in terms of fewer calls to the police and less domestic violence (Kuo *et al.* 1998a; Kuo, 2001, 2003). For example, Kuo (2003: 148, emphasis added) found that:

The presence of trees and well-maintained grass can transform these no man's lands into pleasant, welcoming, well-used spaces. ***Vital, well used neighborhood common spaces serve to both strengthen ties among residents and deter crime, thereby creating healthier, safer neighborhoods.*** *... Contact among neighbors and informal surveillance are, in turn, known to be linked to strength of community and levels of crime...*

Burden (2008: 3) also links trees to improved 'security' through increased ownership and surveillance.

Trees create more pleasant walking environments, bringing about increased walking, talking, pride, care of place, association and therefore actual ownership and surveillance of homes, blocks, neighbourhoods, plazas, businesses and other civic spaces.

Urban areas with trees appear to have potentially stronger and more stable communities. As with safety value (reduced crime) above, this phenomenon is again linked to increased *use* of community spaces when trees are present and the resultant increased interaction between community members. This relationship is now well established (see Kuo *et al*., 1998b; Kuo, 2003). Schroeder and Ruffolo (1996) (data also analysed in Schroeder *et al*., 2006) highlighted that residents in a Chicago suburb included increased 'sense of community' among the most important benefits of street trees, echoing an earlier finding by Sommer and Sommer (1989). Residential areas with trees have also been correlated to higher property occupancy rates and reduced household 'turnover', suggesting a more stable community (Miller, 2007).

The wider literature on the social and cultural values of trees identifies their historical value – that is, their capacity to connect human generations. Mynors (2002: 4–5) notes:

the very fact of a tree's longevity, its normal life greatly exceeding that of a human being, means that it is a direct and tangible contact with both past and future. ... very many trees are older than any people now living, or even their parents; and their age provides a link to past ages that is itself of value.

This category of value is not contingent upon social interaction, but is clearly relational in other respects.

One category of value at the interface of economic and social life is the added value that street trees can bring for businesses, especially those able to utilise tree spaces such as cafes and restaurants (Wolf, 2004, 2005a, 2005b). It appears, for example, that customers travel further to, and

pay higher prices for goods in (i.e. *behave differently in* relation to) shops in areas with trees. This is likely also to be the case for small green space areas. Venkatesh (2006) describes the central place of urban parks in the informal economy of poor communities.

Hitchmough and Bonugli (1997), Bonnes *et al*. (2004), Martin *et al*. (2004) and Zhang *et al*. (2007) all suggest the values associated with street trees vary with socio-economic 'status'. Individual knowledge (Kalmbach and Kielbaso, 1979; Bonnes *et al*., 2004), gender (Hitchmough and Bonugli, 1997) and ethnicity/cultural background (Fraser and Kenney, 2000) have all been discussed as further potential influences. However, Flannigan (2005) found that demographic factors had little effect upon attitudes towards street trees among residents in South West England.

Street tree projects and the generation of social action

The literature described above illustrates and explains the breadth of social values associated with street trees, including the generation of social action. Recent initiatives and projects have sought to apply this, and have begun to generate practical evidence to support the theoretical framework. A report for BBC News (Barford, 2010), covering the Big Tree Plant campaign, highlights how the UK government claims that getting involved in planting trees can make communities happier. The report cites the Trees for Cities Chief Executive stating that community involvement in choosing tree species and planting the trees can have a big impact in deprived areas where urban 'wastelands' can be transformed into accessible community places. This programme builds on the Coalition government's 'Big Society' agenda aimed at helping communities to come together and take responsibility for improving their neighbourhoods (Defra, 2010).

Green Streets projects in the Red Rose Forest, Greater Manchester, and Mersey Forest aim to improve the environmental quality of deprived areas and the quality of life for urban residents. Both the Red Rose Forest and Mersey Forest encompass a growing network of woodlands and green spaces. Local people are given the opportunity to become involved in the design and development of greening schemes, such as tree planting, which further encourages community interaction and a sense of ownership of the schemes. TreeBristol is a local authority body overseeing the city's trees (McEwan, 2010). A centralised mapping and database system highlights potential locations for tree planting that are most cost-effective. Community engagement facilitates people choosing tree species and becoming involved in planting (although the practical difficulties of planting trees in concreted highways can limit the direct involvement of community members in planting), all of which can contribute to long-term commitment to maintenance and care of the trees. In addition, projects such as 'celebration trees' are promoted where family and friends can fund the planting of a tree in memory of a loved one (McEwan, 2010). This project benefitted from having dedicated staff for community engagement, and from partnership working which facilitated application for funding unavailable to individual organisations (Horsey, 2011, pers. comm.).

Newlands, a Forestry Commission-led land regeneration programme, comprises eight developments across the North West. Community involvement is once again an integral part of the programme with partner organisations (e.g. Groundwork) leading engagement activities (including planting sessions with schools) to foster a sense of ownership and pride in the new green areas. At the Brickfields site, the Forestry Commission and Mersey Forest are working together to integrate regeneration of the site with wider activities involving the greening of local streets and linking green spaces and community woodlands.

As the Greenspace Scotland website notes, green spaces 'encourage communities to mix, supporting people in meeting others, making new connections and developing commitment to their locality and identities'. Communities working together to create 'attractive, well-integrated greenspaces' can contribute to the development of stronger and inclusive communities (http://www.greenspacescotland.org.uk/default.asp?page=492). The Central Scotland Green Network also emphasises the role of green networks in the creation of stronger communities while the Glasgow and Clyde Valley Green Network (GCVGN) incorporates a number of regional 'greenspace teams' working with local communities to regenerate neighbourhood open spaces.

