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To cite this article: Gemma Jerome (2017) Defining community-scale green infrastructure, Landscape Research, 42:2, 223-229, DOI: [10.1080/01426397.2016.1229463](https://doi.org/10.1080/01426397.2016.1229463)

To link to this article: <http://dx.doi.org/10.1080/01426397.2016.1229463>



Published online: 24 Oct 2016.



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# Defining community-scale green infrastructure

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## ABSTRACT

Over the last 15 years, we have seen green infrastructure planning develop and refine its focus. The observable shift is from a focus on *what*, to *why* and more recently, *how* we deliver green infrastructure. In the urban context, there is often an emphasis on the capacity of *strategic* level projects to deliver the plurality of functions and benefits we have come to expect from our towns and cities. However, PhD research conducted at the University of Liverpool brings into focus the potential for small scale green infrastructure sites to respond to green infrastructure needs. As such a new concept of *community-scale* green infrastructure is introduced to describe activity at the local level. With reference to examples from research in The Mersey Forest Community Forest area of the north-west of England, community-scale green infrastructure is understood as a network of groups and projects who aim to deliver locally relevant functions and benefits to respond effectively to changing social and environmental needs.

## KEYWORDS

Green infrastructure;  
community engagement;  
social capital; civic  
engagement; urban  
environmental stewardship

## Introduction

Broadly speaking, current academic thinking allows analysis of small scale voluntary activity within green infrastructure through two main lenses. Firstly, small scale green infrastructure sites may be analysed in terms of social outcomes. For example, the dynamics between people and place, and the recent popularity of community gardens as a site of social capacity building (Firth, Maye, & Pearson, 2011; Johnson, 2012; Zoellner, Zanko, Price, Bonner, & Hill, 2012). These studies primarily measure outcomes utilising qualitative social indicators such as personal well-being, confidence and self-esteem; and collective pride and cohesion at the local level. This approach is typified by Firth et al.'s study which found that access to a community garden encouraged 'a greater sense of pride and motivation to make aesthetic changes' to small scale sites of green infrastructure (2011, p. 557). Secondly, relating to the physical and ecological attributes of green infrastructure, small scale voluntary activity may be analysed in terms of the contribution it makes to ecological networks, and specifically how it improves instances of 'interconnectivity' between sites of green infrastructure (Benedict & McMahon, 2006) and 'continuity' across 'hubs' (larger areas) and 'sites' (smaller areas) (Ahern, 2007, p. 241). As such, small scale green infrastructure becomes a significant mechanism for delivering multi-functional benefits attributed to green infrastructure more generally, and supports Natural England's understanding of a 'multi-scale' approach to delivery (2009, p. 9). This paper is principally concerned with the first focus and presents new insights into the role of small scale green infrastructure plays in contributing social outcomes.

## Defining community-scale green infrastructure

In order to define the specifics of community-scale green infrastructure, it is first necessary to establish the parameters by which green infrastructure in general is understood. It may be reasoned that, over the past 15 years, the advocacy argument for delivering multi-functional green and blue spaces through the framework of green infrastructure planning has largely been won (Benedict & McMahon, 2006; Mazza et al., 2011; National Research Council, 2004). Attention has consequently turned to the effectiveness of existing and emergent mechanisms which successfully deliver *function/s* in response to an area of identified green infrastructure *need*, with the aim of delivering *benefit/s* to human or non-human actors (The Mersey Forest, 2014, p. 8). In the context of implementation, particularly at the European level of green infrastructure guidance, *function* and *service* are used interchangeably. Examples of function within the environmental service vernacular include carbon storage and sequestration, water purification, air quality, and production of food, fibre and fuel (EC European Commission, 2012). In simple terms, *function* refers to the question of 'how' in green infrastructure.

In contrast, *benefit* refers to the question of 'what' and 'why'; and details the quality and quantity of value transferred to a range of beneficiaries, for example 'increased yield attributable to soil quality', 'perception of the attractiveness of an area for workers/investors', or 'number of visitors per year' (EC European Commission, 2012; The Mersey Forest, 2012, 2014). Green infrastructure *need* relates to both function and benefit, such as density of tree cover in a neighbourhood in need of urban cooling due to high seasonal temperatures; and describes the 'quality, distance and quantity' of a site of green infrastructure (CABE Space, 2009). In addition, *need* may also refer to addressing the exclusion of a certain social group/s to these benefits, and therefore highlights the role green infrastructure provision can play in enhancing quality of life through sustainable land management approaches (The Mersey Forest, 2013, p. 29). As a consequence, when analysing the contribution of green infrastructure elements within a specific geo-spatial context, it is possible to measure *function*, *benefit* or *need* or a combination of all three.

