Green Infrastructure Planning Guide Project

Final Report

May 2006

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1. Introduction

Green Infrastructure (GI) is what might be termed a developing concept. It might also be defined a contested concept i.e. it means different things to different people. It is for this reason that any project to move forward on GI planning needs to ensure that the key interest and stakeholder groups are effectively engaged with the project and that their differing priorities and appreciations of GI as a concept and as environments on the ground are accounted for.

This project was primarily exploratory to try to understand the concept and contribute to discussion with regard to methodologies by which the practice of GI planning can be developed. The project was undertaken by an interdisciplinary team led by Clive Davies and Chris McGloin at the North East Community Forests (NECF), and including Rob MacFarlane from the Centre for Environmental & Spatial Analysis at the University of Northumbria, and Maggie Roe from the Landscape Research Group at Newcastle University. The project relied heavily on guidance and discussion between stakeholders during its inception, development and investigation. This report then represents a body of work which should be regarded as contributing to 'work in process' rather than a finished product. We are indebted all those who took part in this process.

2. The Project Brief

2.1 Background

Discussion with the Countryside Agency concerning a possible project developed from attention drawn to collaborative work carried out by the same team in relation to strategic thinking in relation to community forestry in the North East. GI thinking was at the heard of forward thinking in relation to this third generation of community forest plans and their linkage with other policy areas. Based on the history of collaboration in this field, the three parties were also awarded a research studentship from the Economic and Social Research Council (ESRC) to examine the application of GI principles to community forest planning and management.

A Steering Group for the project was established led by the Countryside Agency. Other members were: English Nature, The Woodland Trust, The Forestry Commission, the Rural Development Service, ONE North East, the Wildlife Trusts and the Groundwork Trust. The final brief was developed and a final format agreed in conjunction with this Group.

At a general level four broad sets of interests in GI were initially identified which helped the development of the brief:

i. *Nature conservation* – the literature on wildlife corridors, ecological networks and the wider discipline of landscape ecology emphasises the value of connectivity at a variety of scales from the continental to the local;

ii. *Recreation* – greenways have been promoted as routes, dominantly for non-car transport, that emphasise the quality of the route as well as more basic issues of welfare and safety. This has become increasingly engaged with interests around public health and quality of life;

iii. *Landscape* – although this is intimately related to (a) and (b), landscape architects and designers have long been involved in the identification, establishment and development of green spaces and corridors in urban areas. This was separated out here as the rationale employed is often different, taking a dominantly aesthetic and experiential, rather than purely functional, view on such resources;

iv. *Regional development and promotion* – Regional Development Agencies have an interest in the environmental quality of regions. This is driven by a range of primary interests, primarily its relationship with quality of life and enhancement of the external image of the region. GI is a critical element of environmental quality.

It was seen as is crucial to link these interests to the Countryside Agency's *Countryside Around Towns* programme which focuses on multi-functionality and identifies a wider set of potential functions for development and enhancement in the urban fringe and areas of land that link urban and rural areas (including green corridors and 'wedges'). These include:

- Town and Country linkages
- Public health interests
- Educational opportunities
- Recycling possibilities
- Sustainable energy resource development
- Sustainable agriculture & forestry
- Social and economic regeneration
- Housing & transportation
- Nature conservation
- Heritage conservation & promotion

It was agreed that achieving perfect consensus across the different interest groups that represent these land uses and users would be extremely difficult. Identifying common ground to move forward on was seen as less difficult, but these debates were to be opened up with:

(i) A clear rationale – why it is happening;

(ii) A defined outcome – a set of principles and tools for GI planning;

(iii) A clear timescale – an end point, not to stifle a longer-term debate, but to focus minds and energy to take the first steps.

2.2 Implementation & GIS issues

It was recognised in the brief that a GIS is a set of tools that can translate principles, priorities, rules and assumptions into spatial plans. GIS operates in a highly mechanistic way and models which combine and analyse datasets must be effectively informed by subject experts and wider interest groups. It was agreed that the issues that needed to be addressed in the GI Model phase included:

a) *Principles* – principles needed to be clearly established. It was important to acknowledge the need and ability to differentiate between different needs within GI as a whole.

b) *Data* – the project was likely to be a very data-hungry exercise and the amount of effort involved in identifying, accessing, formatting and integrating required datasets should not be underestimated.

c) *Rules* – rules are derived from the principles and they set out how the priorities and issues around spatial layout were to be implemented. It was envisaged a move away from the grid cell based approach to a vector approach where individual parcels of land are separately identified within the GI modelling process. This would move the approach from strategic overview to site-specific analysis and assessment.

d) *Outputs* – it was envisaged that the primary output would be a series of GIS data layers, which could be combined in a model to assess areas and sites with regard to the principles and guidelines for GI development. Development of this was regarded as an iterative process, so that feedback could help refine the final outputs.

2.3 Actual brief/project proposal/objectives

The three main aims of the project were:

i. Define the functions of GI, with reference to a wide range of stakeholder groups;
ii. Define the components, parameters and indicators to be used in a model for GI planning;
iii. Define and assess the usefulness of the City Regions for the purposes of GI planning.

The short term objectives of the project were:

i. Facilitate a debate about the nature and potential of GI for promoting a multi-purpose urban fringe;
ii. Develop a GIS-based tool to support informed decisions in urban-fringe planning and management and the longer term development of GI plans.

3. Approach to Project: Principles & conceptual basis

The project was based on a number of clearly defined stages. Within each stage discussion, consultation and feedback sessions took place with the core Steering Group and with the wider group of stakeholders. The

principles were therefore to combine a consultative process using expertise and analysis based on academic rigour and experience and understanding from practice. It was understood that a strong academic basis for the project would provide important information concerning existing initiatives and understandings and provide a robust methodological approach to the exploration of GI potential. This, combined with the knowledge and experience of those in practice, would provide the best possible opportunity to move thinking forward in relation to GI given the time and financial constraints of the project.

A number of discussion papers were produced during the project in order to obtain feedback from the Steering Group and Stakeholders. Some of these papers have been edited and now form part of this report.

4. Green Infrastructure Context

4.1 Introduction

A review of the academic literature and policy documents reveals a plethora of seemingly overlapping 'green' concepts. These include:

- Nearby nature
- Sustainable cities
- Sustainable greening
- Green cities
- Green space
- Green structure
- Green lanes
- Green spokes
- Green wedges
- Green belts
- Green lungs
- Green exercise
- Green corridors
- Greenways
- Greenway skeletons
- Recreational corridors
- Parkways
- Rail trails
- Ecological corridors
- Ecological networks
- Wildlife corridors
- Landscape planning
- Linked landscapes
- Urban forests
- Community forests
- Ecological footprints
- Green infrastructure

These are variously associated with a range of benefits, which include:

- Recreation and exercise opportunities
- Landscape enhancement
- Nature conservation benefits
- Conservation of cultural heritage
- Sympathetic management of sites of geological significance
- De-fragmentation of green spaces/patches within the urban landscape
- Provision of trees in the urban landscape – aesthetic and cultural dimension
- Public health (physiological and psychological)
- Water management (e.g. flood mitigation through increased porosity of land cover)
- Amelioration of climatic extremes
- Pollution control and buffering
- Development buffers and visual screening
- Noise abatement
- Non-car transportation opportunities (with an emphasis on quality and safety)
- Education – the "outdoor classroom"
- Provision of space for public art
- Land reclamation
- Linking town and country and integrating the urban fringe into urban networks
- A recognition of the multiple values of 'un-built' land in urban and urban fringe areas
- Economic development through regional image enhancements
- Locally grown food and the provision of fresh food in areas of deprivation
- Farm diversification opportunities and the wider rural economy
- Localisation of supply chain linkages
- Overarching quality of life gains

This almost sounds too good to be true; a win-win solution at the landscape scale. In reality, of course, attaining multiple benefits is extremely problematic. In spite of the undoubted difficulties of achieving multiple benefits – environmental, economic and social – the concept of multi-functionality is now at the heart of Countryside Agency thinking, perhaps most notably in the context of the Countryside In and Around Towns (CAIT) (Gallent *et al*., 2004). This discussion paper introduces the concept of Green Infrastructure (GI) as a concept, a tool and a framework for planning a multi-functional countryside.

4.2 Green Infrastructure and Multi-functionality

4.2.1 Background

'Green' and 'Infrastructure' are two very widely understood terms and, individually, their essential meaning is subject to relatively little dispute. In conjunction however there is a danger that the term could mean all things to all people, so one of the objectives of this discussion paper is to propose a perspective on the term that underpins ongoing work by North East Community Forests (NECF) in conjunction with the Universities of Northumbria and Newcastle.

Although the term has gained increasing use in recent years, GI sits within the semantic pick-and-mix that appears above, sometimes roughly equated with other terms, at other times used in an over-arching sense and sometimes used interchangeably with other terms. Although the academic literature on greenways in particular (primarily from the United States) is now relatively well established (the seminal publications date back to the 1980s) GI itself has only emerged alongside in the last three to four years. Benedict and McMahon (2002) commit themselves to a definition:

> *Green infrastructure is an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations. Green infrastructure is the ecological framework needed for environmental, social and economic sustainability* (p.12).

We would perhaps dispute the centrality of the terms 'natural' and 'ecological' and it is, of course, relatively vague and terms such as 'associated benefits' are wide-open. However, the range of benefits that can accrue from well planned and managed GI is extremely broad and they are also specific to local conditions, histories and demands. A definition from the UK is from TEP (2005):

> *Green infrastructure: the physical environment within and between our cities, towns and villages. The network of open spaces, waterways, gardens, woodlands, green corridors, street trees and open countryside that brings many social, economic and environmental benefits to local people and communities (p.1).*

This definition is even more all-embracing, but they share an emphasis on the interconnectedness of the elements and this interconnectedness if of course both functional and physical; it is not just about spatial organisation and physical integration, but it concerns interaction as well.

In respect of spatial patterning, an appreciation of geography is critical to an informed understanding of GI: where resources are located, how demands are distributed and how priorities work out on the ground. The concept of scale is also important: at the end of the day plans become realities through transformations of form and function on specific plots, or parcels of land. These parcels may be large or small, linear features or developments may be short or long and timescales for realisation may be immediate or long term. Generally, the larger something is the more strategic it is in concept, design, decision-making, funding and operational support, but infrastructures are, by their very nature, hierarchical. You may take the A1 from London to Newcastle but it is along trunk, A, B and minor roads that you reach your destination, and it is the design and implementation of these 'branches' and 'twigs' that can ensure (or not) a smooth and pleasant journey. The history of transportation infrastructure is that most routes started out to meet local needs, merged, were integrated and complemented by strategic links over time. Fabos (1995) suggests that greenways developed in the same way, and over time a greater degree of attention has been paid to the higher levels of the network, or infrastructure.

It has been suggested that GI is 'old wine in new bottles'. A more positive view might be that GI has its roots in thinking that go back several decades. It is not the purpose of this paper to carry out a detailed genealogy of the concept, but the most significant antecedents are as follows.

4.2.2 Basic connectivity studies

Basic connectivity studies in Geography used links, segments and nodes to describe networks, a language that is still alive and well in the field of Geographical Information Systems (GIS). Concepts of

connectivity also underpin studies of infrastructure (e.g. roads, water supply networks) where things need to get from A to B (nodes) along specified routes (links).

4.2.2 The Tradition of Urban Parks

The development of urban parks really originates in the mid-nineteenth century when areas of land in or close to cities were allocated for public use. Early parks were based on the pastoral model and developed by people such as John Nash (1752-1835) and Joseph Paxton (1803-65) in the UK, and the Frederick Law Olmsted (1822-1903), who extended the idea to create a series of linked parks in his famous 'Emerald Necklace' around Boston, USA. The approach to urban park establishment can be said to be human-centred – for improving health, increasing access to wildlife, or providing scenic settings. However the development of the Amsterdam Bos Park in the 1930s had considerable influence on later 'ecological' approaches developed in the UK in the 1970s and 1980s which produced 'nature-like' landscapes focused very much on providing a green structure based on ecological principles. An important part of the ecological movement was also the understanding that children in particular benefit from access to natural surroundings in urban areas.

Parks went through a period of the doldrums in the middle of the last century, but better funding and research have brought about a renewed vigour in the development of parks and a greater understanding of their benefits. The psychological benefits have always been particularly important and with this the understanding that green space needs to be near to where people live and work. Although there has also been a move towards highly designed hard landscaped parks – such as can be seen clearly in Barcelona and Paris, generally the 'green' component of parks in the UK is still seen as of primary importance. Parks are increasingly seen as a fundamental part of the green infrastructure of urban areas and their value is reflected in the fact that they remain, even though they often occupy areas of considerable land value in city centres.

4.2.3 Urban Forestry

Urban forestry has been defined as "*the art, science, and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic and aesthetic benefits trees provide society*" (Helms, 1998). Although the term is used relatively interchangeably in Europe and the UK in particular with the term Community Forests, the terms have differing meanings in North America where CFs are dominantly recognised to be in a rural setting.
At the outset of the UK Community Forest Initiative in the 1980s the Amsterdam Bos Park was seen as a key example of what could be achieved. In common with North American experience urban forestry is seen as not just being about trees and thinking from elsewhere in Europe is raising interest in natural processes of establishment rather than tree planting *per se*. Recent shifts in community forest policy in the UK reflect this diversification.

4.2.5 Landscape Ecology,

Landscape ecology is a discipline that takes a multi-scaled view of human, biotic and abiotic influences on the development and planning of landscapes. There have been multiple definitions, but the consideration of interacting systems across multiple scales and both human and non-human systems (and values) are characteristic. Although this runs the risk of oversimplifying a multi-faceted and increasingly well-established discipline, connectivity is a key interest in landscape ecology.

4.2.6 Ecological Networks

The literature on ecological networks is extensive and Jongman *et al*, (2004) and Jongman and Fungetti (2004) provide a thorough overview of its origins and current status. Interest in ecological corridors dates back to a realization that designated conservation sites alone were no longer enough to ensure the long term conservation of key species. The relatively small size of sites and the encroachment of an ever growing range of threats such as pollution, land improvement and climatic change led early landscape ecologists to raise the scale of their thinking and consider individual components (such as Ancient Semi Natural Woodland or designated nature reserves) in their landscape setting. The terms site-in-context and landscape-ecological matrix were increasingly widely used to foster approaches that sought to tackle problems at a similar spatial scale to the factors that were causing them. The need to support

migration and dispersal processes led to the development of ecological corridor concepts which is 'today recognised as a framework of ecological components, e.g. core areas, corridors and buffer zones, which provides the physical conditions necessary for ecosystems and species populations to survive in a human-dominated landscape' (Jongman and Fungetti, 2004. p.3).

4.2.7 Greenways and Green corridors

These two concepts are treated effectively as one, as they are both focused on the provision of opportunities and routes for recreation and commuting. Groome (1990) identifies a number of characteristics of such linear routeways:

a) They can provide open space in which people can escape the 'harshness … and aggravation … of the urban environment' (p.383)
b) They have a potential role to play in urban design, fostering many attributes of more sustainable cities
c) They can enhance recreational opportunities, not only by the route itself, but also through use of the route to access other opportunities and other parts of the wider network
d) They can provide a spatial framework for balancing conservation interests with development initiatives
e) Linear routes are of particular interest to recreational users for whom active movement (e.g. walking, running, cycling or canoeing) is the objective, and disused canals and railway lines are especially important in this regard
f) Linear open spaces provide long 'edges' at which the relationship between built up and open spaces can be experienced and explored – again the idea of contrast with the built environment and everyday life is important.

Other authors have allied greenways with ecological corridors (e.g. Jongman *et al*, 2004), emphasising that the concepts of connectivity which are now central to landscape ecology were initially set down from a human perspective in the early greenway plans and papers. However, the emphasis in much of this work focuses on how to achieve nature conservation objectives between and around the spatial and other constraints imposed by human development and activities.

In respect of social inclusion, research from the US (Moore *et al*., 1992) which reports that the demographic profile of greenways users in any given area was strongly representative of the demographic profile of the area the route was passing through is important. Although this is not necessarily transferable to a NE England context, the fact that empirical evidence and standards alike support local use of local resources is a strong argument for the spatial targeting of GI investments where social as well as environmental needs are high. The link to social capital is also significant; if social capital is a measure of individuals, social groups and communities to positively effect changes that benefit them, then the evidence that environmental enhancements can improve community cohesion and strengthen sense of worth, opportunity and control of is significant.

4.2.8 Ecological footprints

'*The ecological footprint is an accounting tool for ecological resources. Categories of human consumption are translated into areas of productive land required to provide resources and assimilate waste products. The ecological footprint is a measure of how sustainable our life-styles are'* (Wackernagel, M and Rees, W., 1995).

It is a concept that has recently attracted increased attention (e.g. www.myfootprint.org and WWF Northern, 2005 and WWF, 2005), not least because it is an effective way to encourage people to visualise the environmental impacts of their lifestyles. Figure 1 is drawn from some WWF work in the North East and it illustrates that the average ecological footprint of a resident of the region is in the order of three times the 'fair share' (and therefore globally sustainable) footprint for all humans. Many of the actions that can reduce this figure relate to personal behaviour (e.g. reducing electricity and water consumption), but others interface directly with public policy areas where provision (and GI) has a key role to play. Examples of these areas are local allotments, purchasing locally grown produce, non-car transport and participation in recycling and composting schemes.

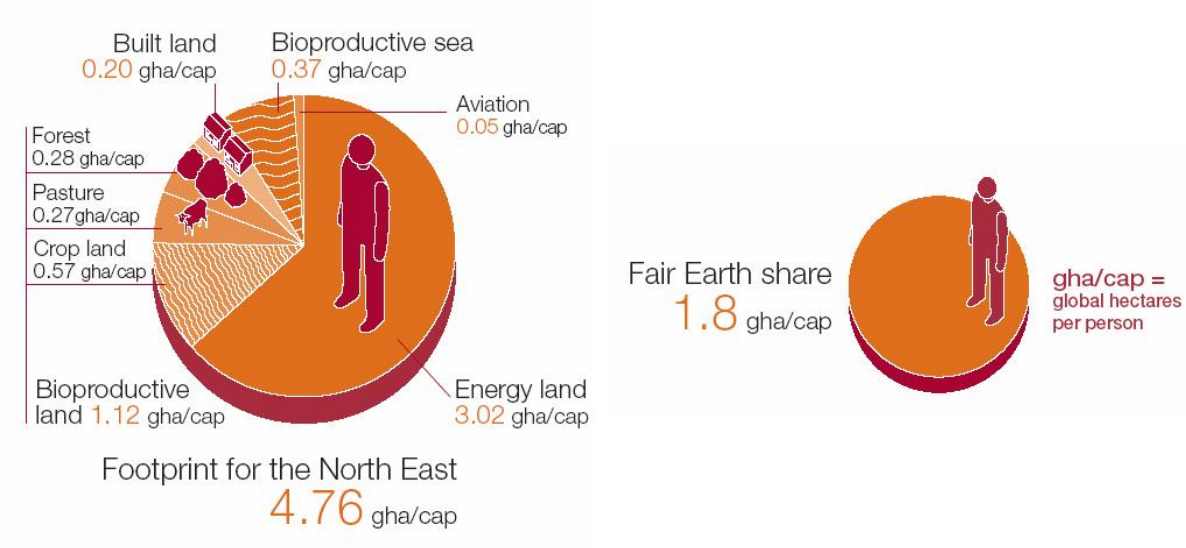


Figure 1: Ecological footprints (source: WWF-Northern, 2005)

4.2.9 Sustainable development

Although this is not directly an antecedent to GI, the language of sustainable development sets the wider frame. This is not the place to get into wider debates about the definition, salience or attainability of sustainability, although Gallent *et al*. (2004) page 4 is a neat review of its problems. Rather than claim that GI is the key to sustainable cities and their environs, it is suggested here that GI should be seen in the context of initiatives that aim to render current land use patterns and practices *more* sustainable.

Figure 2, based on Rannikko (1999), emphasises that sustainability is multi-dimensional. It is not simply about the viability of environmental systems (e.g. hydrology, climate, nutrients, soils and vegetation), but it recognises that the protection and conservation of those systems must be based on economic viability, social welfare and human quality of life.

