



Merseyside
Environmental
Advisory Service



GOVERNMENT OFFICE
FOR THE NORTH WEST

Green Infrastructure

Proceedings from a training workshop for
Merseyside spatial planners

Cunard Building, Liverpool. 31st October 2007.



North Merseyside
Biodiversity Action Plan

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Introduction

These proceedings are an account of the Green Infrastructure Workshop jointly organised by Merseyside Environmental Advisory Service (MEAS) and Government Office North West (GONW) which took place on Wednesday 31st October 2007 at the Cunard Building in Liverpool.

This training event was principally aimed at forward planners from the Merseyside Local Authorities (see appendix A for an attendance list). Its stated aims were:

1. to raise awareness of GI amongst planning officers, especially the spatial planning element; and
2. to promote a common understanding of GI across Merseyside Local Authorities.

Paul Nolan – director of The Mersey Forest - chaired the event. The day's agenda was as follows:

9.40am	Registration / Tea & coffee	
10.00am	Welcome and Introductions	Chair: Paul Nolan
10:05am	Overview of GI issues in the NW	Martin Moss Natural England
10.30am	Regional Spatial Strategy & emerging GI issues	Matt Ellis Environment Agency
11.00am	Tea & coffee	
11.15am	Sefton Greenspace Strategy (community thread)	Steve Matthews Sefton MBC
11.45am	Economic benefits of the GI approach (economic thread)	Peter Wilmers Natural Economy
12.15am	Developing an Ecological Framework for Liverpool (environmental thread)	Jane Hayward Liverpool CC
12.40pm	Lunch	
13.40pm	The role of GI in mitigating climate change	Susannah Gill The Mersey Forest
14.10pm	Introducing the workshops	Richard Burkmar MEAS
14.15pm	Workshop (A, B or C)	Facilitated workshop
14.40pm	Workshop (A, B or C)	Facilitated workshop
15.05pm	Workshop (A, B or C)	Facilitated workshop
15.30pm	Tea & Coffee	
15.45pm	Plenary, questions & discussion	Chair: Paul Nolan
16:00pm	Close	

These proceedings summarise the main points from the presentations and those raised at the workshops. The original presentations are available for download from:
<http://www.merseysidebiodiversity.org.uk/index.asp?content=v2news\071121-gi-workshop.xml>.