Beyond the variables of *function*, *benefit* and *need*, green infrastructure can be defined by its *scale*. The Landscape Institute (2013) emphasises the importance of the landscape scale when considering how to integrate green infrastructure within urban developments. Similarly, Natural England and Land Use Consultants (2009) iterate the role of green infrastructure in creating a framework for delivering large-scale environmental improvements across urban and rural contexts, highlighting the role of 'ecological networks' and 'green corridors' which intersect local authority boundaries necessitating joined up approaches to management (2009, p. 8). Within the same guidance document, Natural England references green infrastructure as a 'strategic, multi-scale' approach to 'land conservation and land use planning' (2009, p. 9). Furthermore, the strategic role of green infrastructure in creating both a conceptual and practical framework for sustainable land management is evidenced in the emergent number of green infrastructure frameworks for both urban and rural areas (e.g. Liverpool City Region and Warrington, 2013 and 2014; North East Wales, Cheshire and Wirral, 2010; Greater Manchester, 2008; South East, 2009). As such, it would be feasible to interpret coalescence of different stakeholder groups around a shared understanding that for maximal function/s and benefit/s, the preferred scale of green infrastructure delivery and enhancement is the landscape scale or the *strategic scale*. Working at such a *strategic scale* has recently been typified by large-scale projects with a landscape scale or technology focus, exemplified by projects such as 'Wirral Waters' (Peel Land & Holdings, 2015) in Merseyside which utilises green infrastructure as the context for attracting investment to redevelop an assemblage of brownfield sites. This type of green infrastructure delivery may be thought of as exemplifying the 'business case for green infrastructure' (Alker, 2015), reflecting the potential to converge green infrastructure development with significant capital investment. However, the last five years have also seen a rise in academic literature on the multi-functionality and associated benefits within small scale projects, such as community gardens (Firth et al., 2011; Johnson, 2012; Zoellner et al., 2012).

One key function that is often highlighted in the context of small scale projects is the capacity they hold to satisfy the planning system's statutory requirements for community participation and

engagement by providing opportunities for co-production (Bovaird, 2007). Another socio-economic function of small scale projects highlighted within the academic literature is the impact of community gardens and allotments when conceptualised as a network or 'system' (Feenstra, 1997, p. 28) or an 'agrifood landscape' (Allen, FitzSimmons, Goodman, & Warner, 2003, p. 61). Thus, the small scale has the potential to complement the social and economic functions attributed to strategic scale projects, and as such this paper seeks to define the role of the *small* scale or *community-scale* in green infrastructure planning as a complementary scale of green infrastructure delivery, management and maintenance.

## Exploring the community-scale in green infrastructure planning

### *Aim*

Building on a previous study by Jerome (2012) that indicates there are different categories of groups who are engaged in the voluntary activity of the creation, management and maintenance of small scale green spaces at the local level, the aim of this study is to define in more detail the characteristics of community-scale green infrastructure activity. To this end, the following two main research questions will be addressed in this paper:

- What role do voluntary groups play in creating, managing and maintaining green space at the local level?
- What types of voluntary group are involved in creating, managing and maintaining green space at the local level?

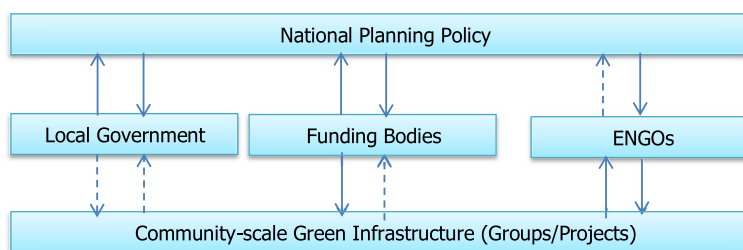
### *Theoretical background*

It is significant to bring focus to the capacity of the *community-scale* to deliver *strategic* value and respond to need as for many years investment in green infrastructure has been defined by the contribution of public sector agencies including: local authorities, The Environment Agency, British Waterways, The Forestry Commission and Natural England (Leeds City Region Green Infrastructure Strategy, 2010). Furthermore, by contributing a richer understanding of activity at the community-scale, we can extend the current academic literature which has tended towards a narrower picture of activity at the local level: one further minimised because of an assumption towards homogeneity of practice, with a predominant focus on community gardens and food-growing initiatives (Firth et al., 2011; Johnson, 2012; Wakefield, Yeudall, Taron, Reynolds, & Skinner, 2007; Yotti Kingsley & Townsend, 2006; Zoellner et al., 2012).