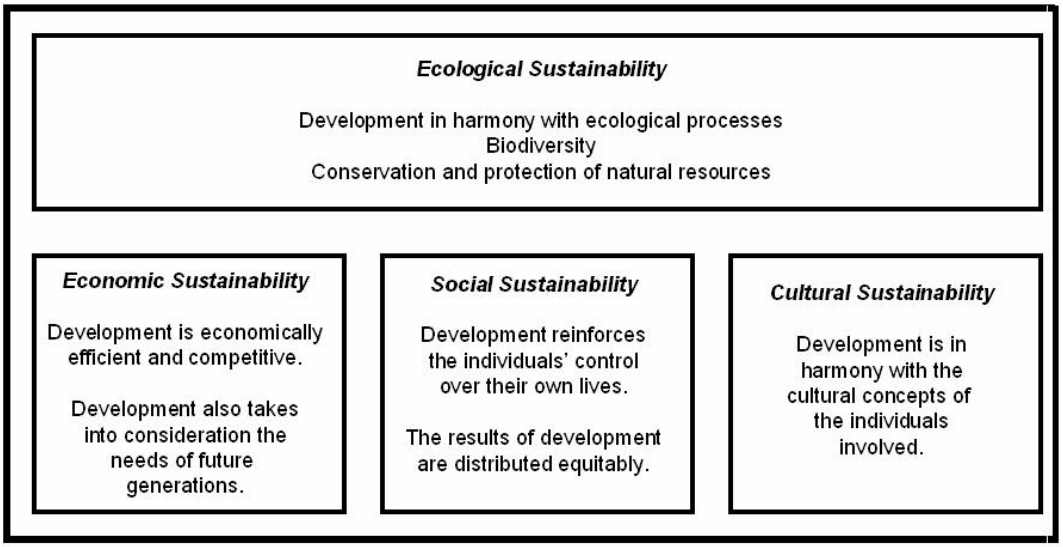


Figure 2: dimensions of sustainable development (after Rannikko, 1999)

4.3 The Multi-functional Countryside

The CIAT vision (Countryside Agency and Groundwork, 2004) focuses on multi-functionality and identifies a wider set of potential functions for development and enhancement in the urban fringe and areas of land that link urban and rural areas. These include:

- A bridge to the country
- A gateway to the town
- A health centre
- A classroom
- A recycling centre
- A power plant
- A productive landscape
- A place to live sustainably
- An engine for regeneration
- A nature reserve
- A heritage resource

Many of these should be familiar, although the language is different, from the earlier list of benefits associated with GI. GI should therefore be seen as a key delivery mechanism for multi-functionality in the CIAT.

The Countryside Agency is seeking to guide the creation of a network of green space where these functions are combined. Although in general terms the concept of multi-functionality supports the provision of a greater rather than a lesser number of functions from any given area of green space, it cannot be simply be boiled down to a 'more is better' principle and there are instances where desirable functions are mutually exclusive with other desirable functions. In this respect the important distinction between integration and interaction needs to be established. **Integration** concerns the spatial patterning of land-uses and activities (and, where appropriate their integration through timing). **Interaction** concerns the 'beneficial interaction between [these functions and components to serve the requirements of] local economies, the environment and social objectives' (Gallent *et al*., 2004, p.100). **Multi-functionality** is defined as' an integration of and interaction between the 10 functions set out in *Unlocking the Potential*' (p.100).

> *The success of any strategy for the countryside around towns will, in part, be judged in terms of successful spatial integration between land uses and activities. The co-ordination of different policy strands is therefore an essential component (and indeed a prerequisite) in securing mutually beneficial interaction between the ten functions set out in Unlocking the Potential* (Gallent *et al*., 2004, p.112)

Multi-functionality and meaningful steps towards GI that contributes to a more sustainable future cannot just be seen in terms of spatial planning; spatial integration is a pre-requisite for multi-functionality but how functions (social, cultural, economic and environmental) are understood to interact must inform spatial planning, something that has to lie at the core of GI planning.

Cutting across these functions identified above are a range of commonalities:

- *Aesthetics:* developments should be appropriate and of a high quality
- *Enjoyment:* ideally 'people will wish to linger rather than move through and exit as rapidly as possible' (Gallent *et al*., 2004, p.iv)
- *Partnership:* defining and realising objectives must be done in partnership with local communities and other interest groups
- *Balance:* potential conflicts must be identified and managed
- *Linkages:* physical linkages lie at the heart of GI but linkages between dimensions of sustainability, QoL and policy areas must also be identified and fostered
- *Functionality:* the CIAT is not, and should not be, a museum
- *Meaning:* developments that have little resonance or relevance for local communities are not sustainable

- *Opportunity:* opportunity is the precursor to use and it relates to access
- *Image:* how things look is important, both internally and externally
- *Viability:* this relates closely to meaning and functionality, but developments have to be sustainable in practice as well as attractive in principle
- *Vision:* GI is more than the sum of its parts and multi-functionality goes beyond co-existence, to consider integration, interaction and inclusion.

GI is being promoted as a concept to underpin the further development of Community Forests (CFs) in urban fringe environments. A number of significant developments have led to this focus:

- An appreciation of the multi-dimensional significance of urban fringe areas for many people, and a recognition of the constrained access, degraded landscape and ecology and depressed productive value of such areas;
- The range of hard benefits of GI can tackle priority policy areas including tackling accelerating climate change effects, improving social structures and reviving local economies;
- The development of landscape ecology as an integrative framework for the analysis and design of more sustainable, meaningful, aesthetically appealing and accessible landscapes and the associated focus on connectivity as a principle for the planning, design and management of landscapes, for the integrated pursuit of ecological, aesthetic and utilitarian objectives;
- A fundamental shift in forest policy, away from timber-oriented productivism, towards multi-functionality, and most recently, explicit direction from government that new woodlands should be planned and managed with the accretion of social benefits as the primary consideration.

Connecting green spaces is an integrating framework: at a conceptual level it relates to the principles of landscape ecology, and the allied concepts of greenways, wildlife corridors, recreational networks and riparian corridors, and at a practical human level it is the framework through which people can access spaces that enhance their quality of life and access to new opportunities. GI is inherently spatial. It is an infrastructure of green spaces ('nodes') and routes and corridors ('links') between them. A focus on GI demands that attention is paid to the sufficiency and suitability of both the 'nodes' and the 'links' for achieving the multiple objectives that are defined for them; it is not just about green spaces or greenways, but about the way these relate in functional and experiential terms for users of this significant resource.

> *Hubs anchor green infrastructure networks, providing origins and destinations for the wildlife and ecological processes moving to or through them. Links are the connections tying the system together and enabling green infrastructure networks to work* (Benedict and McMahon, 2002, p.12).

Again, Benedict and McMahon's language is ecological in its focus, but the concepts are directly transferable to human interests in, and movements through, the landscape.

In the existing literature, the science of landscape ecology establishes a framework for the integrated pursuit of ecological, aesthetic, cultural, social and economic objectives but is unable to establish detailed templates for their integration 'on the ground', and the appreciation of the principles of connectivity amongst planners and allied professionals has been shown to be highly variable (Dover, 2000; Turner, 2004). The reality of networks such as greenways or wildlife corridors is that they have usually been developed in an opportunistic fashion, linking such areas of open and green space as was cost-effectively and politically possible, without either a systematic approach to planning or design in pursuit of the multiple benefits that such connectivity may confer. Furthermore, the UK land-use planning system lacks the statutory tools and focus to establish and implement truly integrated spatial land-use plans (Selman, 1997). This is to say, there has been relatively little attention paid in the UK to green infrastructure planning at the strategic scale, although there are pressures to change this, and CF plans are at the forefront of this.

Recent shifts in forest policy have considerable relevance here: the UK government has long been committed, for various reasons, to driving up the proportion of land under trees and the current

emphasis in policy and practice is on integrating woodland with other land-uses rather than the replacement of other land-uses with woodland. The integration of forest planning with urban and urban fringe planning and management is the context for the forthcoming development of the third generation of CF plans, which are adopting the theme of GI, underpinned in the North East with a study to target investment at a regional scale (MacFarlane & Roe, 2004).

CFs are spatially defined zones on the edges of 12 major towns and cities. They are intended to promote an increase in tree cover within these areas, but the emphasis is on realising multiple benefits for local communities, economies, landscape and conservation interests through well designed, accessible, interesting and safe woodlands that are embedded in their landscape context. The future of CFs is to extend outside of the spatially defined boundaries and take on a greater role in urban fringe planning and management; connectivity and spatial integration is at the core of the GI concept.

As set out above, the GI concept is not new, it is strongly related to the well-established concept of greenways, but it is one that has attracted a great deal of interest in recent years, within the Countryside Agency, English Nature, Forestry Commission and Woodland Trust amongst others. So, at the moment GI is what might be termed a developing concept. It might also be defined a contested concept i.e. it means different things to different people. This discussion paper and the wider project of which it forms a part, are intended to establish a consensus about what GI is and how it can be practically used to promote multi-functionality in urban and urban fringe areas.

However, multi-functionality is also contested, not so much at a conceptual level as at a practical one. For example, although greenways (with a recreational emphasis) and ecological networks (with a habitat and species conservation emphasis) may, at a very basic level, seem similar – they are linear features dominated by vegetation rather than hard human developments – in reality they may be largely mutually exclusive in their detailed prescriptions, especially where species are disturbance-sensitive. This is by no means always the case, but the point is made to emphasise that you can't please all the people (and any other interest groups) all the time and detailed GI planning needs to accommodate competing priorities through spatial planning that is informed and systematic.

At a general level six broad sets of interests in GI might be identified, although there are of course strong inter-linkages between these categories:

i. *Nature conservation* – the literature on wildlife corridors, ecological networks and the wider discipline of landscape ecology emphasises the value of connectivity at a variety of scales from the continental to the local.

ii. *Recreation* – greenways have been promoted as routes, dominantly for non-car transport, that emphasise the quality of the route as well as more basic issues of welfare and safety. This has become increasingly engaged with interests around public health and quality of life.

iii. *Landscape* – although this is intimately related to (a) and (b), landscape architects and designers have long been involved in the identification, establishment and development of green spaces and corridors in urban areas. This is separated out here as the rationale employed is often different, taking a dominantly aesthetic and experiential, rather than purely functional, view on such resources.

iv. *Sustainable resource management* – GI has a potentially extremely significant role to play in the sustainable management of land and water resources, including production (e.g. energy and food crops) and pollution control.

v. *Economic development and regeneration* – development and regeneration agencies have an interest in the environmental quality of regions. This is driven by a range of primary interests, primarily its relationship with quality of life and enhancement of the external image of the region. GI is a critical element of environmental quality which has been shown to be related to inward investment decisions as well as the residential choices of key workers in local economic sectors.

vi. *Sustainable communities* – many of the attributes of more sustainable communities can be provided and supported through a strong GI, for example green space for recreation, education and health, shading, increased porosity of land cover, provision for non-car transport and shortened supply linkages.

Although these different dimensions of GI and the rationale to promote and develop GI are separate[1], they do of course interrelate, as policy areas and as lived experiences of people in local areas. Figure 3 is based in the concepts of human ecology, but variants of this from many other sources identify the interrelationships between people, their environment and the economic context (for example Ian Thompson's *Ecology, Community and Delight*). Gallent *et al.* (2004), in the same vein, uses the metaphor of a three-legged stool for sustainability; if any one of the legs comes off then the whole stool topples over.

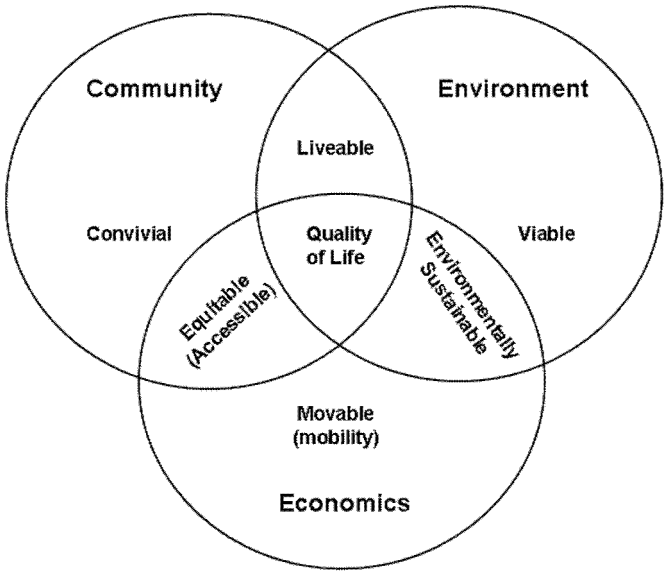


Figure 3: A human ecological perspective on the factors that contribute to community quality of life (Shafter *et al*., 2000)

Measures of quality of the environment underpin documents and initiatives such as state of the environment reports and the Countryside Quality Counts (www.cqc.org.uk). Quality of life is now embedded in government thinking about sustainability and social inclusion alike and a range of indicators have been developed to assess quality of life and improvements over time. The concept 'quality of place' is less well known, but it is used, for instance, by Regional Development Agencies as an overarching term to indicate the attractions of an area for economic development such as inward investment or the attraction and retention of key workers. It is a concept that overlaps and interrelates with quality of environment and quality of life and indeed the three dimensions of quality relate directly to the dimensions identified in figure 3.

4.4 Livability of Cities of the Future

Livability has been defined in terms of interaction between a community and the environment (Shafer *et al*., 2000). Access and positive engagement with local environments that service the range of communities' wants and needs imply livable areas. Problematic access, poor engagement, depressed value and low quality environments imply areas that are less livable. This is not just about green spaces to fly kites and walk dogs, it is far broader, embracing the range of environmental services such as heat and flood mitigation and safe journeys to school.

Overarching concepts (Green Infrastructure and Sustainable Cities included) need to be analysed, defined and disaggregated if their attainment is to be expressed through (spatially specific) plans. Such

[1] For example Gobster and Westphal (2004) define six interdependent human dimensions of greenways: cleanliness, naturalness, aesthetics, safety, access and appropriateness of development and Bischoff (1995) defines the purposes of greenways as environment, ecology, education, exercise and expression.

plans need to address both personal objectives (e.g. an attractive, accessible and meaningful local environment) and wider social and governmental objectives (e.g. promoting healthy living and managing the long term finances of health care for an ageing population). However, this is precisely what multi-functionality can address. For example, climatic change predictions for the UK indicate wetter winters, drier and warmer summers and an increasing incidence of extreme weather events, for instance flash flooding. Under such conditions the argument for increased woodland cover in urban areas takes on additional strength: a more porous urban land-cover is better able to mitigate extreme rainfall events and enhanced shading controls extremes of temperature, in turn reducing the demand for (energy hungry and carbon generating) air-conditioning in buildings.

This is what Jongman and Fungetti (2004) and others have termed the 'hypothesis of co-occurance', the ability of GI (although their point of reference was greenways in particular) to service multiple demands. This ability can only be achieved through insightful and informed planning and careful delivery processes. Section 3 goes on to introduce some of the methodological issues involved in GI planning.

4.5 Concluding comments

'Quality' is a pervasive word. Three key qualities are used to audit and measure progress towards various targets, including the overarching pursuit of sustainable development. These are quality of place, quality of life and quality of environment. Quality of place is used, for example by Regional Development Agencies, to embrace many of the characteristics of an area that will be attractive to existing and potential investors, employers and employees. Quality of environment, embracing tangible indicators such as hedgerow quality and more experiential dimensions such as tranquillity, is also multi-dimensional. Quality of life has been defined in terms of a series of indicators including for example employment, health, housing, risk of crime, noise, access to services and environmental pollution. It is clear that these three dimensions interrelate and attainment of high quality on one dimension is dependent upon 'performance' on the other dimensions.

We place three key ideas at the heart of thinking about GI:

- Sustainability
- Liveability
- Viability

For communities to be sustainable their economies must be viable and their local environments must be liveable, that is accessible, attractive and supporting a wide range of services that enhance quality of life, promote sustainable use of resources and enhance the ability of the area to attract, retain and grow economic opportunities. The interdependence is clear. Green infrastructure is not the answer, it is however a framework for bringing together thinking about multi-functionality and planning for the future of the countryside in and around towns

5. Overview of the Green Infrastructure Planning Guide

The GI Planning Guide is included in this report at Annex 1. This section is intended to provide a brief overview of what it contains, although the Guide itself stands as a completely self-contained document.

Fundamentally, the GI Planning Guide is intended to embed an awareness of and application of some of the principles of green infrastructure thinking into land-use planning and management decisions at differing spatial scales. This is not to say that the Guide is only aimed at land-use planners; a wide range of agencies (for instance Regional Development Agencies, Government Offices, Forestry Commission, Natural England, DEFRA, Sport England, Environment Agency, Wildlife Trusts and the Woodland Trust) and many professionals within those have responsibilities which directly or indirectly shape the provision, quality and connectivity of green infrastructure. So, its focus and intended audience is wide.

The Guide contains much of the material that appears in this final report, but where this is the case the material in the Guide is synthesised (more notably the literature review). The Guide balances three primary elements:

i. what green infrastructure is and why it matters – essentially, 'selling' its significance;
ii. a technical, GIS-based, element that establishes how green infrastructure may be inventoried, analysed and planned for;
iii. a section which discusses the 'real world' context and application issues arising – delivery issues.

The Guide is heavily illustrated with case study materials from the North East, in particular provided with the support of the Borough of Stockton-on-Tees.

6. How can the Green Infrastructure Planning Guide be used in the Real World?

Application

The primary application of the GI Planning Guide is to facilitate forms of Green Infrastructure Planning at different geographical levels; these key levels are:-

- Regional level e.g. North East England
- County, sub-region or city region level e.g. Tees Valley
- Borough or District level e.g. North Tyneside
- Neighbourhood level e.g. West Middlesbrough Neighbourhood Renewal Area

It is anticipated that the majority of users of the GI Planning Guide will be 'professionals' engaged with aspects of spatial or functional based planning. These professionals will include:-

- Strategists and policymakers in the public sector
- Town and country planners (engaged in local authority planning[2] and in private practice[3])
- Environmental and sustainable development professionals[4]
- Landscape architects, planners, managers and scientists
- Regeneration specialist's e.g. urban design, housing renewal, community development.
- Consultants offering services to public and private sector clients
- Academics and research students

The GI planning guide facilitates the production of geographically based Green Infrastructure Plans. By convention, plans normally include a **proposals map** supported by other mapped outputs, a descriptive **narrative** and **policy proposals**. Based on our research we see no particular reason for GI plans to vary from this convention. It is however necessary for GI plans to embrace contemporary planning techniques for them to widely accepted, in particular they must not appear to be 'top down' documents. Key amongst these is the movement towards broad-based planning frameworks and 'customer' or 'community' led planning based on a high degree of participatory involvement. We therefore recommend that the GI Planning Guide is marketed as a flexible tool intended for moulding by professionals to meet the 'real world' requirements they are dealing with.

In view of this adaptability a **wide range** of Green Infrastructure Planning outputs is anticipated which can include:-

- Spatial Green Infrastructure Plans based on the geographical levels referenced above
- Strategic GI guidelines that steer decision making in the development control process
- Supplementary planning documents
- Policies embedded within Local Development Frameworks
- Statutory and non-statutory plans produced by organisations including Natural England and Environment Agency.
- Proposals included within local Area Based Initiatives
- Proposals included within regional strategic documents

The GI Planning Guide follows an iterative 'step by step' process and as far as possible been made accessible to users and adaptable by them. We believe that the guide will be enhanced by the production of an HTML version, which would bring several accessibility benefits.

Professional Support System

However, it is recognised that green infrastructure planning; a holistic approach to green area connectivity; requires professionals to have (a) a conceptual understanding of environmental systems (b) knowledge of multi-

[2] This can be subdivided into Forward Planning and Development Control
[3] Generally as advisors to developers or working within development based businesses
[4] For instance LA21, environment city.

functionality as it applies to green areas (c) understanding of how environmental, economic and social issues intermingle in relation to sustainable development and sustainable communities.

These aspects are outside the scope of the GI Planning Guide but are very important. Professional training support is required to overcome perceived and actual knowledge gaps hence we believe that in association with the guide there should be a **Professional Support System** moderated by a lead organisation[5]. A support system could offer:-

- Regionally relevant GI planning training based on the Planning Support Guide (this could be delivered in association with RTPI and/or other professional bodies)
- A draw down contract to provide 'consultant mentors' to support professionals in organisations embarking on Green Infrastructure Planning.
- Open access training support provided by the regions Universities.

This professional support system will also help to overcome potential concerns that this emerging area is too costly to pursue since the support costs would be met by the lead organisation.

Delivery

It is imperative for there to be a robust policy framework if Green Infrastructure Planning is to significantly progress in the North East region. Ideally this should include:-

- A **Green Infrastructure Chapter in the Regional Environmental Strategy** (NESE) – making Green infrastructure a key component of environmental thinking in the region for at least the next 10 years
- A Green infrastructure **policy or supportive policies in the Regional Spatial Strategy** and association of this with sustainable communities as well as environmental policies
- **Lead plans which serve as exemplars** to the rest of the region (e.g. Tees Valley Green Infrastructure City Region Plan or Strategy)
- **Commitment to fund** the professional support system

A multi speed approach to Green Infrastructure planning is nevertheless inevitable and regional stakeholders should be prepared for this. Given the 'hard pressed' status of relevant local authority departments[6] detailed regional GI plan coverage is not foreseen in the immediate future. Nevertheless it would be **beneficial for NESE to state a realistic timescale[7] for comprehensive coverage of the region by different types of Green infrastructure plans**.