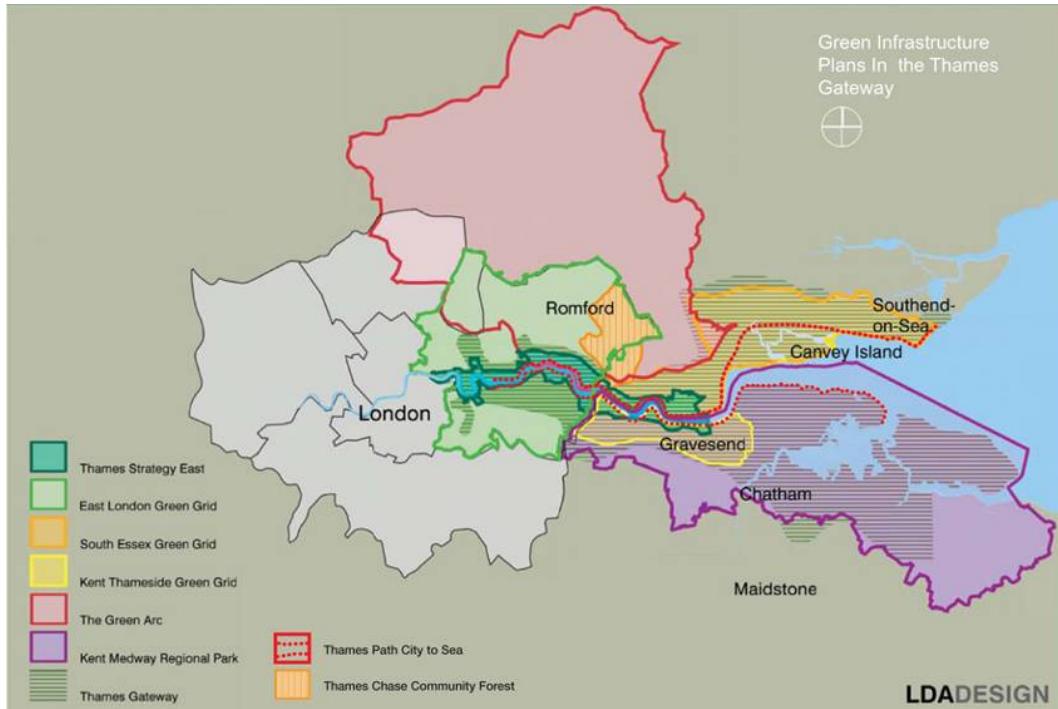


Green Infrastructure and the North West region

Martin Moss, Natural England (Senior Specialist, Regional Advocacy and Partnerships Team)

Green Infrastructure was originally a US concept. They Thames Gateway in the South East – a key area of new housing development and growth is a prime situation for the application of Green Infrastructure concepts and extensive GI plans have been developed there with the aims of:

- enhancing quality of life of new and existing residents;
- supporting and protecting biodiversity;
- creating a positive image;
- creating a network of varied greenspace as the setting for new and existing residential and commercial areas; and
- regarding landscape as functional green infrastructure delivering a range of benefits.



In the North West we have fewer areas of new growth, but a lot of regeneration. There are opportunities for the application of GI concepts in the following NW activities:

- regeneration and re-structuring of existing settlements – urban morphology change;
- major land restoration – tackling the industrial legacy;
- housing market renewal and improving the regional housing offer;
- public realm transformation;
- tackling population decline; and
- boosting GVA – image, investment, economic productivity, new business sector development.

We can think about three facets of GI in the North West: purpose, definition and approach. The purpose of GI is the development of more sustainable and multi-functional urban and rural landscapes by:

- ensuring socio-economic activity brings spatially appropriate environmental benefits;
- developing natural environmental systems that contribute to providing for socio-economic needs; and
- providing a practical means to help deliver sustainable development.

There are many definitions of Green Infrastructure, some more user-friendly than others. The North West Green Infrastructure Guide puts it thus:

“The region’s life support system – the network of natural environmental components and green and blue spaces that lies within and between the North West’s cities, towns and villages which provides multiple social, economic and environmental benefits.”

We are advocating a five step approach to Green Infrastructure projects in the North West:

1. Establish partnerships and priorities.
2. Carry out data audit and mapping.
3. Conduct a functionality assessment – now, forces for change.
4. Undertake a needs assessment – spatial issues of key initial themes.
5. Create an intervention plan.

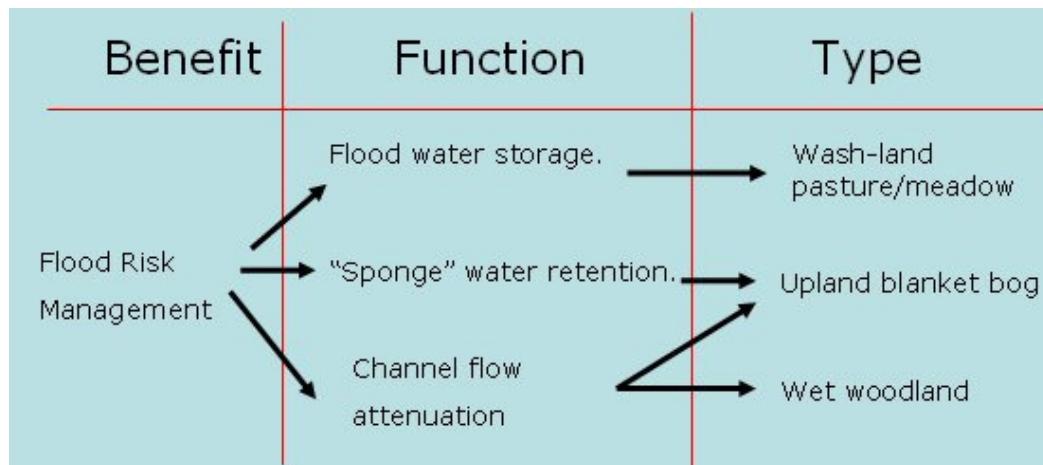
Projects developed along these lines should give us:

- new GI where needed - often retro-fitting of new GI into old places;
- changes of function of existing GI to meet identified new needs;
- recognition and protection of what is already good; and
- GI that is planned, delivered and maintained like other forms of infrastructure.

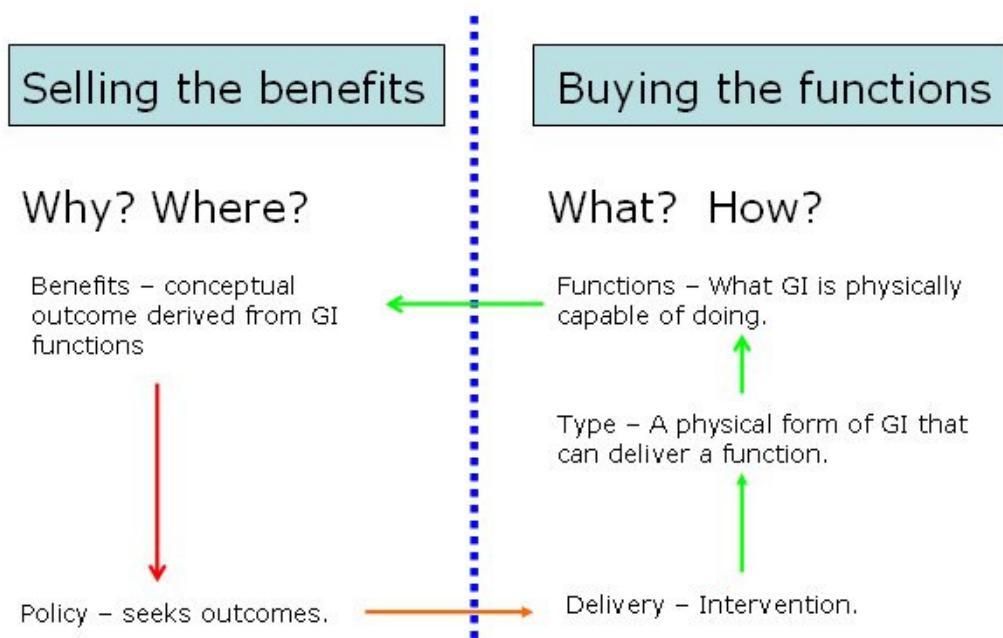
Green Infrastructure is everywhere. It can be exposed (e.g. country parks) or hidden (like street trees). It can exist in all land use contexts – its type, functionality and benefits will vary, reflecting the context within which it exists.

When we think about what GI delivers, we can make a distinction between types, functions and benefits:

- Types – physical kinds of green infrastructure – resource v asset.
- Functions – something the GI is physically capable of doing/delivering.
- Benefits – what is derived from functional GI – the outcome.