## Methods

### *Case description and sampling*

This paper draws on Ph.D research conducted at the University of Liverpool (2011–2015) to contribute to understanding of green infrastructure activity at the community-scale. The broader thesis is concerned with understanding the key factors and forces at play in the longevity and resilience of community-scale green infrastructure activity. This paper is reporting on one aspect of the research study, which is defining community-scale green infrastructure, both in terms of its activity focus and observable approaches to governance (Figure 1). For this aspect, an initial desk-based search of green infrastructure activity was conducted, recording both current and historical groups and projects. This involved drawing on data available from formal sources including project websites and funder websites such as the Big Lottery 'Local Food' archives, plus various online social networks, including 'Project Dirt' and Facebook. The sample area for data collection was the geographical boundary of The Mersey Forest, an official partner of the research study. The Mersey Forest covers a 500 square mile area in the north-west of England. It spans urban, urban fringe and rural land use (The Mersey Forest, 2014); hence, it was possible



**Figure 1.** Conceptual framework diagram showing the multi-directional engagement in community-scale green infrastructure activity, and highlighting the gaps in understanding between community-scale green infrastructure (groups and projects) and those responsible for facilitating activity through funding (funding bodies) and access to land (local government).

to explore activity being led by individuals and community groups working in a variety of settings such as street-scale plots, local parks and woodlands. Groups and projects who currently or historically had taken an active role in designing, delivering, managing and maintaining green infrastructure were recorded. It was necessary to limit the sample size however; therefore groups which had discontinued their activities by 2008, the launch date of the Big Lottery 'Local Food' project, were not recorded. The rationale for this decision reflects the theoretical background to the project, which shows that a large number of groups were established as a consequence of this new and significant source of funding for green infrastructure projects at the local level.

## Results and discussion

The desk-search returned a population of 300 groups and projects, which were active beyond 2008, or were still currently active in The Mersey Forest area. By organising the groups and projects thematically, it was possible to create a typology of four distinct types: *formal group (active)*, *formal group (inactive)*, *informal group* and *project*. Across the four types it was possible to identify a range of common *benefits*, including conservation and education, health and well-being, food growing, social cohesion, and regeneration. These benefits were observable in varying degrees across the types; and there was often a noticeable correlation between activity focus and benefit/s. This finding builds on Firth et al.'s (2011) typology of small scale green infrastructure which prioritises discussion of variations across groups and projects primarily by *activity*. In contrast, the typology presented here broadens the thematic variation to include categories of *constitutional difference* and *organisational understanding*. The typology therefore describes groups and projects according to activity focus and associated benefits: plus adopted approaches to governance as a key characteristic affecting experiences and outcomes of voluntary groups at the local level.

The theme of governance was primarily utilised to create the four distinct types of community-scale green infrastructure. Firstly, *Groups* distinguish green infrastructure activities which are wholly managed by community volunteers. There are two main types of group: *Formal groups* describe groups who have a formal constitution, such as Friends groups; and *Informal groups* comprise groups who manage and maintain sites of green infrastructure without formal governance structures and systems in place. Secondly, the typology records *Projects* which define green infrastructure activity which is supported by volunteer involvement, but is ultimately managed by employees within an organisation whose aims and objectives are not directly related to green infrastructure. An example of a *project* is a community garden facility developed by a public health organisation to promote well-being benefits associated with access to green space.

By defining voluntary green infrastructure activity at the local level within The Mersey Forest area this study contributes to the research literature by extending a picture of diversity at the community-scale. The typology created shows that many different green infrastructure *functions* and *benefits* are being

delivered in response to perceived *need* at the local level. Further, community-scale green infrastructure activity shows a picture of community engagement which is multi-directional: encompassing engagement with a piece of land (over a sustained period of time); engagement with other members of a (place-based/interest-based) community; and engagement between an organisation and its participants. In this context, engagement is understood in terms of *active* engagement, not *passive*, drawing on the work of planning theorists Healey (1992) and Campbell and Marshall (2000), and in particular Arnstein's conceptual framework of active 'participation' (1969). As such, further analysis of community-scale green infrastructure activity, in particular the role of group governance, may also contribute to discussions of citizenship, social responsibility and 'delegated power' (Arnstein, 1969).