Translating Green Infrastructure Plans into delivery is however the critical task and must be **addressed as part of the GI planning process and not as an after thought.** Discussions held by the North East Environment Forum suggest that at a strategic geographical level[8], that **Landscape Scale partnerships represent the best delivery mechanism**. Local authorities will play a lead role in these partnerships along with other bodies such as Groundwork Trusts, North East Community Forests (NECF) NGO's, Community based organisations etc. Fortunately, the North East Region is reasonably well serviced by **Landscape Scale initiatives** which include Great North Forest, The Tees Forest and the Mineral Valley's Project, elsewhere notably in Northumberland coverage is sparse or absent. At the **neighbourhood scale, Area Based Initiatives (ABI's) such as Groundwork Trusts are best placed to lead on delivery.**

It is recommended that the funding of GI delivery should account for the following spatial properties:-

- Place a high value on existing green areas, prevent deterioration of these and seek quality improvements.

[5] We suggest that Natural England are seen as a 'lead body' for Green Infrastructure Planning
[6] Local authorities will undoubtedly continue to prioritise Development Plans and Economic regeneration
[7] five to seven years is suggested
[8] considered as all levels of District and above

- Improve the diversity of these areas to address local needs by addressing the potential to deliver multi-functional benefits generally achieved through landscape led improvements.
- Connect 'green areas' areas together to achieve a 'strategic whole' and create connectivity benefits
- Seek cooperative management of joined green areas whether they are in private ownership (such as gardens) with adjoining public areas (such as parks or the street scene)
- Prioritise the creation of new landscapes that connect existing landscapes together, unless there are compelling reasons not to do so (for example a biodiversity constraint)
- Select areas for green infrastructure improvements that protect or enhance natural resources (for example through protection of soils)
- Activities that aid delivery of existing local priorities (for example that release more land for tree planting in community forest areas)

But how can this be funded? There is not a single answer to this question but there are two clear characteristics of this funding:-

- **Grant** type funding - funding based around providing additional public benefits
- **Value added** type funding - secured through the increased value of land through the spatial planning/development process.

It is **recommended that action research is undertaken** to explore the extent to which 'value added' funding can deliver GI benefits.

Need for a Regional and National Advocate

We **recommend that a strategic organisation becomes advocate for Green Infrastructure Planning**. The component parts of Green Infrastructure appear to overlap with the work of several national bodies with regional structure, namely:

- Natural England (from 1st October 2006) brought about by the merging of Countryside Agency LAR, RDS and English Nature
- Environment Agency
- Forestry Commission
- Land Restoration Trust
- Regional Development Agencies

Based on an analysis of this report we believe that the **best match would appear to rest with Natural England** taking on this role. Green Infrastructure Planning is a natural extension to the existing work of all three constituent organisations. For example the management of 'farmland' is a key aspect of GI planning. There is a key role also Environment Agency and it is also recommended that close liaison takes place at a regional and national level between these two bodies over GI planning.

In the North East region we recommend that a Regional Stakeholder group is former with represents of the above named bodies along with key NGO's and that this group is serviced by Natural England. The terms of reference for this group would be to:-

- Hold an overview of GI in the region and ensure coordination of effort
- Facilitate and enable activities at all geographical levels
- Manage the support programme
- Keep abreast of new developments and ensure that they are used regionally
- Seek to update the Planning Support Guide within three years.

A further opportunity exists to **merge existing Countryside Agency and English Nature policy streams together and meld them into a Green infrastructure policy stream**. The most notable being English Nature's 'urban programme' and Countryside Agency's 'Countryside in and around town's policy'. The Countryside Agency CIAT policy stream is built upon multi-functionality and this is highly complementary to GI planning.

HTML Version of the GI Planning Guide

The GI Planning Guide is iterative and as far as possible it has been made easy for professional users to understand and adapt. To enhance its usability we believe that the **GI Planning Guide will be enhanced by developing it into an HTML document**. There are a number of benefits that can flow from this:-

- Ease of access to potential users
- Low cost CD-R format
- Ability to 'post on the web' as a microsite.
- Easily adapted by professional users with rudimentary ICT knowledge to meet their own requirements.
- Print outs or screen shots for use in exhibitions and reports.
- Easily updated to incorporate new knowledge and correct omissions.
- The master CD can be 'owned' by the project funders.

Recommendations Summary

1. The GI Planning Guide (*output from this work programme*) will be enhanced by developing it into an accessible menu driven HTML document, with regular updating and posting on the internet.

2. Merge existing Countryside Agency (CIAT) and English Nature (Urban) policy streams together and meld them into a new Green infrastructure policy stream.

3. That a strategic organisation becomes the regional/national advocate for Green Infrastructure Planning and we believe that the best match would appear to rest with Natural England.

4. That action research (*learning and change through doing*) is undertaken to explore the extent to which 'value added' funding can deliver GI benefits especially through (a) grant type funding - funding based around providing additional public benefits and (b) value added type funding - secured through the increased value of land through the spatial planning/development process.

5. That landscape Scale partnerships (e.g. Community Forests) represent the best delivery mechanism excepting at the neighbourhood scale, where Area Based Initiatives (ABI's) such as Groundwork Trusts may be best placed to lead on delivery.

6. That a Green Infrastructure chapter in the Regional Environmental Strategy is produced accompanied by support from a wide range of regional environmental bodies.

7. Seek supportive policies in the Regional Spatial Strategy (and future revision thereof) especially in association with sustainable communities as well as environmental policies.

8. That 'lead' regional GI spatial plans are produced as pilot documents to serve as exemplars to other public sector organisations in the rest of the region

9. Establish and maintain a professional support system [PSS] (to support planning professionals) with a commitment from Natural England to fund the PSS

10. Establish a regional Green Infrastructure steering group to facilitate and enable future regional GI developments and seek a mandate from lead partner bodies for it to coordinate a regional GI delivery plan

11. Develop the academic resource in the region and offer teaching and research opportunities. Maintain existing academic links and seek to develop new ones.

Appendices

Appendix One

Green Infrastructure and City Regions: Workshop Report

1.0 Introduction

Three workshop sessions were held during September 2005 with stakeholders concerned with the North East region at a local and regional scale *(see Appendix A for a list of attendees).* A briefing paper was pre-circulated *(see Appendix B)* and three major questions were posed:

- What are the functions of Green Infrastructure in the City Region?
- Where do City Region boundaries lie in respect to green infrastructure planning?
- What are the components, parameters and indicators required for green infrastructure planning in the City Region using GIS?

A wide-ranging discussion took place around these questions. Participants were asked to consider briefly the definition of Green Infrastructure as an introductory exercise, but this was not dwelt upon in great depth *(see Appendices C & D).* During the discussion a number of themes emerged and the following report summarises the comments made:

2.0 Green infrastructure generally and as a concept

There was considerable enthusiasm for the idea of green infrastructure and for using it as a way to progress thinking in relation to the issues it raises. It emerged that a key issue was to develop green infrastructure as an attitude or ideology. Progressing thinking about green infrastructure was seen as a potential mechanism for breaking down physical (political) boundaries in the landscape and psychological boundaries in the minds of policy-makers and planners. The main point was how to ensure that this was brought onto the political and practical agendas at all levels thereby ensuring that green infrastructure is at the forefront of people's thinking in order that they can use it in their professional day-to-day work. Although this was widely agreed to be of critical importance by participants it was identified as likely to be the most difficult aspect of green infrastructure planning. It was suggested that raising green infrastructure awareness and understanding should not be an afterthought but an integral part of developing a green infrastructure framework. It could be attractive to local planners as concept because it provides a more integrative than traditional nature conservation frameworks, but the capacity of Local Authorities to grasp green infrastructure as a planning tool was likely to be a stumbling block. The functionality of the idea was considered important particularly as competing demands for land (e.g. landfill sites) and commercial or political demands may counteract green infrastructure planning objectives. However it may also provide opportunities as has been shown by North East Community Forest (NECF) initiatives. A decision-making framework to establish the priorities for competing interests and green infrastructure is needed. It was felt that priorities for green infrastructure could be based on user benefits. In physical terms it would be important to determine the potentials and constraints or the fragments and gaps of the present green infrastructure - particularly the gaps - and the quality of the existing areas. In general, quality of the provision emerged as a critical issue in the discussion, as did green infrastructure as a long-term concept. In particular the importance of planning green infrastructure for tomorrow's city, especially in relation to ameliorating the effects of climate change and as a forward thinking mechanism for quality of life improvement. One participant suggested that green infrastructure could be seen as the *"sense of the natural"* i.e. *"It is in your head and everything else follows".*

3.0 The issue of scale and coverage of the project

The key idea emerged that green infrastructure is hierarchical. There was a general feeling that it was important to consider the whole picture of the North East region within the concept of green infrastructure and particularly with regard to natural ecosystem processes at the larger scale. It was agreed that this could be done through a hierarchical concept of the region focusing on the two city regions as the core areas. This focus on the areas of high population would provide financial and delivery potential for maximum real public benefit and the opportunity to make the most difference to people's lives. Using the two city regions will help balance what

each has to offer and reinforce the recognition that each has a different identity. The city region approach was seen to be valuable because it allows planners to break out of existing boundaries (physical, political and psychological) and to encourage a more outward-looking approach.

It was felt that a tiered approach might work best – regional scale, city regional scale and intra-urban scale. The term 'nesting' was also used. However, it was felt that small areas – particularly in the cities - should not be ignored, as these are often the most important in people's everyday lives. It was felt however that analysis of green infrastructure at the different scales could be difficult, for example at the larger scale green infrastructure planning is already often based on catchment areas, but this would be difficult at the city region scale. It was felt that different principles and criteria would need to be developed for the different scales. A flexible transboundary planning approach is needed to create a toolkit to address green infrastructure planning needs.

The city region scale was felt generally to be a particularly useful scale to concentrate the examination of green infrastructure in the North East. Although human boundaries may not always be useful for ecological processes, it was felt important that the green infrastructure project had the potential to influence political procedures and policies, so that as a 'planning tool' it needed to be able to respond to the Regional Spatial Strategy (RSS) and this would be best done by relating to the city regions.

(a) Particular points for green infrastructure consideration at the regional scale

At a regional level it includes both linear 'human' features (e.g. nationally or regionally significant recreational networks such as NCN and Long Distance Footpaths), linear 'natural' features (e.g. main river corridors connecting the coast to the uplands, the coastal strip) and 'environmental resources' that may have intrinsic value (e.g. places for wildlife as shown by biodiversity mapping), instrumental or contingent values (e.g. flood mitigation) or human values (e.g. local National Park and other protected areas in the uplands which provide recreation for many city dwellers and places to interact with nature). It was suggested that since there was already a considerable amount of work done at the regional scale, that this data should be used and interpreted. Other data, which should be useful, include:

- Landscape character area assessments
- Catchment areas and hydrological networks/groundwater resources
- Links between urban areas and into villages as well as the broader countryside
- Landscape character areas
- Strategically significant transport corridors
- Climate change issues

(b) Sub-regional scale (city region scale)

Consideration at the sub-regional scale would mesh with recent political thinking and initiatives that concentrate on the 'city region'. It would also help break down barriers and communications with other regions. Cross-border thinking was seen as important as was permeability within the city region areas. Sub-regional and strategic planning needs to ensure transport works with the idea of green infrastructure – with links into and throughout the city. It was felt that there are considerable opportunities e.g. on Teesside for ex-industrial sites or contaminated land sites. Other data for consideration at this scale includes:

- Large brownfield areas and coalmining regeneration areas along rivers etc.
- Travel to work/distance to work information
- Local radio boundaries may be useful, particularly to provide the idea of 'fuzzy edges' and overlap between sub-regional areas.
- Understanding and use of connections between city and countryside.
- Quality of life issues

(c) Neighbourhood scale (intra-urban scale)

At the local level green infrastructure becomes much more focused on direct human use values (e.g. perhaps the emphasis is on places to see wildlife as distinct from places for wildlife). In terms of administration and implementation of green infrastructure planning, this level, i.e. not bigger that the size of local authorities, was seen as likely to be convenient. Green infrastructure here should embrace spaces of landscape, recreational, amenity and nature conservation significance and the links between the various types. Interaction between

spaces is of particular importance, and there is need to get urban areas 'working better' to provide a number of benefits (e.g. so people do not journey into the wider countryside to find quality green space and recreation; to provide people with the ability to walk and cycle from home). More efficient use of green areas within the city where there is a high population could have the maximum benefit. It was suggested that green infrastructure resources in relation to scale of space needed to be clarified e.g. what size of pocket park = a greenspace and could or how should it be linked to other such spaces? It was felt important that the 'bits and pieces' of greenspace should not be lost in the big picture just because they may not have the opportunity to be linked to a green infrastructure framework. However generally it was felt that there pockets need to be linked and linkable because isolated pockets are of less value than a number in the same area.

Adjacency of green infrastructure in deprived urban areas was regarded as particularly important. Raising green infrastructure capital by creation of new green infrastructure in such areas would provide the greatest benefit to the maximum number of people. In redevelopment and regeneration schemes opportunities should be made to create green infrastructure benefits in areas where buildings are demolished.

It was felt that although access to and through green infrastructure is a central, even a defining, principle, not all areas included as green infrastructure must be accessible. So, private spaces such as gardens have significance in amenity and conservation terms and 'the view' can be an element of green infrastructure, perhaps qualitatively enhancing a site that is otherwise relatively ordinary. Included in this might be approaches such as 'Britain in Bloom' where some pedestrian public spaces can be significantly enhanced through coordinated private actions in private or public-facing spaces (hanging baskets, front gardens, window boxes, etc).

4.0 'Grey' and 'Green' Infrastructure

There was lively debate concerning 'grey' versus 'green' infrastructure. There seemed to be an appreciation and support that green could be used to denote the function or facility provided by an element, even if it was not strictly 'green' i.e. green used to denote sympathy with the wider structure and functioning of the green infrastructure network. There was some uncertainty over whether the yellow buses of the Quayside are green infrastructure, but the strictly 'grey' infrastructure of cycle paths represent consistency of purpose and connectivity in a physical and opportunity sense with 'green' green infrastructure. It was suggested therefore that the definition of 'grey' as fundamentally distinct from 'green' is not altogether helpful, and that, like a colour chart, we can move through a range of shades: in the middle is grey/green e.g. cycleways *(see Figure 1)*. Therefore elements that are grey, but which contribute to the wider functioning of green infrastructure should be treated as part of the green infrastructure network. Grey infrastructure, such as bus routes, should be made to integrate with green infrastructure networks rather than vice-versa.

On the other hand however it was agreed that comparisons between grey and green infrastructure might be useful in that grey infrastructure is considered as essential and part of the initial and normal planning process at all scales. It was generally agreed that green infrastructure should be considered in this light. The 'lack of obviousness' of green infrastructure was seen as a problem, contrasting unfavourably with the very accessible concept of grey infrastructure. These links (wildlife, flood mitigation, etc) may not be accounted for properly as they are hard to visualise.

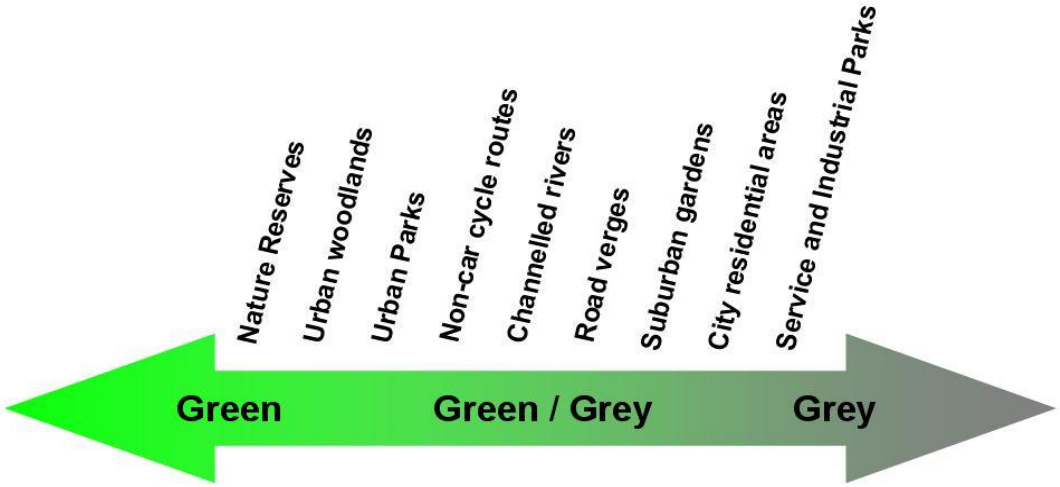


Figure 1: The Green-Grey Continuum

A list was compiled of what participants felt green infrastructure included (see Appendix E). The discussion concentrated on the issue of quality, which was felt to be more important than getting too hung up on what should or should not be included in any list of physical areas.

5.0 Services or Functions of green infrastructure

Some participants were confused with the term 'services' so it was confirmed that in this context it is used as *functions* or *benefits* of green infrastructure. A wide range of potential functions was defined (see Appendix F) relating to present services and potential future services. Services could be divided into physical functions and those which support approaches, ideology or principles of green infrastructure. It was observed that principles of service or function rather than the definition of services were of primary importance. Intellectual accessibility to areas was raised as being of equal importance to physical accessibility.

6.0 Data

A discussion concerning data availability took place. It was felt that although data is generally available the quality and coverage as well as the boundaries used are very variable. There is generally less available data in rural areas. Some local authorities have already carried out Green Space Strategies and Open Space Strategies. Sustrans holds a comprehensive database relating to present and future walking, cycling and vehicular use including travel to work, schools, tourism etc. The Environment Agency also has a useful database concerning various projects and related areas e.g. the EA/RSPB Wetland Restoration project in the North East. It was suggested that data such as areas of deprivation filtered to take account of adjacency could be useful. Some analytical data such as Newcastle City's exercise measuring the benefits of greenspace would be useful.

7.0 Priorities for green infrastructure

The key priorities were identified. These were not put in any particular order.

(a) Gain support for green infrastructure at all levels.

There was a general consensus that green infrastructure would remain as a 'nice idea' unless it was mandated in some way. At the very least, regional strategies must strongly support the concept significance and the creation of green infrastructure plans. 'Pitching' the significance of green infrastructure is a highly political issue, but green infrastructure thinking and planning must be infiltrated at a variety of scales. It was felt that it was important to engage support and ownership from communities in order to gain support for the financial aspects of green infrastructure. This was also true in relation to the 'unconverted' policy-makers and planners to help develop engagement with the idea of environmentally led regeneration to increase money flow in the region. It is important to promote adherence to the principles of green infrastructure and promote Local Development Frameworks (LDF) and Development Control planners and others to pay due heed to them. It was felt that there is already support from development organisations (e.g. house builders) for a green infrastructure approach in the North-east as an image-builder for the region.

The development of a green infrastructure framework that everyone could 'buy-into' would be important. This would need to filter down to local plan level, as it is important to address those at the 'sharp end' who are actually implementing proposals. Statutory 'sticks' can be very useful and it may be that this needs to be incorporated into green infrastructure framework thinking.

(b) Address quality of life/liveability issues

Quality was at the core of much of the observations provided by participants. It was agreed that finance should be put into quality rather than quantity and there was now a general political will to do this. Multiple green areas and sites covering large expanses that are homogeneous, of little interest and weakly or poorly managed have relatively little value. Quality of the management of the physical features of green infrastructure and footing the bill for better management was a key point. It was felt that developing thinking about and support for green infrastructure generally would help support the likelihood of funding for management and maintenance. It is important to try and determine indicators for green infrastructure's role in addressing quality of life issues and action on the ground.

Various dimensions and potential measures of quality were identified:

- Diversity of use (relating to multi-functionality)
- The fit with demand (local and higher)
- Meets biodiversity objectives
- Makes money
- Engagement with local (and wider) communities
- Fulfils sustainability objectives (e.g. Newcastle's quality audit was based on the Green Flag assessment for urban parks)
- Perceptions of safety/self policing and quality of place perceptions for locals and visitors were seen as important issues
- Development of popular access networks
- Is it valued?
- Quality can be defined in respect of the site, but it can also be defined (or affected by) context – views, vandals, latent demand, etc.
- Health and deprivation issues
- Education
- Raising awareness

(c) Provide for multi-functionality/multiple-use

The identification of mechanisms to change single-use sites to multiple-use sites was seen as important. What facilities (e.g. meeting rooms café, adventure playground etc) are needed to create multi-functionality? Investment in infrastructure and facilities was seen as particularly important. The National Trust initiative at Gibside was used as an example of providing a range of objectives for the same site including education and heritage. NECF have also demonstrated the potential of multiple use sites and are helping to push forward thinking in relation to multi-functionality. It was felt that single use sports pitches are a particular problem and could provide for other uses (such as wildlife) with fairly simple alterations to management.

(d) Identify and Address Vulnerability Issues by increasing and improving green links

The vulnerability of existing green infrastructure and potential links to development pressures was seen as a very significant issue. Provision of new links between spaces, particularly within urban areas was seen as important e.g. creation of a wider and more dense network of green routes to encourage more use. There is a need to increase connectivity generally at the landscape scale to aid landscape and habitat restoration. It was felt that development pressure as a result of town cramming may be increased as a result of the Northern Way and it is important not to lose existing green infrastructure capital through urban compaction particularly at the city region scale. It might be possible to balance development pressures against each other and policy-makers and planners could use this in their strategic thinking as a positive way to create links and corridors. Where need suggests provision (even in the absence of any Green or Green-Grey Infrastructure) this should be addressed.