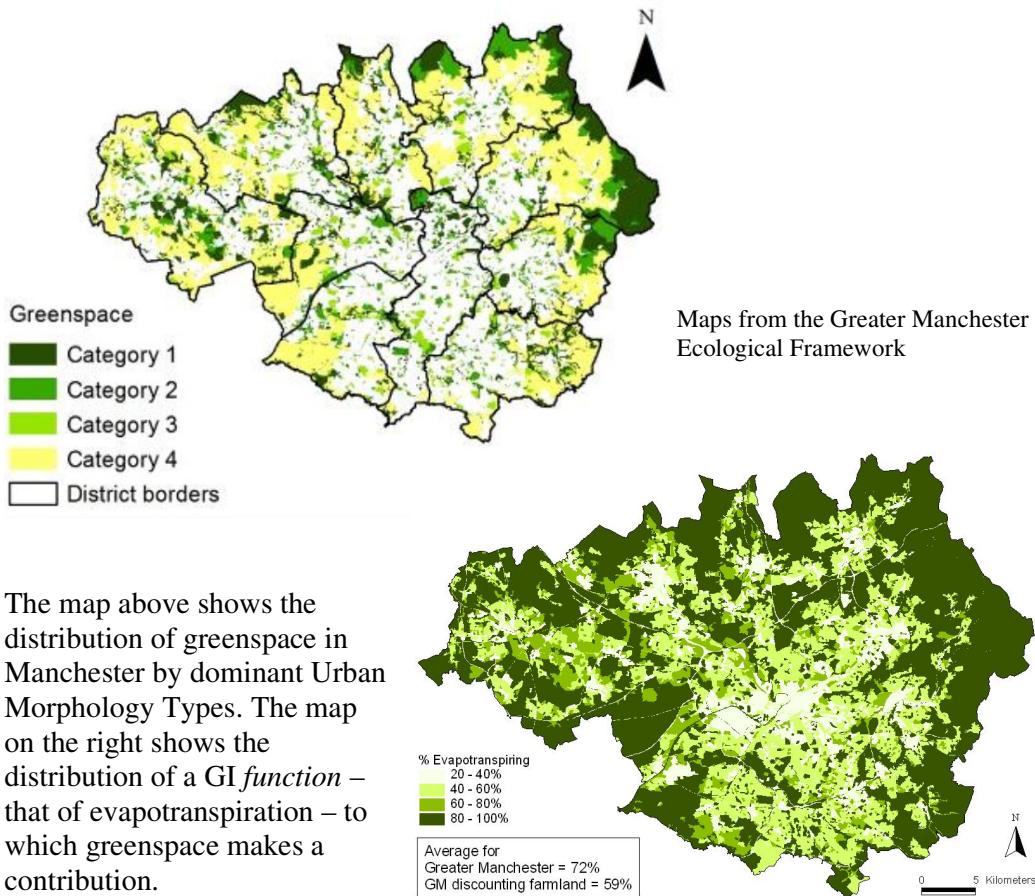
We can characterise the relationship between benefits and functions as a cycle thus:



It can be useful to consider what differentiates Green Infrastructure from greenspace. GI can be thought of as greenspace plus environmental components in non-greenspace

land use contexts. The benefits of GI derive from *functionality*: it's more than just space - it's a natural environmental system. Green spaces are part of our GI, but GI goes beyond simple spaces.

The Adaptation Strategies for Climate Change in the Urban Environment (ASCCUE) project in Manchester can be used to demonstrate the difference between greenspace and GI.



Three key areas of policy development have been driving thinking on green infrastructure:

- sustainable communities – driven by the growth agenda;
- ecosystems services – quest for integrated land, water and living resources management; and
- natural economy – economic benefits of the natural environment.

In the North West over the last 3 years, we have been driven by 5 main agendas which have informed the development of activities in our region:

1. Economic regeneration.
2. Land regeneration.
3. Ecological frameworks.

4. Climate change.
5. Flood risk management.

Lately we have seen the growth and sustainable communities agenda growing.

The North West Green Infrastructure Guide has been developed to:

- aid communication;
- provide guidance on process;
- supply a case study library; and
- advise on policy.

It is a ‘live document’ which is continually undergoing development as the GI concept becomes applied at different scales. Updates to the document will be made available via the website¹ as experience grows.

What’s the future for Green Infrastructure planning in the North West? The following bullets highlight future opportunities:

- LDFs – Core strategies – Action Plans – implementation.
- Pilot strategic GI plans should develop firm advice on how to use the GI concept and approach in LDF processes.
- ABIs – Masterplanning.
- Begin to engage with ABIs (URCs, HMR etc) and explore detailed local application.