All the examples above involve some element of environmental 'education', but individuals and communities can also be encouraged to engage with the outdoor environment and contribute to scientific understanding of the natural world. Indeed, one promising area for engagement with street trees is citizen science, or the gathering of scientific data by volunteers usually towards a collective end that has more impact than would individual efforts. If we consider citizen science as a form of social action we can see that street trees, or trees in residential areas, have the potential to catalyse such action.

Citizen science projects linked to street trees certainly contribute to the 'bigger picture'. London's Natural History

Museum (NHM) is currently running an 'urban trees survey' which relies on members of the public sending in reports of street trees. It encourages such records with the plea: 'Take part in our survey so we can build a picture of what trees are growing where and find out how the tree population is changing. ...We need you to take part because you have access to the neighbourhoods and gardens we're interested in'. There is some evidence that the existence of the survey leads some participants to see green spaces as linked in to the street trees. For example, although the survey explicitly excludes woodlands, one question posted on the bulletin board asks: 'I would like to include the trees in a nearby cemetery in the NHM survey. There are hundreds and I want to do this only if it is useful. I also want to know if anyone else is including them.' (http://www.nhm.ac.uk/natureplus/thread/2118?tstart=0).

Discussion and conclusions

Green networks have risen up the planning agenda speedily, encompassing nearly every natural and semi-natural feature of the urban landscape on their way. However, during this rise the relative contributions of the distinct components of green networks have been rather swept aside. Street trees, for example, appear not generally to be perceived as a major element, and feature only weakly in British planning policies which largely fail to adequately acknowledge their values.

Given that community engagement is likely to be essential for the effective expansion and improvement of green networks, it is essential to try to understand how communities engage with them. Some initiatives, such as the GCVGN, are attempting to achieve this; however, there is virtually no relevant evidence nor much experience, and so our understanding remains very unclear. It might be that some lessons might be drawn from other established networks, such as long-distance footpaths or cycle routes. Anecdotally, our own experiences may lead us to conclude that people do engage with these networks by, for example, repeated use of sections of them in an attempt to complete the whole. There are, however, no prominent attempts to discover how green networks might learn from this experience, and no clear evidence that there is anything to learn! Currently, perhaps the best assumption is that green networks will be engaged with primarily at the level of (through) their individual components. How can this engagement become engagement with the network?

Our paper has brought together considerable evidence to illustrate how street trees, and green spaces, can generate social action, which, although perhaps *ad hoc*, can in turn lead to stronger communities. This might transform into social action around a wider network in a number of ways. First, it may be that local-scale interest groups and 'societies' are intrinsically more likely to evolve from within stronger communities. These groups could, of course, be very varied in their focus, but environmental and wildlife groups are particularly common and such groups may well develop an interest beyond their 'own' street trees towards the wider environmental context and network, and the issues they face. There is a literature on the development and role of 'friends' groups, especially relating to public resources such as parks and libraries, from which lessons could be learned here. Second, social interaction in urban spaces with trees, especially newly planted spaces, is likely to feature conversation about and attention on the trees themselves. This might engender an increased recognition not only of the values and benefits of trees but also more general environmental awareness. Trees can bring greater awareness of seasonal change to an urban street with few other natural signs.

It is likely that social action around street trees can also be transformed into wider social action by external inputs. For example, street trees require regular maintenance and with some community engagement this could be transformed into opportunities to foster environmental knowledge and to communicate about the wider network of which the specific trees are a part. As noted above, another strong opportunity to achieve this transformation is through citizen science. Cooper *et al.* (2007) draw attention to this potential in what they call residential ecosystems (i.e. urban and suburban areas). They propose citizen science as a way to recruit and motivate citizens, and achieve conservation decisions at a cumulative and effective scale. While their arguments are applied particularly to private land such as gardens, they are highly relevant for street trees. Although street trees are usually a public resource, to residents of the streets where they occur, they can feel more personal. Citizen science can draw in data (which is a recognised gap in urban forest management), strengthen connections and engagement, and potentially help citizens to see 'their' street trees as part of a larger whole. Although this should only be treated as a hypothesis at this stage, there is some evidence to support it.

Street trees can open up many opportunities for environmental volunteering, which can have many social benefits, including increasing physical and mental wellbeing and providing opportunities for social interaction (O'Brien *et al.*, 2008, Bell *et al.*, 2010). These activities could easily build awareness of green networks from smaller engagement around street trees as Lawrence and Turnhout (2010) identify wanting to contribute to the bigger picture, or

understanding the whole, as one of two main strands of motivation for such volunteering common across many groups and cultures.

We are not seeking to claim that street trees are *per se* better at 'pulling people in' to green networks than other components such as parks or rivers. However, they can clearly have particular social values, can often be in close proximity to people's homes so perhaps in their more immediate thoughts, and their potential is vastly underestimated. They may be of chief importance in some areas, such as those which are green space poor and crowded (i.e. where there is little available space *per se* for green network improvement or expansion). In such circumstances, a small number of trees on a packed urban street, perhaps as part of a 'traffic-calming' redesign scheme, could not only deliver some environmental and safety benefits but also have a potentially transformative impact on the street's community: creating 'space' within it for engagement with green networks. This may especially be the case where some street trees already exist. These could (should!) be celebrated, measured, mapped, maintained and talked about by their local community members.

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