The approach must incorporate a scaling that ensures sites that are vulnerable by virtue of their (potential) use and location are accorded heightened significance as is illustrated schematically below *(see Figure 2)*: the red area below is 'the weakest link' in the green infrastructure illustrated by the green areas. While pragmatic voices recognised that a level of flexibility would be required in respect of 'trading' some of the less critical elements ('net environmental capital'), loss of certain features would have a disproportionate effect and this must be reflected and addressed.

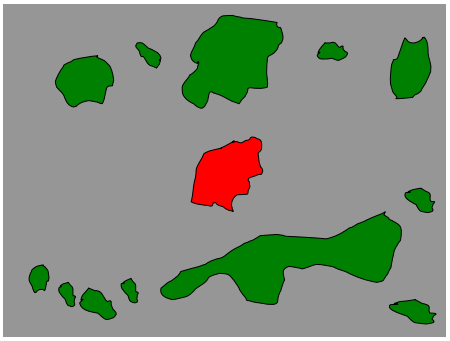


Figure 2: Links and site vulnerability

(f) Provide for Future Change and Needs

There was an emphasis on the need to consider sustainability issues in relation to green infrastructure which should respond to the need for long-term visionary and strategic thinking. This particularly emphasised the need for a change in policy, attitude, knowledge and values. A vision for green infrastructure needs to be defensible and therefore needs 'teeth'. A good evidence base to show the potential increase in relative benefits is therefore important. It was felt that some spatial and visual ideas to show the status quo versus what it could be like would be useful. Assumptions should be challenged e.g. does urban sprawl have to be bad?

It was important that the city is not seen as a fixed object but needs to be flexible in order to respond to change, particularly in relation to global change. An example of this was the practical application of temporary woodland establishment (e.g. phytoremediation of contaminated land or planting for leachate control).

The ‘bigger picture’ needs consideration and perhaps cities could be seen as a life support system with a corresponding need to consider longevity. Permeability as a concept was also seen as useful e.g. in respect of viewsheds, physical accessibility, etc.

(g) Provide Maximum Benefit

The idea of maximum benefit was closely related to that of multi-functionality and gaining political support for green infrastructure. Behind the thinking was the fundamental belief in the importance of understanding interactions between human and natural communities. Green infrastructure should be seen as a tradable and dynamic commodity for development that needs to be flexible and realistic. Protection of everything was not seen as feasible so the question needs to be asked: could you create something of more quality elsewhere? The net capital of green infrastructure should increase and change, but not reduce. green infrastructure could be seen as a marketing exercise - it needs to be able to generate money and counteract undesirable development pressure. Green infrastructure thinking and development could provide numerous additional benefits or services (see Appendix F) but key issues were:

- Inclusivity by helping to target areas of deprivation for enhancement
- Providing associated training, job creation etc.
- Provide a vehicle for volunteering
- Provide health and occupational benefits for an increasingly ageing population
- Increase co-operation
- Maintain and improve net capital of greenspace
- Provide ‘teeth’ for planners for the argument with developers
- Provide arguments for a change the existing system so that green infrastructure cannot be swapped for swimming pools thus reducing the overall green infrastructure capital.
- Provide a new dynamic to change values and provide a new approach to development.

(e) Mesh with Existing Political Boundaries and Planning Frameworks

It was widely felt that the project needs to mesh with and pay due heed to existing planning policy, initiatives and spatial frameworks (e.g. City Regions, Catchment Management Plans, Biodiversity mapping exercises, Community Forest Plans, landscape character areas, etc.) particularly with regard to implementation.

It was felt that it is important to link to existing structures so that it can become a valuable and useful tool for policy-makers – particularly the implications of the identification and use of the ‘city regions’. Capacity is needed to develop green infrastructure planning further. It is not presently seen as mainstream and needs to be incorporated as an integral part of the planning process. It was felt that green infrastructure has considerable potential but that implementation needs to be through the RSS and Northern Way. It was felt that green infrastructure should have a stronger emphasis within the RSS and it would help if the city regions were defined. In order to implement green infrastructure thinking, funding sources and land management agencies need to be brought together. It is important to gain a ‘shared vision’ for green infrastructure through partnerships and that getting some kind of consensus on a definition for green infrastructure is important because at present green infrastructure as a planning and policy mechanism is not generally accepted. In particular the multifunctional approach was highlighted. It was felt that there might be a variety of answers for implementation and funding mechanisms depending on the area richness. The need to engage with other interested organisations such as CABESpace was identified.

8.0 Summary and Next Steps

This report distils information gained through the workshops. It does not provide an analysis of that information. Such analysis is now being carried out and will feed into the development of the GIS ‘toolkit’ and will be set out in the final report.

The project team will now be examining issues of data access and identifying the potential of and possible case studies for more detailed exploration of the green infrastructure issues as identified by the workshop participants. Any further comments on the issues identified in this report are welcome and should be sent to NECF.

9.0 Appendices:

Appendix 1A: List of Attendees
Appendix 1B: Pre-circulated paper
Appendix 1C: Definition exercise question sheet
Appendix 1D: Results of definition exercise
Appendix 1E: Green Infrastructure components
Appendix 1F: Green Infrastructure functions

Appendix 1A: List of Attendees

15th September 2005:

Nicola Melville RSPB
G. Thomasson (for Jan Arger), CPRE NE Regional Group
Vicki Sixmith, Great North Forest
Brett Grimm, PhD Candidate (Exchange Programme Adelaide University), Newcastle University
Colin Percy, Newcastle City Council, Senior Policy Officer planning & transportation
Edwina Symonds, Newcastle City Council
Nina Barr, Newcastle City Council
Bryn Dowson, Sustrans
Susan Clark, Countryside Agency

16th September 2005:

Katie Wellstead Great North Forest
Nick Brodin Biodiversity Forum
Mike Boase, Gateshead Council
Lindsay Perks LAF
M. Gibson, Chester le Street District Council
M. Goldsmith, Chester le Street District Council
Jeff Singleton Derwentside District Council
Steve Scoffin, Great North Forest
Jim Marshall, The Tees Forest
David M. Walton Durham City Council
Della Marian North East Community Forest
Jill Antrobus, Blyth Valley Borough Council
Mick Sharpe, Blyth Valley Borough Council
Sam Talbot, Castle Morpeth Borough Council

19th September 2005:

Timothy Crawshaw, Darlington BC
Rob George, Darlington BC
Sam Wilson Garside, Middlesbrough Council
Fiona Gillespie, District of Easington
Graham Clingan, Countryside Agency

Glenn McGill, North East Community Forest
Martin Coleclough, Middlesbrough Council
Ged Demoily, Redcar and Cleveland BC

Appendix 1B: Pre-circulated paper

Green Infrastructure and the City Regions

Workshop Paper No. 1: Preliminary Discussion Paper
September 2005

Introduction

This short paper aims to be a catalyst for the discussion which will take place during the three workshop sessions on Green Infrastructure planning with regard to City Regions in the North-east. It is not meant as homework! The idea in producing this is to get participants mulling over the subject of Green Infrastructure (GI) shortly before and as a preliminary to the workshop sessions. A further and more detailed discussion paper with a bibliography will be provided at the end of each workshop session.

Three main questions will be addressed during the workshop sessions. The first relates to the definition of elements of a GI model by examining the functions of GI. This will help us to establish what comprises GI and match them to the relevant GIS datasets. The second is to define the 'City Region' in relation to GI, and the third is to define the priorities and parameters for the model and to consider indicators, improvements and other issues of relevance to the project. Broadly speaking we need to define what data we need and then consider what we should be doing with the data.

What does Green Infrastructure mean to you?

Here are some key terms and buzzwords extracted from the literature to help you think about this issue:

Interconnected, networks, holistic, proactive, multi-scale, coherent, overarching framework, strategic planning and delivery, complex interdependency, collaborative, unified action, wide-ranging benefits, urban-rural interface, political horizons, core areas, corridors, links, nodes, communication, emotional well-being, emotional development, green apprenticeships, cognitive skills, physical development, urban renaissance, the grain of nature, live-ability, environmental services, accessible greenspace, green wedges, urban river valleys, community gardens, landscape assets, environmental comfort, multiple benefits, greenways, multifunctional, integrative, interaction.

1. What are the functions of Green Infrastructure in the City Region?

Recent focusing on GI as a potential planning tool can be seen as a response to concerns relating to quality of life, quality of environment and quality of place issues. This perhaps is indicative of a general development in thinking in relation to green issues from a concentration on the '*how much?'* (or quantitative) questions to perhaps a more complex concern over a *'what is the quality?'* (or qualitative) type questioning.

Words such as *'integration', 'interaction'* and *'multifunctional'* are also commonly used when discussing GI and these are key issues to consider. But how can these relate to GI in City Regional planning? What are the implications for planning methods, tools and practice of thinking about the issues that arise from these concepts? Is GI more than the physical environment? If so, how can we use GI as a tool for positive change in City Region planning? How far can or should the concept be taken as a planning framework?

Different professionals and representatives of interest groups will have very different values with response to the functions of GI in City Regions. How can we consider these? Is it possible to agree to priorities for all regions, or any region in particular?

Many functions of GI can be identified and there are a number of different definitions of GI that can be used as a starting point for our discussion. GI thinking has perhaps proved to be of relevance to a wide range of interest groups precisely because it encompasses a 'broad church' of ideas and definitions – but is it possible to identify more clearly what is important in relation to City Regions in terms of the functions of GI? Is it perhaps most useful to try and define the *purpose* rather than the meaning of GI?

Recent thinking in relation to GI can be seen to have grown out of a number of subject areas such as green space planning, nature conservation, landscape ecology, infrastructure and engineering planning, recreation planning, health and safety concerns, socio-economic issues, heritage protection, accessibility issues, and so on. Sustainable development is also now an important framework within which GI planning sits. But how do all these concerns and issues relate to GI planning in City Regions? Are there others issues that should be considered? How can we break down these concerns into more detailed functions relevant to GI planning at the City Region scale?

2. Where to City Region boundaries lie in respect to GI planning?

The present project focuses on GI planning at the City Region level using GIS to develop a tool to explore the possibilities of GI. In order to carry out GIS analysis it is important to establish a clear boundary for the City Regions in relation to the needs of GI. A series of questions can be asked in order to help determine these boundaries: In what way would GI plans be used at the City Region level? Does this help us to determine where the boundaries need to be? Boundaries may be determined by physical and/or political criteria. What are the criteria that should be used for determining the boundaries for this project? What about 'gaps' between the city boundaries under consideration in this region? Are there existing models for boundary decision-making for city regions? If so, are these appropriate for the purposes of this project? How can we consider cross-boundary working in the context of GI?

Scale is an important point to consider when working with GIS. GIS analysis depends on the quality of the data that is available for manipulation, and this data is available at a variety of different scales or resolutions. What is the appropriate scale to be thinking about GI Planning for City Regions? How much detail is needed? How do you feel you might use a GIS decision-support tool in relation to GI planning and does this help to define the parameters needed for creating a useful GIS model?

3. What are the components, parameters and indicators required for GI planning in the City Region using GIS?

In order to create the proposed GIS model, we need to define as clearly as possible the components and parameters for consideration. A range of benefits can be identified for GI – but what are the most important components for GI planning in the NE City Regions? What are the components we need to consider for the practical purposes of GI Planning in this context and which components would you give priority to?

Should parameters be defined by existing information – or is there additional information we need? Should we or how should we be considering the long-term environmental issues such as climate change, flooding, CO2 reduction? How can such considerations be turned into 'components' for the GIS model? Similarly, how can 'big' social issues such as financing of health care for ageing populations be turned into a 'component'? What are the most important components in terms of community, environment and economics?

A number of indicators have been developed to assess quality of life. Are existing indicators useful to help us examine how successful GI planning will be in the City Region, or is a new set of indicators needed? How can we assess quality of place and quality of environment in relation to GI? Are there useful measures already in place at the City Region level that could be used?

Can consideration of the likely delivery structure and mechanisms for GI in City Regions help us to define exactly what components should go into the model?

Appendix 1C: Definition exercise question sheet

Green Infrastructure and the City Regions

Definition exercise

Green infrastructure is a term that can mean different things to different people. We would like your assistance to shape a definition of *green infrastructure* that is applicable to Green Infrastructure as it impacts upon city regions.

Instructions

Three existing definitions are given below, please annotate these definitions with your amendments (or if you are in total agreement – indicate this with a large✓). There is also space for you to write your own definition. When completed - please hand this sheet to a workshop organiser.

What happens to your input?

All contributions are un-attributable. They will be used in developing the Green Infrastructure definition used in the project, be presented to the project steering group and may appear in the final report.

Definitions

Green infrastructure provides a network of multi-functional green spaces that contributes to the high quality natural and built environment required for existing and new sustainable communities, consisting of both public and private assets, with and without public access, and in both urban and rural locations.
Source: - city region park draft paper 2005

Green infrastructure is an interconnected network of green space that conserves natural eco-system values and functions and provides associated benefits to human populations.
Source: - Benedict Mark A, and McMahon, Edward T;
Renewables Resources Journal, Autumn 2002

Green infrastructure is the physical environment within and between our cities, towns and villages. It is a network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes towards sustainable resource management.
Source: - Countryside Agency discussion paper 2005

Appendix 1D: Green Infrastructure Definition Exercise Results
(Comments have been anonymised)

(a) Regional Stakeholders - Exercise 15th September 2005

Contributor 1	GI provides a network of multifunctional green spaces within and between our cities, towns and villages. It is a biodiverse network that helps conserve wildlife and the natural environment whilst providing space for public access. It contributes to a high quality environment that attracts people to live and work within the city region.
Contributor 2	Definition no 3:Greenbelt/green wedge (RPGI) issues. These green spaces probably need protection in Regional Plans (RSS) and local planning frameworks. “Green Lungs” for Urban dwellers – link to urban/rural/fringes. Could be used to ameliorate brownfield contaminated land.
Contributor 3	Definition 1 (with amends). GI provides a network of multi-functional green spaces that contributes to the high quality **semi-**natural and built environment

	required for existing and new sustainable communities, consisting of both public & private assets, with and without public access, **from urban to rural** locations.
Contributor 4	Definition 3 addition ' GI is the physical **& psychological** environment'
Contributor 5	Comment on Definition 3: " Nearly there" Own def: GI comprises the natural and semi-natural network of links and spaces. The links and spaces are predominantly but not always open and green, but many include hard features such as cycle tracks and water carrying structures where they support the green network. The network is used in many ways generally supportive of sustainable resource management.
Contributor 6	Definition 1: GI provides a network of multi-functional green spaces that contributes to the high quality natural and built environment required for existing and new sustainable communities **and comprises all environmental resources,** consisting of both public & private assets, with and without public access, **within and between our cities, towns and villages.**
Contributor 7	Definition 3 with amendments: GI is the physical environment within and between our cities, towns and villages. It is a network of multifunctional green spaces, including formal parks, private gardens, woodlands, road verges, green corridors, cemeteries, allotments, street trees and open countryside. It contributes to the high quality natural and built environment required for existing and new sustainable communities.
Contributor 8	Definition 3 with amendments: GI is the physical environment within and between our cities, towns and villages. It is a network of multifunctional green spaces, including formal parks, gardens, woodlands, road verges, green corridors, traffic-free routes, street trees and open countryside. It comprises all environmental resources, and thus a GI approach also contributes towards sustainable resource management.
Contributor 9	Ticked Definition 1 Amended Definition 2: "provides associated socio-economic benefits to human populations." Own definition: Would like to see a succinct definition that encompasses the components (what it is) and how to use it (functions/benefits). How it is managed will determine whether or not it contributes to sustainable development.

(b) Tyne & Wear Stakeholders - 16th September 2005

Contributor 1	Definition 3: with comments "This definition is possible the most encompassing. Needs to draw attention to different scales – local, district, regional etc & building design – not just about green environment.
Contributor 2	No selection but amendments to all definitions: Definition 1: GI provides a network of multi-functional green spaces that contributes to the high quality natural and built environment required for existing and new sustainable communities **and the maintenance of natural eco-system processes**, consisting of both public & private assets, with and without public access, and in urban and rural locations. Def 2: GI is an interconnected network of green space **including gardens, parks, disused or derelict land, woodlands, 'Green' transport corridors and open countryside and moorland,** consisting of both public and private assets, with and without public access, and in both urban and rural locations. Def 3: GI is the physical environment within and between our cities, towns and villages. It is a network of multifunctional green spaces, including formal parks, gardens, **living roofs and built environment with environmental functions e.g. as bat roosts or bird nesting sites** woodlands, road verges, green corridors, waterways **brownfield sites and derelict land of nature**

	conservation interest (including, for example, upland areas that have a role as natural stores of floodwater) towards, street trees and open countryside. It comprises all environmental resources, and thus a GI approach also contributes towards sustainable resource management.
Contributor 3	No selection but added: It also provides an essential contribution to the well being of those individuals with the settlements it serves and a contribution to the local economy. (All 3 definitions have useful elements.
Contributor 4	Def 3: GI is the physical environment within**, between and around** our cities, towns and villages. It is a network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees, **footpaths, bridleways, cycle routes and** open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes towards sustainable resource management. Comments: all must be accessible
Contributor 5	Own def: Green Infrastructures form interconnected networks of multi-functional green spaces that support a diverse ranges of activities and purposes. They provide an important function in the natural and built environment helping to create high quality spaces in both urban and rural locations.
Contributor 6	Own def: GI is the network of green spaces which provide social, economical and health benefits to the population in rural and urban settings. And ecological benefits for species).
Contributor 7	Definition 3 with amendments: GI is the physical environment within and between our cities, towns and villages **within the city region**. It is a network of multifunctional **green** spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. **It contributes to the high quality natural and built environment of sustainable communities.**
Contributor 8	Definition 3 with amendments: GI is the physical environment within and between our cities, towns and villages. It is a network of multifunctional green spaces, including formal parks, gardens, woodlands, road verges, green corridors, traffic-free routes, street trees and open countryside. It comprises all environmental resources, and thus a GI approach also contributes towards sustainable resource management.
Contributor 9	Own Definition: ' A systematic approach to the integration of ecological principles and the development planning process."
Contributor 10	Own Def: GI is a network of existing and planned spaces which soften grey infrastructure and contribute and enhance an ecologically modern urban or rural environment from a local to global scale.
Contributor 11	Def 3: GI is the physical environment within and between our cities, towns and villages. It is a network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees, footpaths, bridleways, cycle routes and open countryside. **It aims to improve quality of life for communities as well as to the environment at landscape level.**
Contributor 12	Selected Def 2: GI is an interconnected network of green space that conserves natural eco-system values and functions and provides associated benefits to human population. Plus from def 3: It is a network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources. Doesn't like "sustainable communities" – too ambiguous Qu: Does green infrastructure include rivers themselves? Not just the green bits on the side?? I would prefer it if it did.
Contributor 13	Selected definition 3 with **"small" network**
Contributor 14	Selected definitions 2 and 3

	Parts of all 3 – GI includes open spaces etc (as in Def 3), it can be in any ownership with varying levels of public access and value as this can lead to varying levels of natural ecosystem values and functions, The benefit to communities is important but incidental.

(c) Tees Valley Stakeholders - 19th September 2005

Contributor 1	Def 1 with amendments GI provides a network of multifunctional green spaces including formal parks, private gardens, woodlands, road verges, green corridors, street trees and open countryside That contributes to a high quality natural and built environment required for existing and new sustainable communities. Consisting of both public and private assets, with and without public access, and in urban, urban fringe and rural locations. (GI is a means of managing resources for the future.)
Contributor 2	Own def: GI is the network of urban parks and countryside that together allow free passage of people around the built environment while keeping them in touch with a sense of the natural world.
Contributor 3	Def 3: GI is the physical environment within and between our cities, towns and villages. It is a network of multifunctional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes to sustainable resource management.
Contributor 4	Def 3: GI is the physical environment within and between our cities, towns and villages. It is a network of multifunctional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes to sustainable resource management (in an ideal world).
Contributor 5	Comment on Definition 1: GI provides a network of multifunctional green spaces that contributes to the high quality natural and built environment required for existing and new sustainable communities….with and without public access, and in urban, urban fringe and rural locations. Def: 2 GI is an interconnected network of green space that conserves and enhances natural eco-system values and functions and provides associated benefits to human populations. (lack of built environment-greening/trees.) Def: 3 Overly long. Own definition: GI is an interconnected network of open space that conserves and enhances natural eco-systems, and provides leisure and recreation opportunity.
Contributor 6	Definition 2: add in Urban Fringe GI is the physical environment within and between our cities, towns and villages. It is a network of multifunctional green spaces, including formal parks, private gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also provides a framework for sustainable resource management and contributes towards sustainable development.
Contributor 7	Own Def: GI provides a network of multifunctional green spaces, including formal parks, gardens, woodlands green corridors, waterways, street trees and open countryside that contributes to the high quality natural and built

	environment required for new and existing and sustainable communities. It characterises both the public and private realm with and without public access in urban, urban fringe and rural locations.
Contributor 8	Mix of Def 1 and 3:GI provides a network of multifunctional green spaces meeting local and social economic needs that contributes to the high quality natural and built environment required for new and existing and sustainable communities, consisting of both public and private assets, with and without public access, and in both urban fringe and rural locations. It comprises all environmental resources, and thus a green infrastructure approach also contributes towards sustainable resource management.