Natural England is taking a lead role in promoting and developing the concepts and policy of GI planning especially in urban areas and relating to housing and growth. NE is actively involved with GI initiatives as the following bullets demonstrate:

- Currently embedded within the Sustainable Communities Major Project.
- Engaged with Growth Areas, later Growth Points – embraced City Regional work in North (Expansion of Growth Agenda).
- Supporting City Regional Strategic Planning.
- Seeking to develop experience in ABI masterplanning for GI.
- Engagement with “developers” to develop exemplar greenspace projects.
- Period of transition – Expansion of Growth agenda – Developing NE view on GI.

“Planned, delivered and maintained like other forms of infrastructure.”

¹ <http://www.greeninfrastructurenw.co.uk/> (go to the resources page).

Regional Spatial Strategy & emerging GI issues

Matt Ellis, Environment Agency (Strategic Environmental Planning Officer)

That RSS is an economically and growth driven strategy is hardly surprising given the history of decline and deprivation in areas of the NW, current government targets and a wish to capitalise on recent improvements in the regions economic performance. The draft RSS is a step change in the regions growth aspirations, with proposed annual house building rates 79% higher than former RPG13. At the RSS EiP, discussions were had around the impact that this growth might have on the regions environmental and infrastructure capacity. The important question arose 'can this growth be achieved sustainably?'

Of specific relevance to the Environment Agency were issues around sustainable water management, particularly the impact of any proposed growth on flood risk, water quality/waste water treatment and associated infrastructure issues. Also emerging were possible impacts on the regions valued species and habitats and landscapes. This was all set against a backdrop of an increasing challenge faced by the region as a result of climate change

Growth and flood risk

Firstly there are the obvious impacts arising from potential pressure to accommodate large amounts of new growth in existing areas of flood risk. For example, some of the districts with the highest proposed new housing numbers also have high numbers of properties in the flood plain and therefore high existing levels of flood risk. There are also potential flood risk impacts of the runoff from the new development on downstream areas and the capacity of our surface and foul water drainage networks.

The more intense storms we expect to see as a result of climate change will further increase the challenge of managing our surface runoff. As a result, surface water flooding may potentially become more regular and widespread and we may expect to see increases in combined sewer discharges and, more unpleasantly, sewer flooding. The floods in June and July of this year may give us an indication of what we might face in the future. For example, whilst many people were flooded from rivers, 5 times as many homes and businesses in places like Hull were flooded from overflowing drains and sewers.



Growth and water quality

More growth, especially houses, leads to a greater demand for water. The consumption of this additional water ultimately leads to increased volumes of sewage

effluent to treat and dispose of. The discharges from our sewage treatment works may have water quality impacts.

The expected increase in intensive storm events as a result of climate change has a water quality as well as a flooding impact. Increased pressure on foul sewer networks capacity can increase the frequency of CSO discharges. This means untreated sewage effluent can enter our water courses more often, with obvious water quality impacts.

Increased development can also lead to more diffuse pollution. This is as a result of construction activities themselves and as a more general result of the often poor quality of urban runoff getting into our watercourses via surface drains and combined sewer systems.