Another area of planning theory where community-scale green infrastructure may contribute understanding is the literature which focuses on discussions of place. In the context of this study, 'place' may refer to 'a sense of place' (Carter, Dyer, & Sharma, 2007); 'place attachment' (Green & White, 2007); or a feeling of *connection, belonging, or ownership* for/with a physical space outside of home and work (Oldenburg, 2000). As such, *community-scale* can also describe a green infrastructure group or project which has formed around a community with shared or common interests, where a site is created or adopted in response to a green infrastructure need relating to a specific cultural, ethnic, religious or 'other' person-centred need. In this sense, motivational factors (Measham & Barnett, 2008; Seaman, Jones, & Ellaway, 2010) may be *environmental*—to improve the functionality of their own local area; or *social*—in response to physical or mental health needs, social exclusion or isolation, or other social needs.

By observing activity within The Mersey Forest, it was possible to create an understanding of small scale green infrastructure which draws on both these perspectives, highlighting the dual function of social dynamics and place-based factors. One way in which 'connectivity' (Benedict & McMahon, 2006) and 'continuity' (Ahern, 2007, p. 241) across sites of activity were observed was through the creation of 'informal networks' (Littlewood & Thomas, 2010) between individual groups and projects. These networks, which are both spatial and social in character, facilitate opportunities for informal knowledge sharing and resource distribution. As such, *community-scale* green infrastructure describes activity which is both socio-economic and physical (spatial) in its focus and it is precisely the opportunities created for 'larger than site' influence through informal networks of activity which provides the underpinning for the creation of an evolving definition of community-scale green infrastructure activity.

For example, the Friends of Everton Park group in North Liverpool averted a significant impact on their capacity after an arson incident in 2014 by being able to draw on an informal network of green infrastructure-focused community groups in Liverpool to organise a donation of plants and tools. This may be understood conceptually as an example of *bonding* social capital (Firth et al., 2011; Putnam, 2000), describing peer-to-peer partnership across place-based or common-interest networks, or 'collective action' (Bovaird, 2007) which in this case proved to be a key influence on their green infrastructure objectives and retention of volunteers. In another example, The Friends of Furey Wood in Cheshire had a track record of 10 years providing volunteering opportunities. However, after the departure of two key volunteers, their activities discontinued. There were two other volunteer-led woodland groups within 2 km of the Furey Wood site, and although the three groups shared common interests including approaches to working and support from the same local authority Countryside Ranger, for the Friends of Furey Wood the role of informal networks on capacity to adapt to change proved less influential than the role of individuals within the group.

The experience of these two groups helps to advance a theoretical understanding of community-scale green infrastructure activity within a local and place-based or relationship-centred context. Moreover, although there is extensive literature highlighting the importance and challenges associated with community engagement in planning for the built environment in both academic (Arnstein, 1969; Campbell & Marshall, 2000; Healey, 1992) and practitioner (CABE Space, 2009) literature, less attention is shown to the role of community management and maintenance of green infrastructure, with research focusing on participation (Mayer et al., 2012), volunteer motivation (Measham & Barnett, 2008; Seaman et al., 2010) and 'use and enjoyment of the outdoors' (Natural England, 2015). Therefore, by exploring



the ways in which individuals and communities organise themselves and create opportunities for the co-production (Bovaird, 2007) of green infrastructure function/s and benefit/s at the community-scale, we can strengthen the conceptual argument that small scale green infrastructure sites provide opportunities for *active* engagement in creation or enhancement of the local environment.

## Conclusion

Community-scale green infrastructure describes a complementary scale of green infrastructure planning and delivery: an 'informal network' of *micro* activity to supplement the strategic level interventions which characterise activity at the landscape scale. Community-scale green infrastructure activity is delivered through the efforts of voluntary groups and volunteers. Its green infrastructure *function/s* and *benefit/s* relate to particular communities of place or interest, and can therefore be understood as responding equally to geographic *need* and social *need*. The research being conducted in The Mersey Forest area of North West England indicates a plurality of actors and activities delivering green infrastructure at the local level; challenging the picture of homogeneity in the recent academic literature evaluating the social impact of community gardening and food-growing initiatives (Firth et al., 2011).

The overall picture of the community-scale is thus one of vibrancy and creativity, characterised by groups and projects of various size, membership, and activity focus. In addition, groups and projects are shown to differ in their governance structures, ranging from legally constituted groups to ad hoc informal groups. Through the utilisation of 'informal networks' and social capital, groups and projects develop a more responsive strategy to adapt outputs and outcomes, multi-functionality and associated green infrastructure benefits, to changing local needs, both social and environmental. A more detailed analysis of the factors and forces affecting resilience at a group or project level would be beneficial to substantiate this argument and establish whether the *community-scale* at which these voluntary enterprises are engaged in green infrastructure planning may in fact be the source of their strength.

## Disclosure statement

No potential conflict of interest was reported by the author.

## Funding

This work was supported by Economic and Social Research Council.

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