Appendix 1E: Green infrastructure components – group feedback

(a) Regional Stakeholder Workshop

- Playing Fields & School Grounds amenity
- Land – not built on
- Gardens
- Road Verges
- Trees, hedges, vegetation
- Rights of Way Network
- Signed Walking & Cycling Routes
- Country Parks and Nature Reserves
- Rivers, Water e.g. ponds
- Surface water and culverted water courses
- Farmland, producers
- Tree-lined streets
- Brownfield land
- Contaminated land
- Allotments and cemeteries
- Moors including Town Moor
- Golf Courses
- Institutional grounds egg Hospitals
- Business parks
- Race courses
- Coast, beaches & dunes
- Roads, Highways green routes e.g. electric buses/tramways
- Woodland cover, forests
- Housing estates
- Green roofs
- Airport land

(b) Tyne & Wear Stakeholder Workshop

- Allotments. Gardens. Parks, green lanes
- Ground water, rain drainage and sewage
- Water courses
- Beaches
- Recreational paths, Rights of Way
- Tree-lined avenues
- Footpaths, bridleways
- Derelict land, brownfield & post industrial
- Motorway and railway sides and verges
- Wildlife corridors
- Designated sites SSSIs
- Burial cemeteries
- Heathland, scrub, hedgerows
- Semi-natural habitats
- School grounds, playing fields
- Woodlands
- Local paths, cycle ways and travel routes
- Golf courses
- Land – not built on
- Designs of buildings and water drainage and landscapes, planting
- Future development and approach ideology
- Flood buffers and drainage
- (Air quality and dark skies)
- Quality is important, local standards function and protection
- Transport routes – grey to green and green bridges

(c) Tees Valley Stakeholder Workshop

- Playing Areas & Fields
- Golf Courses
- Beaches, coastal areas
- Littoral zone, estuaries
- Private clubs egg Bowls, Rugby etc
- Country House Grounds
- Sight miles
- Seascapes
- Senses – natural space
- Hedgerows
- Quarries
- Street furniture
- Groundwater resources
- Street trees
- Wasteland
- Woodland
- Moorland
- R.O.W and byways
- Cemeteries & churchyards
- Green roofs
- Wetlands
- Waterways rivers etc
- Reservoirs
- Geological exposures
- Verges
- Farmland
- Parks – urban and Country
- Allotments
- SSSIs and Local Nature Reserves
- Wind Turbines
- Private gardens
- Air quality
- Bogs
- Energy crops
- Recreation sites – public open space
- Urban fringe
- Floral displays/baskets etc
- Greenbelt
- Roundabouts, highways
- Screening belts
- Culverted waterways
- Habitats for bats, birds
- Road and rail verges
- Hotel, hospital, school grounds

Appendix 1F: Green infrastructure functions – group feedback

(a) Regional Stakeholder Workshop

- Recreation
- Mental & Physical well being
- Exercise and Health
- Travel to work, anti congestion
- Biodiversity & habitats
- Meeting places
- Climate change management: 1. Biomass fuel production etc 2. Flood plains/measures etc
- Flood management
- Burial
- Food production & Energy production e.g. biofuel
- Farming Livelihoods
- Employment
- Formal Sport
- Sense of space and place
- View & outlook
- Defining and protecting character and identity
- Heritage & archaeology
- Cultural values
- Event venues
- Tourism
- Noise reduction
- Smell senses
- Water quality
- Education
- Transport
- Play
- Carbon/pollutant fixing
- ROW improvement plan
- Shade provider
- Defining development e.g. Greenbelt
- Composting/waste/recycling

(b) Tyne & Wear Stakeholder Workshop

- Not necessarily 'green' – bat bricks
- Information, education, signage and interpretation
- GI by design
- Climate change – flood management
- Accessibility – travel & transport
- Public access & local green space
- Public and private land
- Wetland preservation of habitat – balance biodiversity
- Visual, hearing and 'sense' accessible
- Amenity value of space between areas
- Ecological capacity
- Management and maintenance – different regimes to include different habitats
- Wasteland – diverse greenspace
- Hierarchy of open space – recreation, leisure and nature
- Assessing local needs financial coast and benefits of recreation
- Future needs and capacity of GI e.g. Climate change benefits
- Define use of green space must be multifunctional

(c) Tees Valley Stakeholder Workshop

- Public Health Mental & Physical
- Sense of place
- Air quality – pollution, dark skies
- Informal and formal recreation and sport
- Social understanding between urban and rural
- Fresh water
- Social identity
- View – landscape
- Setting for investment
- Training – skills gap ILMs alternative employment
- Education facilities formal/informal
- Knowledge Lifelong learning
- Volunteering opportunities
- Event venues and community spaces for activity
- Global benefits – environmental capital
- Climate change – shade, porosity – flood drains etc
- Social inclusion
- Community identity
- Noise absorption
- Grey/green integration
- Criminal rehabilitation, anti-social behaviour
- Sustainable solutions demonstration areas on urban fringe
- Land use, horticulture
- Production of food and energy crops
- Nutrient transfer – geo/water
- Desirable journeys by foot, bike or horse
- Green burial sites
- Free food – hedgerows etc
- Buffering protection of SSSIs and LNRs
- Short-term space planning – green space
- Timber production
- 'Cleaning' previously developed land
- Sustainable access to greenspace
- Prevent leaching problems, fixing benefits
- biodiversity

Appendix Two: Green Infrastructure Planning Seminar Flyer

GREEN INFRASTRUCTURE PLANNING

Sustainable Cities in the 21st Century

North East England Regional seminar

Monday 3rd April 2006, 09.30 – 15.45

The Life Centre, Newcastle-upon-Tyne

Never before has the sustainability of urban areas depended as much on the quality and quantity of green spaces within, adjacent and within their extensive footprint. The list of challenges is seemingly endless; managing climate change, public expectations for recreation, close to nature living, non-motorised transport, carbon management, locationality of economic investment sites and housing, regional growth strategies, management of natural resources are all included. Green infrastructure planning has come to the fore as a framework for managing these potentially complex interactions and has already become widely used in national and regional growth strategies.

Who is the seminar aimed at?

Planners in local authorities and private practice, Strategy Managers, Regeneration Specialists, Corporate Management, NGO's, Portfolio Holders, Consultants, Land Managers, other professionals.

Key Feature

Launch of the Regional Green Infrastructure Planning Support Guide and workshop sessions by the authors.

Speakers already confirmed

Clive Davies ..... Chief Executive of North East Community Forests
Dr Robert MacFarlane ..... Director for the Centre for Environmental and Spatial Analysis
Ian Preston ..... The Northern Way
Susan Clark ..... Countryside Agency

General Information

Cost: £40.00 (reduced rate of £30.00 for charities and community sector representatives)
CPD attendance letters available for professional memberships.

Travel Information

Adjacent to Newcastle Central Station, Car Parking: Times Square Multi Storey Car Park (653 spaces) (drivers are encouraged to car share if possible).

Booking Form available online at: ***www.necf.org.uk***
Alternatively email: ***greeninfrastructure@necf.org.uk***
or telephone Stephanie Grayson: ***+44 (0)1642 300716***
Fax: ***+44 (0)1642 300715***

Please see map overleaf

Appendix Three: GI Seminar Timetable

Monday 3rd April 2006 at the LIFE Centre, Newcastle upon Tyne

09.30 – 10.00	**arrival, coffee and registration**
10.00 - 10.20	**Clive DAVIES,** *Green Infrastructure in context – the development of ideas, key principles and important antecedents.*
10.20 – 10.40	**Susan CLARK***, Multi-functionality and the public benefits that accrue from the countryside in and around towns*
10.40 – 11.00	**Ian PRESTON***, growth and sustainable communities how green infrastructure can support the Northern Way*
11.00 - 11.15	**Comfort break and coffee break**
11.15 – 12.00	**Rob MacFarlane,** *the green infrastructure planning guide from A to Z.*
12.00 – 12.15	Questions on the Green Infrastructure Planning Guide moderated by Clive Davies.
12.15 – 13.15	LUNCH and opportunity for delegates and speakers to network
13.15 – 15.15	Workshop carousel – delegates have the opportunity to attend three workshops with a change over every 40 minutes.
	Green infrastructure – principles, overlapping concepts and use in spatial planning strategies. FACILITATOR: Susan Clark, RAPORTEUR: Ingo Schuder
	Green infrastructure – mapping and GIS (geographical information systems) as a tool to GI Plan production FACILITATOR: Rob MacFarlane, RAPORTEUR: Chris McGloin
	Green infrastructure – bringing about delivery 'making it happen' FACILITATOR: Clive Davies RAPORTEUR: Ian Mell/Penny Sinclair
15.15 – 15.30	Feedback from raporteurs
15.30	Summing up moderated by Clive Davies
15.45	DEPART

NB: The feedback from the workshop sessions will be used to inform v1.1 of the Green Infrastructure Planning Guide and be incorporated in the Regional Green infrastructure Report. Delegates are thanked for their contribution to this.

Appendix Four: Green Infrastructure Planning Seminar Workshop Group Feedback

Group A

Topic 1: Delivery Priorities: Are they the right ones? What should be added or removed?

Topic 2: At what level(s) should delivery occur? Are landscape- scale partnerships key?

Group A1

1) Priorities in Section 16:

- May be too much overlap.
- May be too wordy-not sufficiently specific.
- Could be improved by an overall structure, e.g. within themes such as Biodiversity, Health, etc.
- Could be related back to underlying principles earlier in document.
- Biodiversity and sustainability agenda not sufficiently prioritised.
- Could be more specifically aligned to targets and an action plan.

General Points

- Local authority planners need help/input on non-statutory issues e.g. G.I., to develop LDFs-need partnership support.
- NECF will develop a support system with on-line help and guidance.
- Need to debate potential conflicts between wildlife and people-centred approaches, protection vs. accessibility& connectivity.
- Need to consider how real projects can be linked to the priorities.

2) Delivery levels

- Appropriate delivery level should relate to funding opportunities, from micro to city regional.
- Need more emphasis on bottom-up delivery, including role of community/vol. Sectors.
- Land ownership problems not being addressed-this limits area of influence. Need to consider greater use of C.P.O.s.
- Need to take holistic view of delivery-not merely linkages between spaces.
- Need to have hierarchy of policy to support delivery, from RSS, down to LDFs.

Group A2

1) Priorities in Section 16:

- Priorities should be realistic, and allow for opportunism.
- Will vary according to different levels of decision-making.
- Need to operate within a strategic framework.
- Need to be flexible to unlock funding.
- Need to combine best of bottom- up and top-down strategies.

General Points

- Need to win “hearts and minds” within partner organisations.
- Need to embed G.I. thinking in L.A. Departments.
- Not clear what G.I. plans will look like.
- Should spatial planning or project planning be the main aim?
- Does the Guide produced by NECF over-emphasise G.I.S.?

2) Delivery levels

- Appropriate levels for landscape level delivery include CFs, & Sub regional partnerships, e.g. Mineral Valleys Project, Hedgerow Partnership.
- Landscape-scale delivery can be hampered by political boundary issues.
- Innovation in projects more common at micro level.
- Delivery needs to be embedded in agendas of non-L.A. partners, and LSPs.
- Need to put delivery in rural areas within strategic framework.
- Question for regional decision makers-How can the delivery of G.I. be resourced on a sustainable basis?

Group A3

1) Priorities in Section 16:

- The emphasis on connectivity must be appropriate to, and relate to, the context of the site.
- Connectivity may be assisted by new planning system-new potential for creative solutions.
- Need to build consensus on concept of wider access rights to open space.
- Need to consider historic context of development patterns- e.g. river catchments.
- Need to consider trade-offs between competing priorities.
- Need caution on definitions of “quality”, and “high value”-for whom?
- Management issues will be critical in ensuring sustainable delivery.

2) Delivery levels

- Delivery at strategic level will depend on availability of funding from partners.
- Section 106 arrangements only provide limited resources.
- Delivery of G.I. needs to be built into Urban Design Guidance.

Group B

Key Issues

Data Accessibility/Availability

Internal within Local Authorities - The consensus within Local Authorities was that there are differing levels of access to data within departments. In the main, most had access to data however in some cases that access may have been through a GIS Officer as oppose to direct access via their own pc. Some authorities had a corporate GIS, others ran on different systems within the same organisation.

External - Outside organisations/consultants had difficulties accessing data from Local Authorities and other agencies. This was partly due to Ordnance Survey licensing issues and also establishing who the main contact was for acquiring data.

Determining the level of provision of data/information to the public and its detail was a discussion point.
Cost of establishing a GIS i.e. licences for software, data and skilled staff proved an obstacle for smaller lesser funded district bodies.

Use of Aerial photography as an alternative to mastermap for assessing typology was also discussed. Use of both mastermap and aerial photography together was a more effective method for data capture, as aerial photography is not as frequently updated as OS Mastermap.

Consistency of Data

Quality of data and information regarding how it was captured (metadata) was a big issue. Not knowing the source of data, what baseline it had been captured on, and its accuracy proved to be something which delegates, whether from a public or private background, found that it could prove misleading and provide inaccuracies in the decision making process.

Assessment of typology differed within organisations. This proved an issue when it came to cross boundary working and consultation with neighbouring bodies. There did not appear to be a consistency across organisations.

Implications of Scales

Issues arose around determining which type of data should be used at what level of scale. i.e. Local to Regional.

When does OS Mastermap stop from becoming useful?
Mastermap can be used to capture a baseline inventory however its visual significance can be lost in small scale mapping i.e. at a local authority level, sub regional level. Size thresholds can be used to help manage this in order to display this and other organisations data at different scales.

Group C

Facilitator: Susan Clark
Raporteur: Ingo Schüder

- Key points reported in plenum session in bold -
NB: answers are still structured in three blocks (= groups) for each question

1 Green Infrastructure principles

Q1.1: What makes GI important?

- **Important to range of professionals, not just planners**
- **Strategic framework applicable to projects and plans**
- **Common agreed terminology – greater understanding of concept**
- **More important for RUF/ UF**
- For issues such as housing/development and related commuting
- For recreation, health and biodiversity
- Open spaces are under urban pressure
- limited/ no natural places in densely populated areas, so we have to protect/ enhance semi-natural/ man-made green spaces
- some remote semi-natural/ wild areas need protection, so people need to experience "nature" elsewhere
- semi-natural/ wild areas are not easily accessible for some (deprived) communities, so they need green spaces closer to where they live
- contribute to QoL in RUF/ UF

- **common sense starting point based on green intelligence**
- **needs common terminology**
- **strategic management of development/ sustainable urban extension**
- lack of conceptual thinking in current planning system
- access from City centre to rural areas (and vice versa –green spines)

- **neutral concept (i.e. no one agency/ organisation involved/leading)→ buy-in**
- **delivering benefits/ targets (already made in existing documents) and possibly developing more**
- general all-embracing concept
- not additional burden
- driving new benefits and targets
- contribution to SD & Northern Way

Q 1.2 Why is it different from other planning approaches (tools)

- **joint-up → get more synergies**
- **own language/jargon/ terminology**
- lack of planners in process
- those involved in GI lack knowledge/experience/understanding of landscaping & planning process on ground
- only covers a part of the country (i.e. not strong rural focus)
- no common agreed language/terminology
- issues with coherence (i.e. not universally established under same name ("GI")

- **offers quality rather than quantity**
- **consistent approach**
- collaborative approach
- operates in RUF interface

- can work across rural –urban spectrum

2.Overlapping concepts & use in spatial planning strategies.

Q2.1 Do you agree that GI planning should be mainstreamed into the spatial planning system?

- **keep focus on specific areas/scales (i.e. RUF/UF)**
- **link rural-urban work**
- **Within RSS, there are a large number of hooks for GI**
- add coastal access
- Yes, regionally and nationally
- Get into RSS → more implementation due to statutory function EiP

- **RSS will give opportunity for more radical thinking**
- **RSS should have policy on GI**
- Yes, but need evidence base "/green intelligence"/baseline information

- **Should be incorporated in RSS --> statutory role --> LA, e.g. LDFs**
- Timing of mainstreaming should be considered (LA have got their plans out)
- Needs buy-in from LA
- GI as cross cutting aspect to be incorporated/ embedded in other areas of work/strategies (i.e. to avoid silo-thinking, GI should not be separate chapter in RSS)

Q2.2 what are appropriate scales for GI plans?

- Boundary issues Yorkshire, Cumbria and Scotland

- Different scales depending on area characteristics (e.g. hard/ soft boundaries between rural – urban)

- Landscape scale appropriate for strategic linked networks
- Need to consider linkages between urban and rural to avoid separate planning

- LSPs, e.g. access/cycling networks
- Scope at all levels

Questions/comments from participants:

- How can rural communities be (better) involved in GI agenda?
- How does GI fit into Northern Way?
- Has everybody signed up to GI? (or is this event preaching to the converted?)
- What do we want? What are the aims and ambitions?
- Is this initiative different/ new to previous initiatives?
- public has generally an anti-development attitude, so even GI planning will be viewed with(some scepticism)
- Multifunctionality is viewed critically by those not involved in GI/ other LA departments. (e.g. multifunctionality can cause conflicts, e.g. vandalism, esp. when increased access of mixed use groups)
- Will future development leave us with any "rural" areas? (i.e. do we need to rethink RUF definition?)
- How can we give incentives for GI planning?
- Is CIAT = GI?
- There is an issue with rural areas/ land supply
- How can we get buy-in from non-converted?
- GI should be already incorporated/ embedded in SD parts of strategies/projects/plans anyway (i.e we do not need separate GI planning[?])
- Timing is difficult (LDFs are all in preparation)

What may be important at a local level may not show as a priority at a regional scale. i.e. public rights of way – higher importance at local level, less at a regional scale, when comparing to National Cycle Networks or Long distance footpaths.

Need for Co-ordination of Core datasets

There was a general feeling that, across the region, a co-ordinated approach to centrally holding GI data would be beneficial. This could be a web based approach similar to www.magic.gov.uk (Multi agency Geographic Information for the Countryside)

This would also help assist in respect of cross boundary working if specific standards of typology and metadata were introduced.

Other non -GIS points made.

Is the method of GI Planning suggested in the guide, as effective in rural areas?

It was felt that the guide was more applicable to the urban and urban fringe. However some the process of creating a baseline GI map

It appeared there was a potential for opportunity for **local developers** to provide **local development.** There was more likelihood of local developers working closely with planners in delivering a higher quality of Green Infrastructure, than some of the larger national housing developers.

Non cross boundary working often led to short term planning in provision Green Infrastructure.

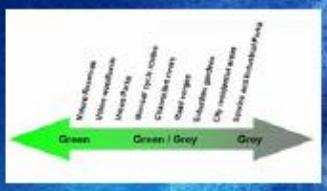
Appendix Five: Presentation to Green Infrastructure Seminar # 1

Green infrastructure in context

2. Principles

Principles

There is a grey-green continuum of thinking relating to concepts surrounding 'infrastructure'. Green can be used to denote the function or facility provided by an element, even if it is not strictly 'green' in land use terms.



Principles

broad set of interests

Principles

Green infrastructure in context

3. Antecedents

Antecedents

Antecedents

- Basic connectivity studies >>> is the basis for the use of links, segments and nodes to describe the world and provides the understanding to use Geographic Information to produce GI plans.
- Human-centred thinking >>> related to improving health, increasing access to wildlife, and providing scenic settings led to the establishment of urban parks and then later to the idea of linked green spaces and 'nature-like' landscapes in residential areas. Contemporary equivalence lies in urban forests and landscape scale 'community forests' in the rural urban fringe.

Antecedents

- Ecology >>> incorporating landscape ecology in which the observer takes a multi-scaled view of human, biotic and abiotic influences on the development and planning of whole landscapes, ecological networks which aim to reduce the isolation of species in human-dominated landscapes, and ecological footprints a measure of how sustainable our life-styles are.
- Multi-functionality >>> describes a vision of the Countryside Agency and Groundwork UK that focuses on multi-functionality and identifies a wider set of potential functions for development and enhancement in the urban fringe and areas of land that link urban and rural areas.

Antecedents

- Sustainable development >>> is not directly an antecedent to green infrastructure but the language of sustainable development sets the context for environmental planning. Green infrastructure should be seen in the context of initiatives that aim to render current land use patterns and practices more sustainable.
- Greenways and Green corridors >>> are two concepts often treated effectively as one, as they are both focused on the provision of opportunities and linear routes with a wide range of characteristics and uses particularly relating to recreation and commuting.

