

Discussion paper: How can Landscape Ecology help inform planning, design, decision making and the implementation of Green Infrastructure?
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Applying principles of Landscape Ecology to Green Infrastructure planning.

Planning New Landscapes

Since human settlement began decisions to build and develop have to greater or lesser extent been influenced by the availability and accessibility of natural resources in cities, towns and rural communities. Current planning policies require an Environmental Impact Assessment (EIA) on developments that meet certain criteria of risk. However, actual long term and accumulative impacts of development on indigenous flora, fauna at local and landscape scale and on ecological processes are rarely monitored and understood. This year, at the Iale World Conference, several papers were using spatial tools and scientific principles associated with Landscape Ecology and were asking how urban developments influenced local wildlife and ecological processes. These included the emergence of 'Road ecology' (Forman, 2007), beetle assemblages across urban-rural gradients (Niemelä, 2007) and response of birds to increased urbanisation (Hepinstall *et al.* 2007). Currently planning professionals are increasingly required to estimate the social, economic and environmental impact of development on flooding, climate change and carbon consumption and it is probably the most opportune time to promote landscape ecology as a discipline that can take the spatial and temporal perspective on land use, biodiversity and the strategic planning of ecosystem services.

The Urban Growth Agenda

A term 'smart growth' appeared within the US planning arena in the 1980s and in the late 1990s as pressure was applied against urban sprawl into adjoining countryside from towns and cities (Haeuber, 1999; Southerland 2004). Smart growth initiatives were favoured, building on brownfield sites and undeveloped land within urban landscapes (Greenberg *et al.* 2001). Urban design professionals are increasingly applying high density design principles that encourage compacted development; thus reducing 'land-take' and allowing more space for nature outside the 'public (urban) realm' (e.g. new urban renaissance; urbanism movement (e.g. Carmona, 1997, 2001; 2003, DETR 2000; Alexander, 2004;)).

Currently there is a growing movement of urban designers and planners who are now advocating a 'people centred' and more 'sustainable' urban design for future developments (The Prince's Foundation, 2007). Some urban designers, architects and landscape professionals are extremely supportive about implementing technologically 'green' solutions to environmental problems such as carbon emissions (offsetting), energy efficiency, water resource management and waste minimisation. House builders are increasingly being asked to meet tighter environmental regulations and more architects are developing 'green-build' techniques. Alongside this impetus to improve techniques and sustainability in the construction of homes, urban planning and design, there is also a requirement on these professionals and practitioners to develop an awareness of 'ecological' issues. However, this is conceptually challenging as it is more difficult to consider making room for bio-diverse and ecologically (socially and economically) functioning green-space within 'new' urban environments

under the current urban growth agenda. However, at the other end of the spectrum there is a growing global network of eco-villages and ecotowns (see <http://gen.ecovillage.org>) with many new developments that include space for permaculture, community farms, and orchards, collection of rainwater and control of surface drainage, aquatic ecosystems and various forms of semi-natural habitat.

Green Infrastructure and Landscape Ecology

Terms such as 'Green Corridors', 'Ecological-networks', 'Green Wedges', 'Greenways' and within urban environments have been widely used in the research literature; for example recently in the UK: (Turner, 2004, Mason 2006), in Europe: Mörthberg and Wallentinus (2000), Jongman *et al.* (2004), US: Lindsey (1999), Fábos (2004), Canada: Rudd *et al.* (2002) Balram and Dragičević (2005) and South Africa: Mugavin (2004). The term Green Infrastructure has appeared to have gained acceptance more recently (Weber *et al.*, 2006) and has been included in government consultation and planning documents in the UK, for example:

- Creating Sustainable Communities: Greening the Gateway: A Greenspace Strategy for the Thames Gateway, 2004,
- Green Infrastructure in the Milton Keynes and South Midlands Sub-Regional Strategy, 2004,
- North Northampton Green Infrastructure Strategy, 2005.

Some principles of Landscape Ecology are filtering into the international planning and urban design sector. Three recent publications from the USA (Girling and Kellett 2005; Benedict and McMahon, 2006) and Australia (Low *et al.* 2005) illustrate how planners, landscape architects and urban designers are willing to take on new ideas to meet the 'green ecological' agenda: driven by a politics, consensus and consumer ethics. These authors have been strongly influenced by prominent landscape ecologists, Forman (1995), and Dramstad *et al.* (1996). The section below is a flavour of how Low *et al.* (2005) bravely communicates some Landscape Ecology concepts for a wider audience:

"Some animals are specialists and others are generalists in terms of habitat: some species require very specific types of habitat while others, generalist species, benefit most from having a variety of habitats and connections between habitats. Specialist species are more susceptible to disturbance at the local scale; generalist species are more susceptible to changes at the landscape scale" (pp.87).

Ecological principles and enhancement of biodiversity are being promoted by planners and landscape architects (e.g. Williamson, 2003 and TCPA 2004). Benedict and McMahon (2006) justify GI and suggest to how it can be applied:

"We define (GI) as an interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustains clean air and water and provides a wide array of benefits to people and wildlife"(pp. 1).

They argue that green space is often interpreted as passive undeveloped areas within a built environment, yet green infrastructure suggests many connected areas that require protection and management. In many areas the availability of detailed environmental and ecological data is patchy but in the UK data

management is improving; particularly with the development of national and local Biodiversity Action Plans and Biological Record Centres.

Benedict and McMahon (2006) used principles of Landscape Ecology as a means to explain how Green Infrastructure may look and function.

"Green Infrastructure uses planning, design and implementation approaches similar to those used for roads, water management systems and other community support facilities.....at multiple scales...across political boundaries" (pp.2).

They have ecological focus and suggest that:

"Together, the fields of Landscape Ecology and Conservation Biology provide Green Infrastructure with the scientific knowledge and tools to plan for viable plant and animal populations over the long term"

The potential role of Landscape Ecology in the UK, for developing integrated planning at large-scaled landscapes was clearly set in Hawkins and Selman (2002). Selman (2006) also provided a useful insight into the complex nature of the planning profession and requirements to comply with changing and fragmenting planning policy guidance and statements from the UK Government, the European Union and international agreements.

There are many practical applications currently using large scaled planning tools to perform land resource evaluation and habitat mapping which are regularly using Geographical Information Systems (Weber and Wolf, 2000). These systems are also being used as tools to strategically identifying existing green infrastructure: for example in Beijing in preparation for the 2008 Olympics (Li, *et al.* 2005) and a Regional Park initiative in, Northamptonshire, UK, which is focussed around landscape characterisation and Green Infrastructure (RNRP 2006). The current growth agenda may hopefully require the identification and targeting of land for new green infrastructures. Along with finding political and economic mechanisms for land acquisition within and around growing urban environments, sound ecological decisions will need to be made at a landscape scale. There will also be a need to protect, enhance and manage existing and new green spaces. Managing green infrastructures will also be problematic and may also require planning mechanisms to set up sustainable economically viable environmental micro businesses and habitat management companies.

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