Green infrastructure in context

4. Examples

Examples

Example 1 | Example 2

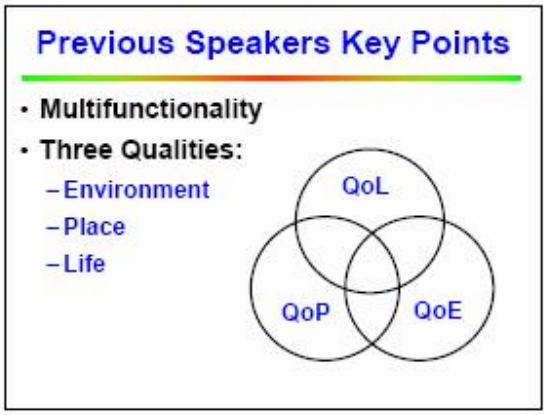
Green Template of Apeldoorn → West Park, Darlington

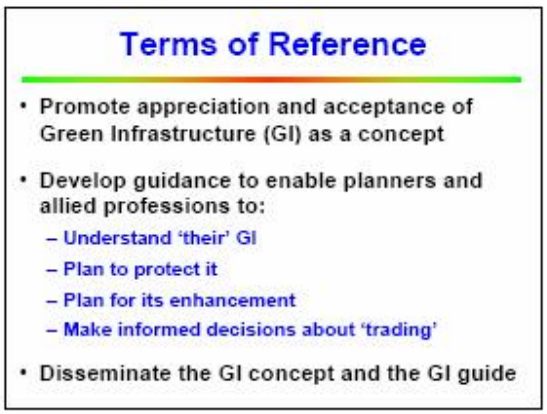
Apeldoorn


West Park


Green infrastructure in context
v1.1 on the web
helpline coming soon
greeninfrastructure@necf.org.uk
Clive Davies

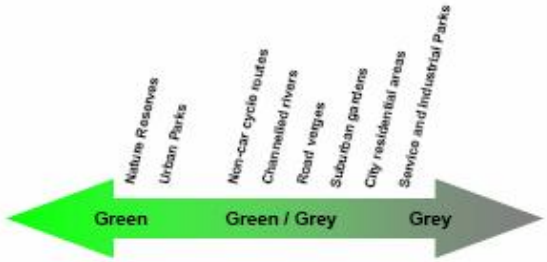
Appendix Six: Presentation to Green Infrastructure Seminar # 2





GI: what is it?

- Not just about green spaces



GI: what is it?

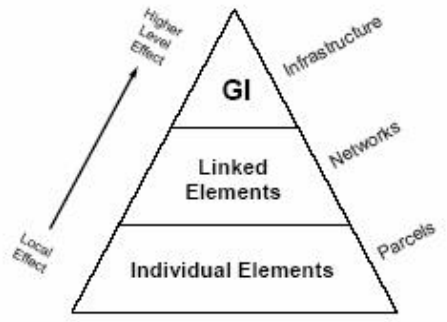
- Not just about green spaces
- Emphasis on multi-functionality
- Focused on connectivity and linkages
- A spatial framework for amenity, conservation and development

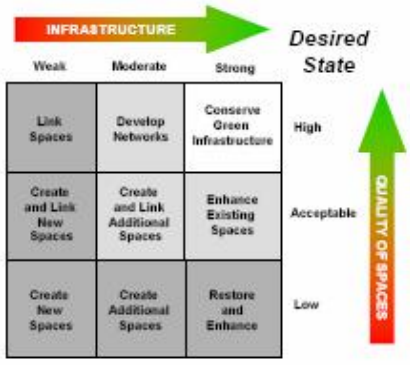
GI is comprised of…

- Playing fields
- Undeveloped land
- Gardens
- Road verges
- Woodland
- Trees and hedgerows
- PRoW network
- Cycle routes
- Country parks
- Nature reserves
- Farmland
- PDL / Brownfield sites
- Allotments
- Cemeteries
- Golf courses
- Race courses
- Beaches and dunes
- Inter-tidal zone
- Flood plains
- Moorland
- Wetlands
- Quarries
- Urban parks
- Waterways
- Institutional grounds

Summary of Concept

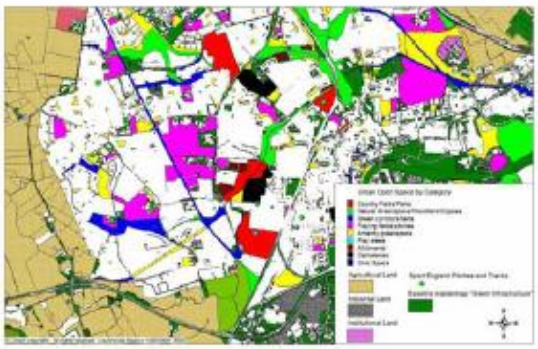
- Need to promote an appreciation of GI
- Driving up the scale of thinking and action
- Individual parcels are inherently less multifunctional than landscapes
- Links, networks and infrastructure are not all the same thing





GI: what have we got, and where?

- A process of inventory or baseline mapping
- A lot of data and information exists:
  - Land use surveys
  - Open and Green Space Surveys
  - Aerial photographs
  - GLUD / NLUD
  - Local Plan / LDF data and processes
- The guide emphasises partnership working to build a common appreciation of what is important



Standards: how do we measure up?

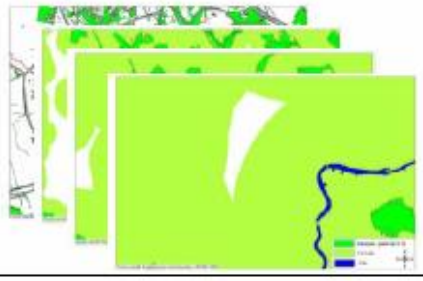
- There are a lot of different standards…

Examples of Standards

Subject	Standard
English Nature ANGSt	No person more than 300m from nearest area of accessible natural green space at least 2ha in size
Woodland Trust Access Standard	No person more than 500m from at least one area of accessible woodland at least 2ha in size
NPFA	Minimum of 2.4 ha per 1000 population
PPG17	General guidance emphasising local standards e.g.
South Tyneside Council	All dwellings within 3km of an open space at least 30ha with general facilities for recreational activity in a landscaped setting

Standards: how do we measure up?

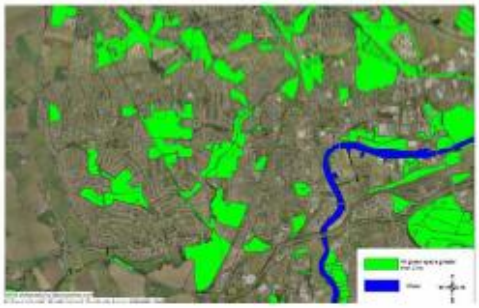
- There are a lot of different standards…
- Which you adopt determines the outcome



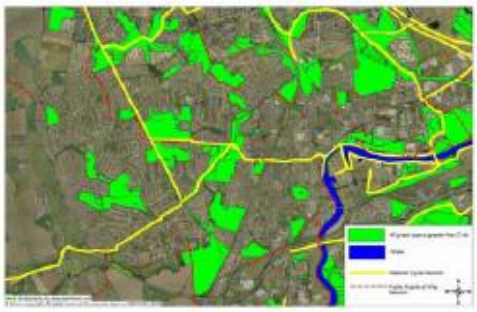
What do we need to know?

- What GI elements must be protected?
- What elements should be changed or enhanced?
- Where should new elements be created and what type should they be?
- Where should the development of grey infrastructure be integrated with GI?
- Which elements should be linked together?
- Which elements are possibly tradable?

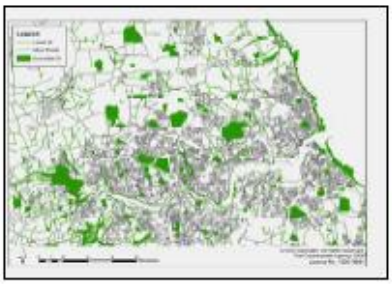
What MUST be protected?



What MUST be protected?



The Issue of Scale

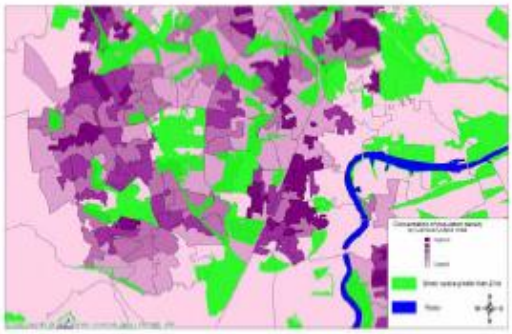


What to develop / enhance? Where to create new elements?

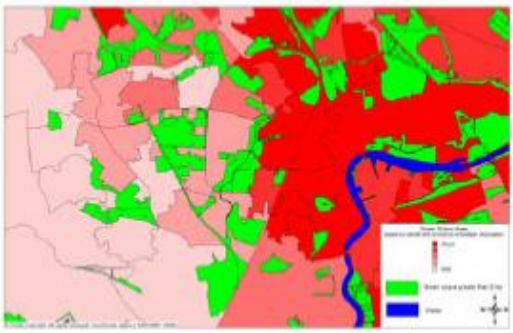
- Context: a two way relationship
- Quality: an absolute concept, but also relative – suitability and sufficiency
- Interaction: multi-functionality and synergies

What to develop / enhance? Where to create new elements?

- Where are there gaps:
  - In green space of any type?
  - In specific types of GI?
  - In linkages?
  - In areas of higher need?



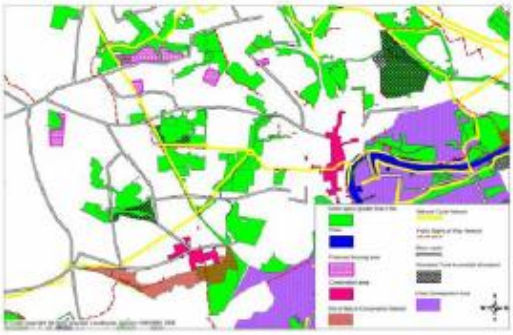
Population Density



Index of Multiple Deprivation

What to develop / enhance? Where to create new elements?

- Where are there gaps:
  - In green space of any type?
  - In specific types of GI?
  - In linkages?
  - In areas of higher need?
- Where are there viable opportunities to create new elements and links?



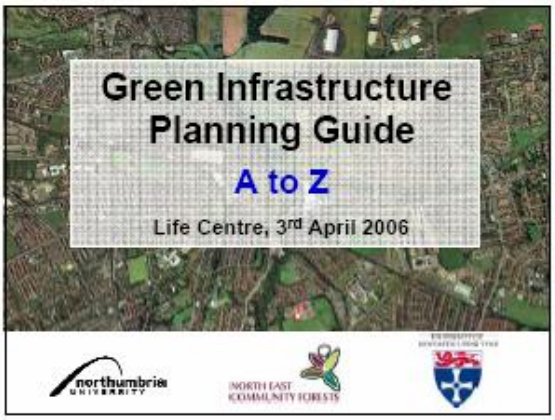
GI and Local Plan Information

What is Tradable?

- This Guide is not put forward in an anti-development spirit.
- To a very large degree GI is about people and it is about positive forward planning - this must (a) be realistic and (b) consider landscapes and communities of the future
- Determining critical GI is part of the same process as determining tradable GI - it is a question of taking a broad view (in more sense than one).

Summary

- Emphasis on a structured approach to gather data and generate relevant information
- An emphasis on raising the scale of thinking in relation to provision and connection
- Links strategic (what should...) with tactical (what could...) approaches
- The Green Infrastructure Planning Guide covers the concepts and assessment, planning and delivery issues.



Appendix Seven: Briefing Paper for Regional Spatial Strategy EiP

GREEN INFRASTRUCTURE PLANNING

NORTH EAST REGION

BRIEFING PAPER FOR
Regional spatial strategy EIP

MARCH 2006

INTRODUCTION

A **Green Infrastructure Planning guide** commissioned by regional agencies including English Nature, Forestry Commission and Countryside Agency has been developed to support the planning and delivery of green infrastructure in the North East region. The guide has been produced by a consortium of Northumbria University (Centre for Spatial Analysis), Newcastle University (Landscape School) and North East Community Forests (Local authority partnership) in conjunction with the commissioning bodies. Additional oversight of the guide has been provided by ONE NE, North East Environment Forum, The Northern Way, Rural Development Service and NGO's. The planning guide will be launched on the 3rd April 2006.

SUMMARY OF REGIONAL FINDINGS

GI[9] is a widely accepted term backed by a robust evidence base plus ample national and regional research. There is an imprecision to the definition but wide regional stakeholder agreement of the components included within Green Infrastructure. It is being viewed by many professionals as a mainstream concept allied to 'city region' and 'sustainable communities' planning. Existing datasets and domain analysis provide a strong framework for developing GI Plans. Delivery is through the work of existing landscape scale partnerships, for which the two city regions are well provided for.

AVAILABLE DEFINITIONS

Green infrastructure provides a network of multi-functional green spaces that contributes to the high quality natural and built environment required for existing and new sustainable communities, consisting of both public and private assets, with and without public access, and in both urban and rural locations.
Source: - *City Region Park draft paper 2005*

Green infrastructure is an interconnected network of green space that conserves natural eco-system values and functions and provides associated benefits to human populations.
Source: - *Benedict Mark A, and McMahon, Edward T; Renewables Resources Journal, Autumn 2002*

Green infrastructure is the physical environment within and between our cities, towns and villages. It is a network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes towards sustainable resource management. Source: - *Countryside Agency discussion paper 2005*

REGIONAL GI STANDARDS

There are widely accepted existing standards available to benchmark GI in the North East region (see appendix 1). Of these those relating to PPG17 (COMPANION GUIDE) and English Nature: ACCESSIBLE GREENSPACE STANDARDS MODEL are highly tailored for this purpose.

DEVELOPED THROUGH A STAKEHOLDER LED APPROACH

The regional GI Planning Guide has been developed through a stakeholder led approach involving representative from regional agencies as well as those from the two city regions. A comprehensive list of GI types has been secured through this process (see appendix 2). These can be shaped into recognised domains (groupings of GI by type).

GI PLANS

Can exist in several forms but a robust yet flexible methodology described in a GI planning guide has been devised to provide a consistent framework for these. This is based on the use of available data, the digital national framework, GIS techniques (which automates much of the process) and a consultative approach to planning, review and delivery – (see appendix 4)

[9] GI is an accepted abbreviation for Green Infrastructure

The GI planning guide facilitates the production of geographically based Green Infrastructure Plans but **is a flexible tool that can be modified by the user to meet the 'real world' situations they are dealing with**. The range of Green Infrastructure Planning outputs that the Support guide can assist with include:-

- Spatial Green Infrastructure Plans in for instance the two NE City Regions
- Strategic GI guidelines that steer decision making in the development control process
- Supplementary planning documents
- Policies embedded within Local Development Frameworks
- Statutory and non-statutory plans produced by organisations including Natural England and Environment Agency.
- Proposals included within local Area Based Initiatives
- Proposals included within regional strategic documents

APPLICATION OF THE REGIONAL GI PLANNING GUIDE

The primary application of the GI Planning Guide is to **facilitate all forms of Green Infrastructure Planning at different geographical levels**; these key levels are:-

- Regional level e.g. North East England
- County, sub-region or city region level e.g. Tees Valley
- Borough or District level e.g. North Tyneside
- Neighbourhood level e.g. West Middlesbrough Neighbourhood Renewal Area

The **county, sub-region and city region level is viewed as a 'critical' level for GI Planning** since it at this scale that the essential components of Green infrastructure especially connectivity are maximised.

The guide is a **practical tool for 'professionals'** engaged with all aspects of spatial or functional based planning. These professionals include:-

- Strategists and policymakers in the public sector
- Town and country planners (engaged in local authority planning[10] and in private practice[11])
- Environmental and sustainable development professionals[12]
- Landscape architects, planners, managers and scientists
- Regeneration specialist's e.g. urban design, housing renewal, community development.
- Consultants offering services to public and private sector clients
- Academics and research students

A **Professional Support System,** moderated by Natural England, can provide support for professionals involved in GI planning, to include:-

- Regionally relevant GI planning training based on the Planning Support Guide
- A draw down contract to provide 'consultant mentors' to support professionals in organisations embarking on Green Infrastructure Planning.
- Open access training support provided by the regions Universities.

This professional support system will also help to overcome potential concerns that this emerging area is too costly to pursue since the support costs would be met by the lead organisation.

REGIONAL STRATEGY

It is imperative for there to be a robust policy framework if Green Infrastructure Planning if it is to significantly progress in the North East region. Ideally this should include:-

[10] This can be subdivided into Forward Planning and Development Control
[11] Generally as advisors to developers or working within development based businesses
[12] For instance LA21, environment city.

- A Green infrastructure **policy (preferable) or supportive policies (at least) in the Regional Spatial Strategy** and association of this with sustainable communities as well as environmental policies
- A **Green Infrastructure Chapter in the proposed Regional Environmental Strategy** (NESE) – making Green infrastructure a key component of environmental thinking in the region for at least the next 10 years
- **Lead plans which serve as exemplars** to the rest of the region (e.g. Tees Valley Green Infrastructure City Region Plan or Strategy)
- **Commitment to long term funding of the** professional support system

DELIVERY

Translating Green Infrastructure Plans into delivery is a critical task and must be **addressed as part of the GI planning process and not as an after thought.** Discussions held by the North East Environment Forum suggest that at a strategic geographical level[13], that **Landscape Scale partnerships represent the best delivery mechanism**. **Fortunately the North East Region is well serviced by Landscape Scale initiatives** which include Great North Forest, The Tees Forest and the Mineral Valley's Project with additional delivery capacity provided for by local Groundwork Trusts.

The **priorities for delivery** include-

- Placing a high value on existing green areas, prevent deterioration of these and seek quality improvements which directly benefit communities whose local environment is deficient in the qualitative benefits of access to improved environments. Deficiency includes lack of access, lack of knowledge and lack of amenity.
- Green infrastructure that increases participation in exercise and tackle 'health of the nation' targets and increases the health and motivation of the regional workforce (for example by providing green routes to work)
- Improve the diversity of green areas to address local needs by realising the potential to deliver multi-functional benefits generally achieved through landscape led improvements.
- Connect 'green areas' areas together to achieve a 'strategic whole' and create connectivity benefits
- Seek cooperative management of joined green areas whether they are in private ownership (such as gardens) with adjoining public areas (such as parks or the street scene)
- Prioritise the creation of new landscapes that connect existing landscapes together, unless there are compelling reasons not to do so (for example a biodiversity constraint)
- Select areas for green infrastructure improvements that protect or enhance natural resources (for example through protection of soils)
- Activities that aid delivery of existing local priorities (for example that release more land for tree planting in community forest areas)

[13] considered as all levels of District and above

APPENDIX 1: DISTANCE AND ACCESS TO GREEN INFRASTRUCTURE STANDARDS

REFERENCE STANDARDS

- Accessible Natural Greenspace Standards -I Promoting the Natural Green structure of Towns and Cities, English Nature
- Green space Strategies: A Good Practice Guide, CABE Space
- Planning Policy Guidance 17: Assessing needs and opportunities (Companion Guide).
- Six Acre Standard: National Playing Fields Association
- Space for People Targeting action for woodland access: Woodland Trust

PROMOTING THE NATURAL GREEN STRUCTURE OF TOWNS AND CITIES: ENGLISH NATURES - ACCESSIBLE GREENSPACE STANDARDS MODEL

- No person should live more than 300 m from their nearest area of natural greenspace of at least two (2) hectares in size;
- There is provision of at least two (2) hectares of Local Nature Reserve per 1,000 population;
- That there should be at least one accessible 20 ha site within two (2) km from home
- That there should be one accessible 100 ha site within five (5) km;
- That there should be one accessible 500 ha site within (10) km.

GREEN SPACE STRATEGIES: A GOOD PRACTICE GUIDE – CABE SPACE

None specific

PLANNING POLICY GUIDANCE 17

Example from South Tyneside (Tyne and Wear City Region): Chapter 6.13

District parks and open spaces: all dwellings should be within 3 km of an open space of at least 30 ha which provides general facilities for recreational activity within a landscaped setting.

Neighbourhood Parks and Open Spaces: all dwellings should be within 1 km of an open space of between 10 and 30 ha which provides general facilities for recreational activity within a landscaped setting.

Local parks and open spaces: all dwellings should be within 400 m of an open space of between 2 and 10 ha which provides facilities for recreation within a localised area, catering for the specific informal needs of occupants of the immediate vicinity.

Pocket parks and small open spaces: all dwellings should be within 200 m of a small formal or informal area of open space of between 0.2 and 2 ha that is suitable for informal use and has high amenity value.

Minimum Acceptable Size Component – Good Practice Example: Fareham Borough Council - Chapter 6.16

- Pitches: a minimum of two pitches plus changing and parking
- Other outdoor sports facilities: a minimum of 0.65 ha
- Local equipped areas for play: a minimum of 0.5 ha
- Neighbourhood Equipped Areas for Play: a minimum of 1.0 ha
- Informal play spaces: a. minimum of 0.1 ha, with no dimension less than 10 m

SIX ACRE STANDARD: NATIONAL PLAYING FIELDS ASSOCIATION

A minimum standard for outdoor playing space of 2.4 hectares (6 acres) for 1000 people, comprising 1.6 hectares (4 acres) for outdoor sport and 0.8 hectares (2 acres) for children's play.

Outdoor equipped playgrounds for children of whatever age; other designated facilities for children which offer specific opportunity for outdoor play, such as adventure playgrounds; casual or informal playing space within housing areas 0.6-0.8 ha (1.5-2 acres)

SPACE FOR PEOPLE TARGETING ACTION FOR WOODLAND ACCESS: WOODLAND TRUST

“Woodland Access Standard” - that no person should live more than 500m from at least one area of accessible woodland of no less than 2ha in size and that there should also be at least one area of accessible woodland of no less than 20ha within 4km (8km roundtrip) of people’s homes.

APPENDIX 2: REGIONAL STAKEHOLDERS LIST OF GI COMPONENTS INCORPORABLE INTO DOMAIN ANALYSIS

Regional Stakeholders

- Playing Fields & School Grounds amenity
- Land – not built on
- Gardens
- Road Verges
- Trees, hedges, vegetation
- Rights of Way Network
- Signed Walking & Cycling Routes
- Country Parks and Nature Reserves
- Rivers, Water e.g. ponds
- Surface water and culverted water courses
- Farmland, producers
- Tree-lined streets
- Brownfield land
- Contaminated land
- Allotments and cemeteries
- Moors including Town Moor
- Golf Courses
- Institutional grounds egg Hospitals
- Business parks
- Race courses
- Coast, beaches & dunes
- Roads, Highways green routes e.g. electric buses/tramways
- Woodland cover, forests
- Housing estates
- Green roofs
- Airport land

Tyne & Wear Stakeholders

- Allotments. Gardens. Parks, green lanes
- Ground water, rain drainage and sewage
- Water courses
- Beaches
- Recreational paths, Rights of Way
- Tree-lined avenues
- Footpaths, bridleways
- Derelict land, Brownfield & post industrial
- Motorway and railway sides and verges
- Wildlife corridors
- Designated sites SSSI's
- Burial cemeteries
- Heathland, scrub, hedgerows
- Semi-natural habitats
- School grounds, playing fields
- Woodlands
- Local paths, cycle ways and travel routes
- Golf courses
- Land – not built on
- Designs of buildings and water drainage and landscapes, planting
- Future development and approach ideology
- Flood buffers and drainage
- (Air quality and dark skies)
- Quality is important, local standards function and protection
- Transport routes – grey to green and green bridges

Tees Valley Stakeholders

- Playing Areas & Fields
- Golf Courses
- Beaches, coastal areas
- Littoral zone, estuaries
- Private clubs egg Bowls, Rugby etc
- Country House Grounds
- Sight miles
- Seascapes
- Senses – natural space
- Hedgerows
- Quarries
- Street furniture
- Groundwater resources
- Street trees
- Wasteland
- Woodland
- Moorland
- R.O.W and byways
- Cemeteries & churchyards
- Green roofs
- Wetlands
- Waterways rivers etc
- Reservoirs
- Geological exposures
- Verges
- Farmland
- Parks – urban and Country
- Allotments
- SSSI's and Local Nature Reserves
- Wind Turbines
- Private gardens
- Air quality
- Bogs
- Energy crops
- Recreation sites – public open space
- Urban fringe
- Floral displays/baskets etc
- Greenbelt
- Roundabouts, highways
- Screening belts
- Culverted waterways
- Habitats for bats, birds
- Road and rail verges
- Hotel, hospital, school grounds

APPENDIX 3: CONTEXT FOR GREEN INFRASTRUCTURE

This information was produced to help inform and develop the conceptual basis for the regional approach to Green Infrastructure and as a discussion paper to engage regional stake-holders.

A review of the academic literature and policy documents reveals a plethora of seemingly overlapping 'green' concepts. These include:

- Nearby nature
- Sustainable cities
- Sustainable greening
- Green cities
- Green space
- Green structure
- Green lanes
- Green spokes
- Green wedges
- Green belts
- Green lungs
- Green exercise
- Green corridors
- Green infrastructure
- Greenways
- Greenway skeletons
- Recreational corridors
- Parkways
- Rail trails
- Ecological corridors
- Ecological networks
- Wildlife corridors
- Landscape planning
- Linked landscapes
- Urban forests
- Community forests
- Ecological footprints

These are variously associated with a range of benefits, which include:

- Recreation and exercise opportunities
- Landscape enhancement
- Nature conservation benefits
- Conservation of cultural heritage
- Sympathetic management of sites of geological significance
- De-fragmentation of green spaces/patches within the urban landscape
- Provision of trees in the urban landscape – aesthetic and cultural dimension
- Public health (physiological and psychological)
- Water management (e.g. flood mitigation through increased porosity of land cover)
- Amelioration of climatic extremes
- Pollution control and buffering
- Development buffers and visual screening
- Noise abatement
- Non-car transportation opportunities (with an emphasis on quality and safety)
- Education – the "outdoor classroom"
- Provision of space for public art
- Land reclamation
- Linking town and country and integrating the urban fringe into urban networks
- A recognition of the multiple values of 'un-built' land in urban and urban fringe areas
- Economic development through regional image enhancements
- Farm diversification opportunities and the wider rural economy
- Localisation of supply chain linkages
- Overarching quality of life gains

Attaining the potential multiple benefits that these benefits indicate is extremely problematic. However, in spite of the undoubted difficulties of achieving multiple benefits – environmental, economic and social – the concept of multi-functionality is now at the heart of Countryside Agency thinking, perhaps most notably in the context of the Countryside Around Towns (CAT) (Gallent et al., 2004) and the following discussion concerning the context for green infrastructure planning therefore examines the concept of Green Infrastructure (GI) as a concept, a tool and a framework for planning a multifunctional countryside.

Green Infrastructure and Multi-functionality

'Green' and 'Infrastructure' are two very widely understood terms and, individually, their essential meaning is subject to relatively little dispute. In conjunction however there is a danger that the term could mean all things to all people. Although the term has gained increasing use in recent years, green infrastructure sits within the semantic pick-and-mix that appears above, sometimes roughly equated with other terms, at other times used in an over-arching sense and sometimes used interchangeably with other terms. Although the academic literature

on greenways in particular (primarily from the United States) is now relatively well established (the seminal publications date back to the 1980s) green infrastructure itself has only emerged alongside in the last three to four years. Benedict and McMahon (2002) commit themselves to a definition:

Green infrastructure is an interconnected network of green space that conserves natural ecosystem values and functions and provides associated benefits to human populations. Green infrastructure is the ecological framework needed for environmental, social and economic sustainability (p.12).

Although we would perhaps dispute the centrality of the terms 'natural' and 'ecological', the authors support this definition. It is, of course, relatively vague and terms such as 'associated benefits' are wide-open. However, the range of benefits that can accrue from well planned and managed green infrastructure is extremely broad and they are also specific to local conditions, histories and demands.

Later sections will elaborate on this point, but an appreciation of geography is critical to an informed understanding of green infrastructure: where resources are located, how demands are distributed and how priorities work out on the ground. The concept of scale is also important because plans become realities through transformations of form and function on specific plots, or parcels of land. These parcels may be large or small, linear features or developments may be short or long and timescales for realisation may be immediate or long term. Generally, the larger something is the more strategic it is in concept, design, decision-making, funding and operational support, but infrastructures are, by their very nature, hierarchical. You may take the A1 from London to Newcastle but it is along trunk, A, B and minor roads that you reach your destination, and it is the design and implementation of these 'branches' and 'twigs' that can ensure (or not) a smooth and pleasant journey. The history of transportation infrastructure is that most routes started out to meet local needs, merged, were integrated and complemented by strategic links over time. Fabos (1995) suggests that greenways developed in the same way, and over time a greater degree of attention has been paid to the higher levels of the network, or infrastructure.

It has been suggested that green infrastructure is 'old wine in new bottles'. A more positive view might be that green infrastructure has its roots in thinking that go back several decades. The most significant antecedents are:

Basic connectivity studies in Geography which used links, segments and nodes to describe networks, a language that is still alive and well in the field of Geographical Information Systems (GIS).

The Tradition of Urban Parks: The development of urban parks really originates in the mid-nineteenth century when areas of land in or close to cities were allocated for public use. Early parks were based on the pastoral model and developed by people such as John Nash (1752-1835) and Joseph Paxton (1803-65) in the UK, and the Frederick Law Olmsted (1822-1903), who extended the idea to create a series of linked parks in his famous 'Emerald Necklace' around Boston, USA. The approach to urban park establishment can be said to be human-centred - for improving health, increasing access to wildlife, or providing scenic settings. However the development of the Amsterdam Bos Park in the 1930s had considerable influence on later 'ecological' approaches developed in the UK in the 1970s and 1980s which produced 'nature-like' landscapes focused very much on providing a green structure based on ecological principles. An important part of the ecological movement was also the understanding that children in particular benefit from access to natural surroundings in urban areas.

Parks went through a period of the doldrums in the middle of the last century, but better funding and research have brought about a renewed vigour in the development of parks and a greater understanding of their benefits. The psychological benefits have always been particularly important and with this the understanding that green space needs to be near to where people live and work. Although there has also been a move towards highly designed hard landscaped parks – such as can be seen clearly in Barcelona and Paris, generally the 'green' component of parks in the UK is still seen as of primary importance. Parks are increasingly seen as a fundamental part of the green infrastructure of urban areas and their value is reflected in the fact that they remain, even though they often occupy areas of considerable land value in city centres.

Urban Forestry: Urban forestry has been defined as "the art, science, and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic and aesthetic benefits trees provide society" (Helms, 1998). Although the term is used relatively interchangeably in Europe and the UK in particular with the term Community Forests, the terms have differing meanings in North

America where CF's are dominantly recognised to be in a rural setting. At the outset of the UK Community Forest Initiative in the 1980s the Amsterdam Bos Park was seen as a key example of what could be achieved. In common with North American experience urban forestry is seen as not just being about trees and thinking from elsewhere in Europe is raising interest in natural processes of establishment rather than tree planting per se. Recent shifts in community forest policy in the UK reflect this diversification.

Landscape Ecology, a discipline that takes a multi-scaled view of human, biotic and abiotic influences on the development and planning of landscapes. There have been multiple definitions, but the consideration of interacting systems across multiple scales and both human and non-human systems (and values) are characteristic. Although this runs the risk of oversimplifying a multi-faceted and increasingly well-established discipline, connectivity is a key interest in landscape ecology.

Ecological Networks: the literature on ecological networks is extensive and Jongman et al. (2004) and Jongman and Fungetti (2004) provide a thorough overview of its origins and current status. Interest in ecological corridors dates back to a realization that designated conservation sites alone was no longer enough to ensure the long-term conservation of key species. The relatively small size of sites and the encroachment of an ever growing range of threats such as pollution, land improvement and climatic change led early landscape ecologists to raise the scale of their thinking and consider individual components (such as Ancient Semi Natural Woodland or designated nature reserves) in their landscape setting. The terms site-in-context and landscape-ecological matrix were increasingly widely used to foster approaches that sought to tackle problems at a similar spatial scale to the factors that were causing them. The need to support migration and dispersal processes led to the development of ecological corridor concepts which is 'today recognised as a framework of ecological components, e.g. core areas, corridors and buffer zones, which provides the physical conditions necessary for ecosystems and species populations to survive in a human-dominated landscape' (Jongman and Fungetti, 2004. p.3).

Greenways and Green corridors: these two concepts are treated effectively as one, as they are both focused on the provision of opportunities and routes for recreation and commuting. Groome (1990) identifies a number of characteristics of such linear routes:

- They can provide open space in which people can escape the 'harshness … and aggravation … of the urban environment' (p.383)p;
- They have a potential role to play in urban design, fostering many attributes of more sustainable cities;
- They can enhance recreational opportunities, not only by the route itself, but also through use of the route to access other opportunities and other parts of the wider network;
- They can provide a spatial framework for balancing conservation interests with development initiatives;
- Linear routes are of particular interest to recreational users for whom active movement (e.g. walking, running, cycling or canoeing) is the objective, and disused canals and railway lines are especially important in this regard;
- Linear open spaces provide long 'edges' at which the relationship between built up and open spaces can be experienced and explored – again the idea of contrast with the built environment and everyday life is important.

Other authors have allied greenways with ecological corridors (e.g. Jongman et al., 2004), emphasising that the concepts of connectivity which are now central to landscape ecology were initially set down from a human perspective in the early greenway plans and papers. However, the emphasis in much of this work focuses on how to achieve nature conservation objectives between and around the spatial and other constraints imposed by human development and activities. In respect of social inclusion, research from the US (Moore et al., 1992) which reports that the demographic profile of greenways users in any given area was strongly representative of the demographic profile of the area the route was passing through is important. Although this is not necessarily transferable to a NE England context, the fact that empirical evidence and standards alike support local use of local resources is a strong argument for the spatial targeting of green infrastructure investments where social as well as environmental needs are high. The link to social capital is also significant; if social capital is a measure of individuals, social groups and communities to positively effect changes that benefit them, then the evidence that environmental enhancements can improve community cohesion and strengthen sense of worth, opportunity and control of is significant (REF).

Ecological footprints: 'The ecological footprint is an accounting tool for ecological resources. Categories of human consumption are translated into areas of productive land required to provide resources and assimilate

waste products. The ecological footprint is a measure of how sustainable our life-styles are' (Wackernagel and Rees, 1995). It is a concept that has recently attracted increased attention (e.g. www.myfootprint.org and WWF Northern, 2005 and WWF, 2005), not least because it is an effective way to encourage people to visualise the environmental impacts of their lifestyles. Figure 1 is drawn from some WWF work in the North East and it illustrates that the average ecological footprint of a resident of the region is in the order of three times the 'fair share' (and therefore globally sustainable) footprint for all humans. Many of the actions that can reduce this figure relate to personal behaviour (e.g. reducing electricity and water consumption), but others interface directly with public policy areas where provision (and green infrastructure) has a key role to play. Examples of these areas are local allotments, purchasing locally grown produce, non-car transport and participation in recycling and composting schemes.

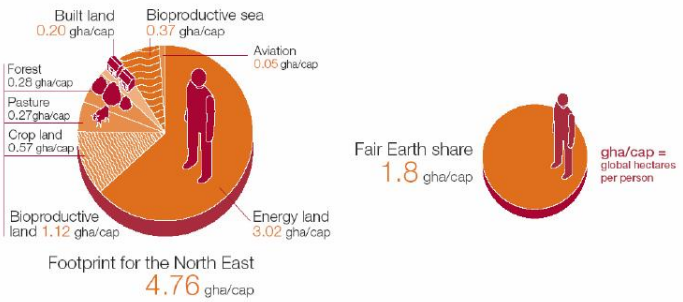


Figure 1: Ecological footprints (source: WWF-Northern, 2005)

Sustainable development: although this is not directly an antecedent to green infrastructure, the language of sustainable development sets the wider frame. This is not the place to get into wider debates about the definition, salience or attainability of sustainability, although Gallent et al. (2004) page 4 is a neat review of its problems. Rather than claim that green infrastructure is the key to sustainable Cities and their environs, it is suggested here that green infrastructure should be seen in the context of initiatives that aim to render current land use patterns and practices more sustainable. Figure 2, based on Rannikko (1999), emphasises that sustainability is multi-dimensional. It is not simply about the viability of environmental systems (e.g. hydrology, climate, nutrients, soils and vegetation), but it recognises that the protection and conservation of those systems must be based on economic viability, social welfare and human quality of life.

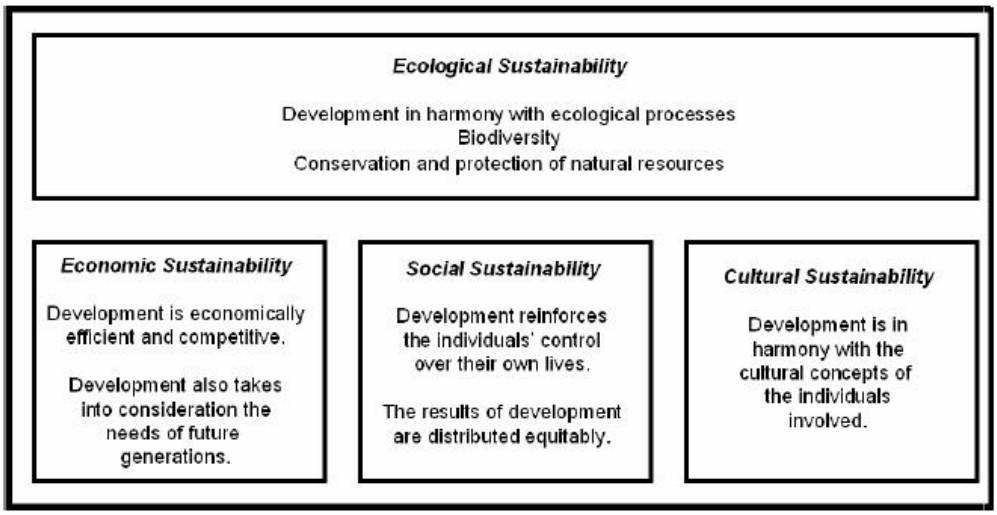


Figure 2: dimensions of sustainable development (after Rannikko, 1999)

Multi-functionality of green infrastructure

The Countryside Around Towns (CIAT) vision (Countryside Agency and Groundwork, 2004) focuses on multi-functionality and identifies a wider set of potential functions for development and enhancement in the urban fringe and areas of land that link urban and rural areas. These include:

- A bridge to the country
- A gateway to the town
- A health centre
- A classroom
- A recycling centre
- A power plant
- A productive landscape
- A place to live sustainably
- An engine for regeneration
- A nature reserve
- A heritage resource

Many of these should be familiar, although the language is different, from the earlier list of benefits associated with green infrastructure.

Green infrastructure - the key delivery mechanism for realising multi-functionality in both urban and rural green areas

Cutting across these functions are a range of commonalities:

- Aesthetics: developments should be appropriate and of a high quality
- Enjoyment: ideally 'people will wish to linger rather than move through and exit as rapidly as possible' (Gallent et al., 2004, p.iv)
- Partnership: defining and realising objectives must be done in partnership with local communities and other interest groups
- Balance: potential conflicts must be identified and managed
- Linkages: physical linkages lie at the heart of green infrastructure but linkages between dimensions of sustainability, quality of life and policy areas must also be identified and fostered
- Functionality: the CAT is not, and should not be, a museum
- Meaning: developments that have little resonance or relevance for local communities are not sustainable
- Opportunity: opportunity is the precursor to use and it relates to access
- Image: how things look is important, both internally and externally
- Viability: this relates closely to meaning and functionality, but developments have to be sustainable in practice as well as attractive in principle
- Vision: green infrastructure is more than the sum of its parts and multi-functionality goes beyond coexistence, to consider integration, interaction and inclusion.

Green infrastructure as a concept

Is being used the further development for Community Forests (CF's) and other landscape scale partnerships. A number of significant developments have led to this focus:

- An appreciation of the multi-dimensional significance of urban fringe areas for many people, and a recognition of the constrained access, degraded landscape and ecology and depressed productive value of such areas;
- The range of hard benefits of green infrastructure can tackle priority policy areas including tackling accelerating climate change effects, improving social structures and reviving local economies;
- The development of landscape ecology as an integrative framework for the analysis and design of more sustainable, meaningful, aesthetically appealing and accessible landscapes and the associated focus on connectivity as a principle for the planning, design and management of landscapes, for the integrated pursuit of ecological, aesthetic and utilitarian objectives;
- A fundamental shift in forest policy, away from timber-oriented productivism, towards multifunctionality, and most recently, explicit direction from government that new woodlands

should be planned and managed with the accretion of social benefits as the primary consideration.

Connecting green spaces is an integrating framework: at a conceptual level it relates to the principles of landscape ecology, and the allied concepts of greenways, wildlife corridors, recreational networks and riparian corridors, and at a practical human level it is the framework through which people can access spaces that enhance their quality of life and access to new opportunities. green infrastructure is inherently spatial. It is an infrastructure of green spaces ('nodes') and routes and corridors ('links') between them. A focus on green infrastructure demands that attention is paid to the sufficiency and suitability of both the 'nodes' and the 'links' for achieving the multiple objectives that are defined for them; it is not just about green spaces or greenways, but about the way these relate in functional and experiential terms for users of this significant resource.

Hubs anchor green infrastructure networks, providing origins and destinations for the wildlife and ecological processes moving to or through them. Links are the connections tying the system together and enabling green infrastructure networks to work (Benedict and McMahon, 2002, p.12). Again, Benedict and McMahon's language is ecological in its focus, but the concepts are directly transferable to human interests in, and movements through, the landscape. In the existing literature, the science of landscape ecology establishes a framework for the integrated pursuit of ecological, aesthetic, cultural, social and economic objectives but is unable to establish detailed templates for their integration 'on the ground', and the appreciation of the principles of connectivity amongst planners and allied professionals has been shown to be highly variable (Dover, 2000; Turner, 2004). The reality of networks such as greenways or wildlife corridors is that they have usually been developed in an opportunistic fashion, linking such areas of open and green space as was cost-effectively and politically possible, without either a systematic approach to planning or design in pursuit of the multiple benefits that such connectivity may confer. Furthermore, the UK land-use planning system lacks the statutory tools and focus to establish and implement truly integrated spatial land-use plans (Selman, 1997). This is to say, there has been relatively little attention paid in the UK to green infrastructure planning at the strategic scale, although there are pressures to change this, and CF plans are at the forefront of this.

Recent shifts in forest policy have considerable relevance here: the UK government has long been committed, for various reasons, to driving up the proportion of land under trees and the current emphasis in policy and practice is on integrating woodland with other land-uses rather than the replacement of other land-uses with woodland. The integration of forest planning with urban and urban fringe planning and management is the context for the forthcoming development of the third generation of CF plans, which are adopting the theme of green infrastructure, underpinned in the North East with a study to target investment at a regional scale (MacFarlane & Roe, 2004). CF's are spatially defined zones on the edges of 12 major towns and cities. They are intended to promote an increase in tree cover within these areas, but the emphasis is on realising multiple benefits for local communities, economies, landscape and conservation interests through well designed, accessible, interesting and safe woodlands that are embedded in their landscape context. The future of CF's is to extend outside of the spatially defined boundaries and take on a greater role in urban fringe planning and management; connectivity and spatial integration is at the core of the green infrastructure concept.

At a general level six broad sets of interests in green infrastructure might be identified, although there are of course strong interlinkages between these categories:

1. Nature conservation – the literature on wildlife corridors, ecological networks and the wider discipline of landscape ecology emphasises the value of connectivity at a variety of scales from the continental to the local.
2. Recreation – greenways have been promoted as routes, dominantly for non-car transport, that emphasise the quality of the route as well as more basic issues of welfare and safety. This has become increasingly engaged with interests around public health and quality of life.
3. Landscape – although this is intimately related to (a) and (b), landscape architects and designers have long been involved in the identification, establishment and development of green spaces and corridors in urban areas. This is separated out here as the rationale employed is often

different, taking a dominantly aesthetic and experiential, rather than purely functional, view on such resources.

4. Sustainable resource management – green infrastructure has a potentially extremely significant role to play in the sustainable management of land and water resources, including production (e.g. energy and food crops) and pollution control.
5. Economic development and regeneration – development and regeneration agencies have an interest in the environmental quality of regions. This is driven by a range of primary interests, primarily its relationship with quality of life and enhancement of the external image of the region. green infrastructure is a critical element of environmental quality which has been shown to be related to inward investment decisions as well as the residential choices of key workers in local economic sectors.
6. Sustainable communities – many of the attributes of more sustainable communities can be provided and supported through a strong green infrastructure, for example green space for recreation, education and health, shading, increased porosity of land cover, provision for non-car transport and shortened supply linkages.

Although these different dimensions of green infrastructure and the rationale to promote and develop green infrastructure are separate14, they do of course interrelate, as policy areas and as lived experiences of people in local areas. Figure 3 is based in the concepts of human ecology, but variants of this from many other sources identify the interrelationships between people, their environment and the economic context (for example Ian Thompson's Ecology, Community and Delight). Gallent et al. (2004), in the same vein, uses the metaphor of a three-legged stool for sustainability; if any one of the legs comes off then the whole stool topples over.

Liveability of Cities in the Future

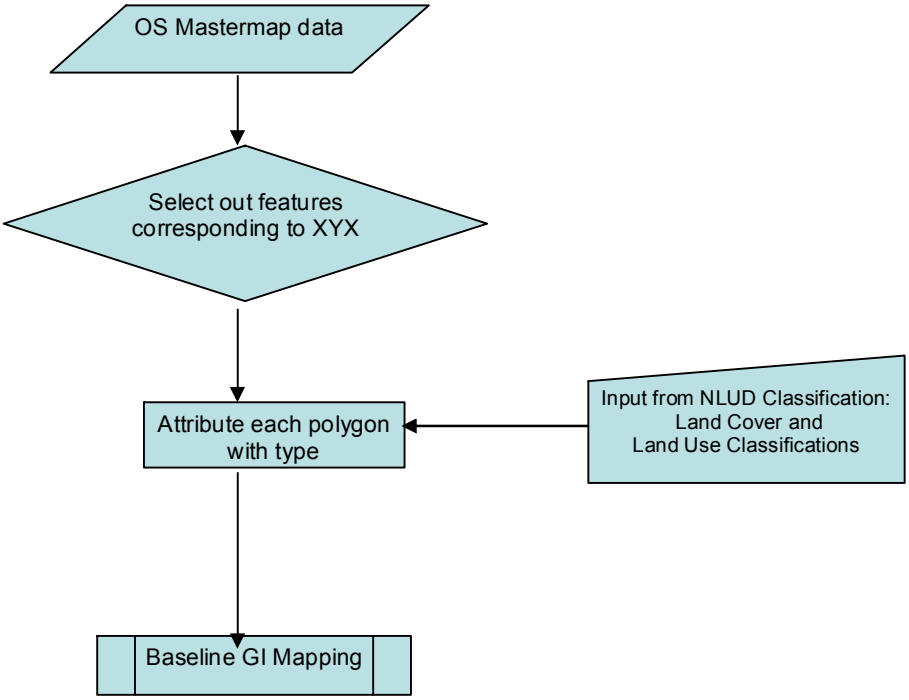
Liveability has been defined in terms of interaction between a community and the environment (Shafer et al., 2000). Access and positive engagement with local environments that service the range of communities' wants and needs imply liveable areas. Problematic access, poor engagement, depressed value and low quality environments imply areas that are less liveable. This is not just about green spaces to fly kites and walk dogs; it is far broader, embracing the range of environmental services such as heat and flood mitigation and safe journeys to school.
Overarching concepts (Green Infrastructure and Sustainable Cities included) need to be analysed, defined and disaggregated if their attainment is to be expressed through (spatially specific) plans. Such plans need to address both personal objectives (e.g. an attractive, accessible and meaningful local environment) and wider social and governmental objectives (e.g. promoting healthy living and managing the long term finances of health care for an ageing population). However, this is precisely what multi-functionality can address. For example, climatic change predictions for the UK indicate wetter winters, drier and warmer summers and an increasing incidence of extreme weather events, for instance flash flooding. Under such conditions the argument for increased woodland cover in urban areas takes on additional strength: a more porous urban land-cover is better able to mitigate extreme rainfall events and enhanced shading controls extremes of temperature, in turn reducing the demand for (energy hungry and carbon generating) air-conditioning in buildings.

This is what Jongman and Fungetti (2004) and others have termed the 'hypothesis of co-occurance', the ability of green infrastructure (although their point of reference was greenways in particular) to service multiple demands. This ability can only be achieved through insightful and informed planning and careful delivery processes.

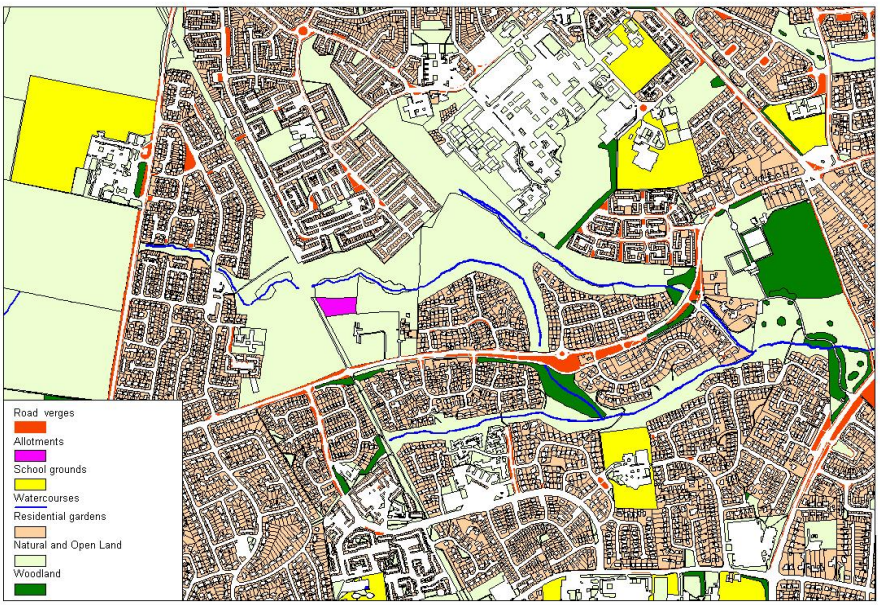
[14] For example Gobster and Westphal (2004) define six interdependent human dimensions of greenways: cleanliness, naturalness, aesthetics, safety, access and appropriateness of development and Bischoff (1995) defines the purposes of greenways as environment, ecology, education, exercise and expression.

APPENDIX 4: METHOD FOR PRODUCING GI PLANS IN NORTH EAST ENGLAND

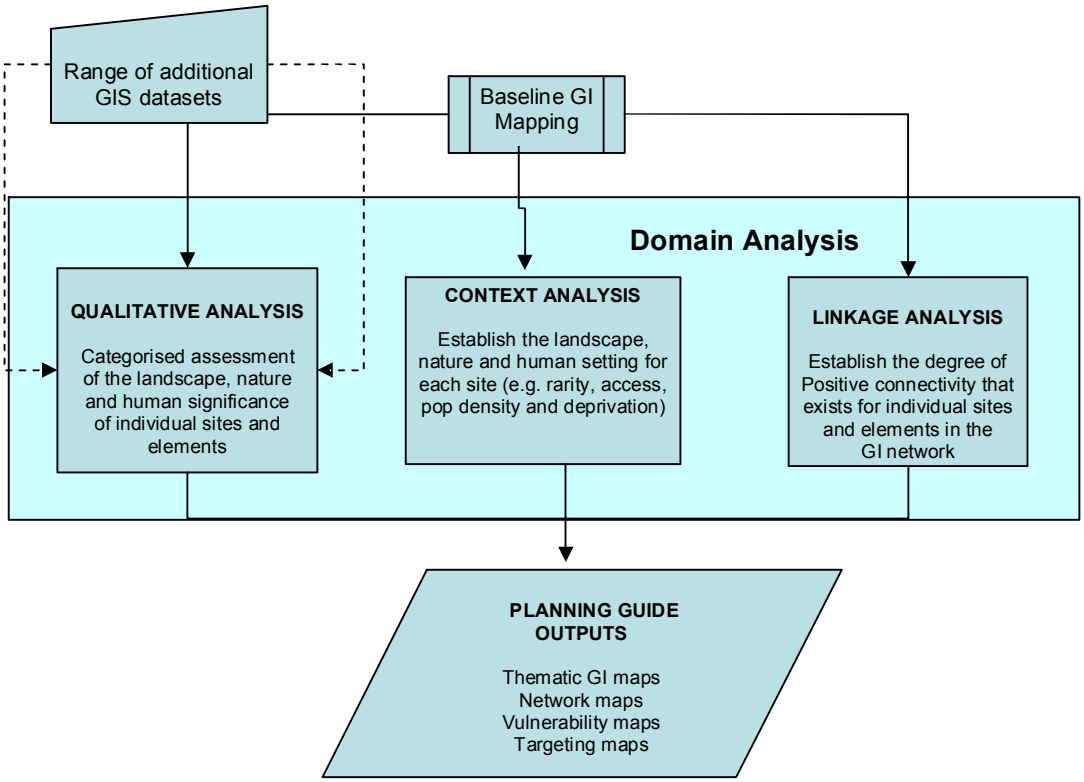
STAGE 1: Mapping Green Infrastructure based on the digital national framework



Example from Stockton-on-Tees - Tees Valley City Region



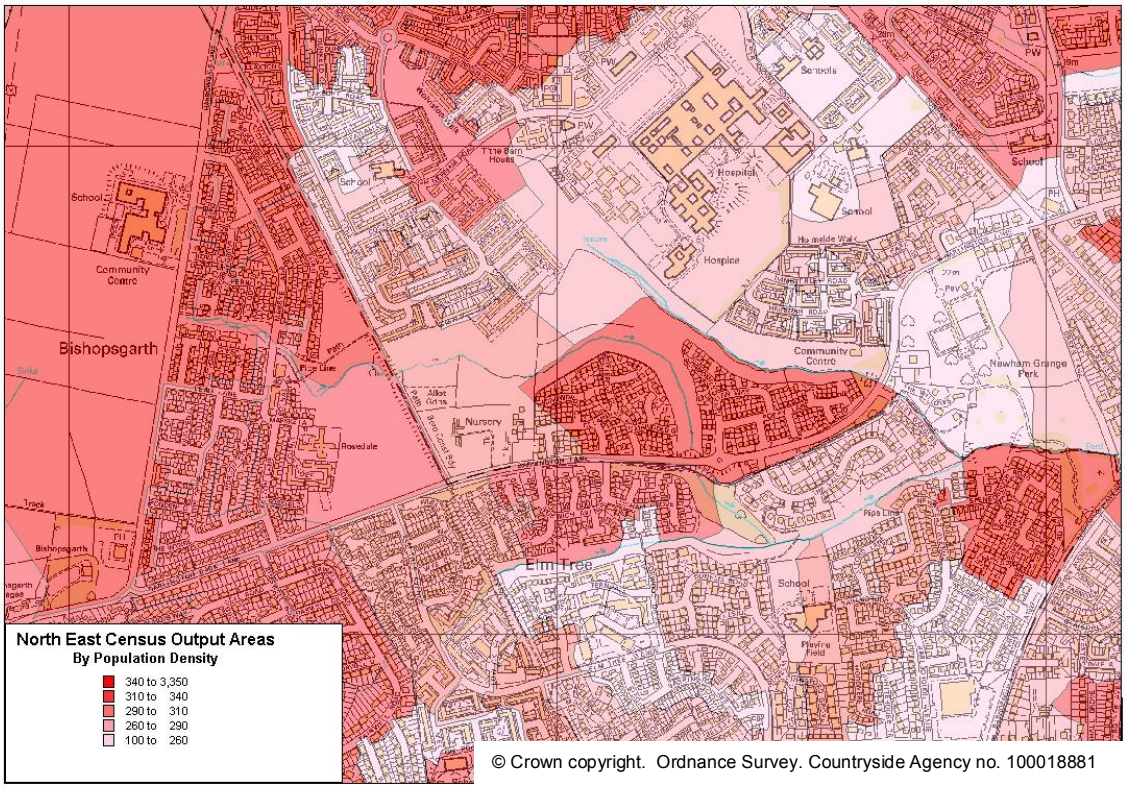
STAGE 2: GI strategy formulation supported by Geographical Information system and a domain analysis developed by regional stakeholder involvement and existing guidelines



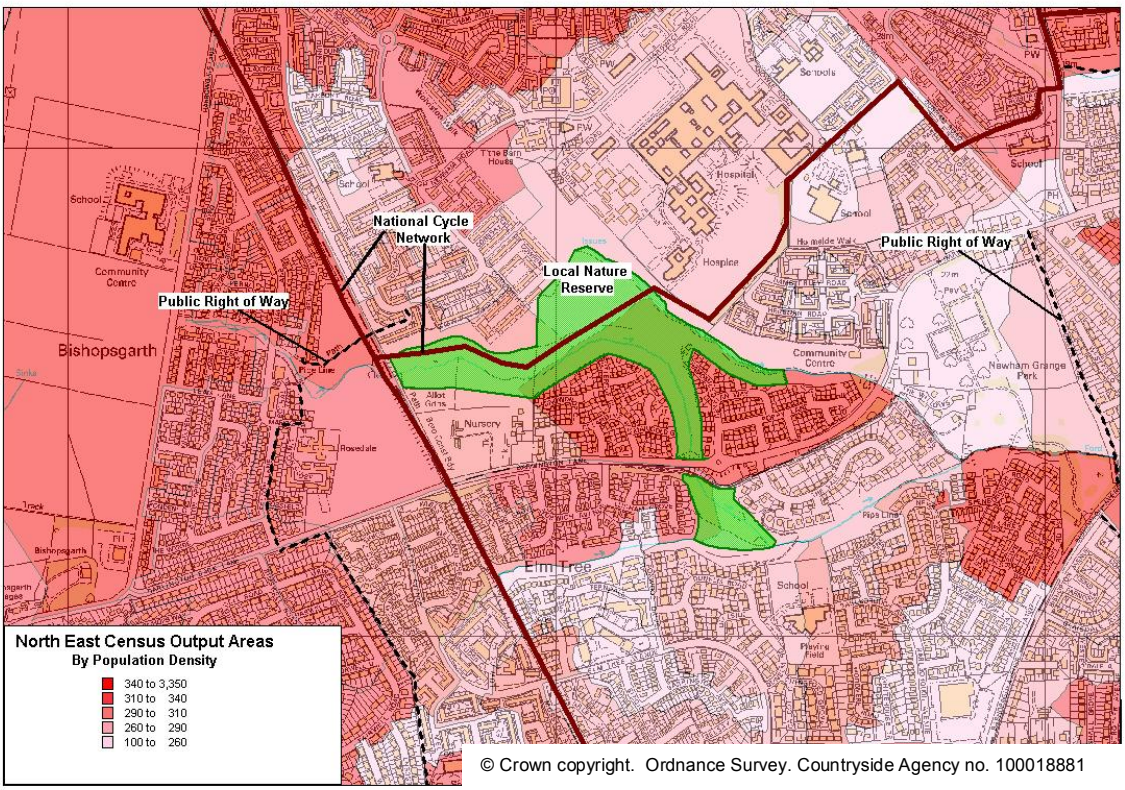
Examples of existing GIS data

- Nature Conservation Sites
- National Cycle Network
- Important Bird Areas
- Public Rights of Way network
- Accessible Woodlands
- Woodland Grant Schemes
- Countryside Stewardship Schemes
- Sport Pitches & Tracks
- Local Plans
- Heritage
- Floodplains
- OS Points of Interest
- Archaeological sites
- Landscape character
- Index of multiple deprivation
- Census data
- Population

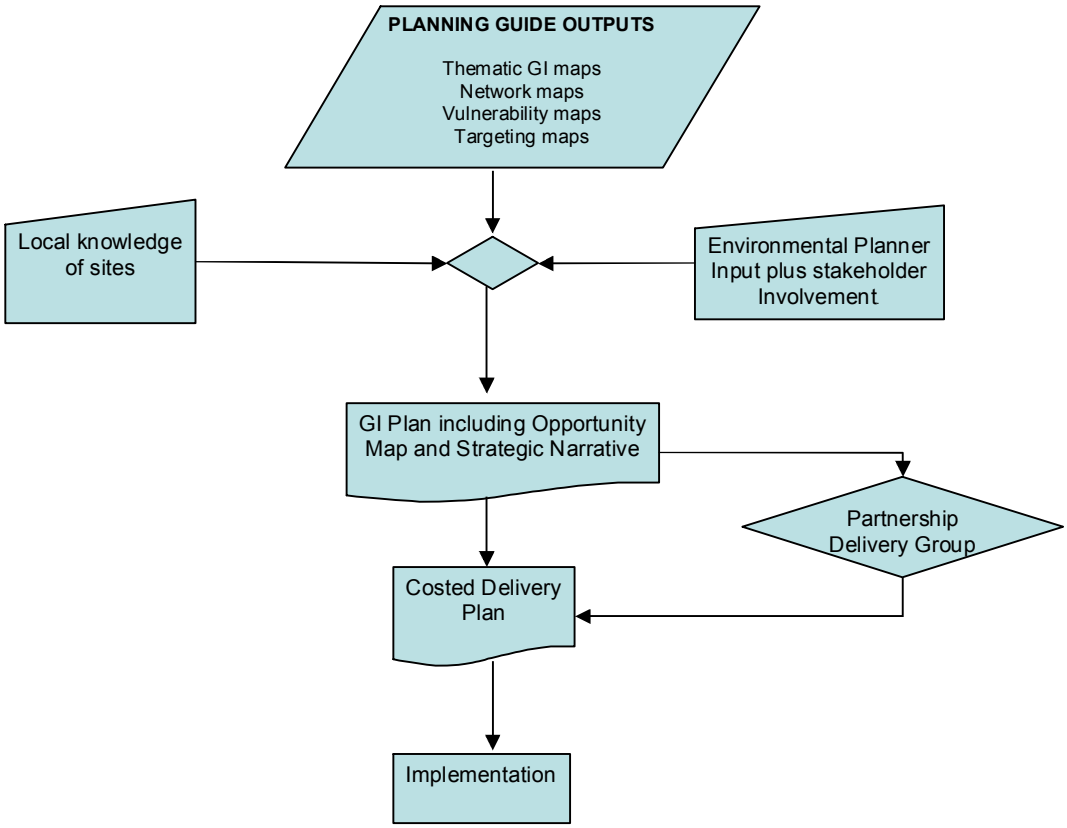
Sample area based on range of population density.



Identification of Linkages



STAGE 3: Consultation and delivery



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