The response of the emerging RSS

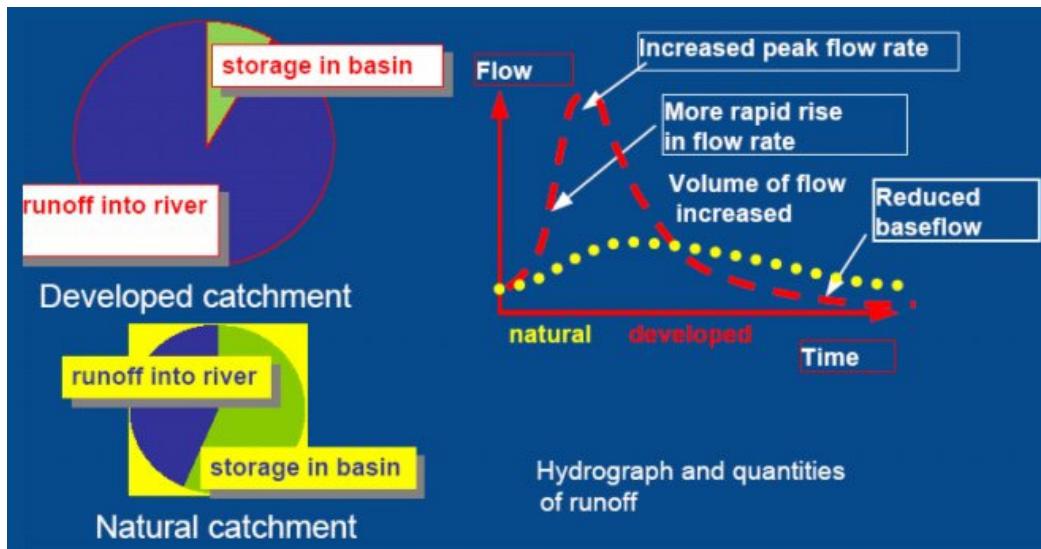
A significant number of the Panel's recommended changes are aimed at ensuring RSS and its policies tackle the environmental arm of sustainability adequately. At a high level the Panel's recommended changes were aimed at embedding sustainable development issues into a new suite of spatial principles contained in policies DP1-DP8. They also put a much increased emphasis on issues of infrastructure capacity. This revolved around the need to ensure development is located in areas of capacity or, where this is not possible, ensuring that it is timed to coincide with the delivery of any necessary new infrastructure.

In addition, draft RSS policy EM5 already contained a strong emphasis on requiring sustainable drainage in new development. Their recommended changes also gave added weight to climate change adaptation, especially to the need to manage and adapt to increased storminess and resultant flood risk, habitat disturbance and pressure on water supply/drainage systems.

The role of Green Infrastructure

GI has the ability to provide multiple functions which deliver beneficial environmental, social and economic goods and services. It represents a solution to some of the key environmental issues and pressures arising from RSS growth.

Draft RSS policy EM5 requires SUDS in all new development and GI is a potential delivery mechanism for this element of RSS policy. To help explain this, it is useful to go back to basics. The diagram on the next page shows generalised urban and rural hydrographs. The difference in drainage response is significant with less storage and greater runoff in urban catchments. This leads to much more flashy urban rivers with higher flood peaks which are reached in much shorter timescales. SUDS have the potential to more closely mimic natural drainage characteristics, helping us better manage urban flood risk. They can minimise the amount of surface water getting into our drainage systems helping maximise existing capacity to take additional surface and foul water flows. This can help minimise the risk of combined sewer overflows, surface and foul sewer flooding.



SUDS therefore have the potential to make our drainage systems more robust and better able to cope with the increased intensity rainfall events we expect to see as a result of climate change. Additionally, there are the benefits of SUDS in improving the quality of runoff before it enters watercourses, vital in addressing the key issue of urban diffuse pollution.

It is the potential of green infrastructure to provide physical space to accommodate SUDS structures which is important here, especially if on plot SUDS controls are difficult to accommodate within increasingly high density developments. For example site controls such as detention basins can be compatible with wider open space provision associated with developments. There are also those SUDS techniques associated with the transfer of surface water around sites, such as road side swales and French drains which can also be incorporated into any green infrastructure provision within developments.

There may also be larger scale opportunities for water storage attenuation solutions within existing or new public open space. These might be aimed at providing surface water or flood risk management on a wider sub-regional or catchment scale. If they are accommodated within managed public open space, this may help overcome some of the well known adoption and maintenance issues surrounding SUDS.

It is important to remember that sustainable water management functions are not the only ones GI provides. Careful consideration should be given, especially through the design stages, to ensure functions such as recreational access, biodiversity protection and enhancement and wider climate change adaptation are also built in.

GI in spatial planning

Clearly GI can deliver sustainable development and therefore sits well within the wider spatial planning system with the potential to contribute to helping us deliver Sustainable Development, the core principle underpinning planning. Emerging RSS has policy references to GI and we've seen the links between GI and the delivery of RSS. But what should planners do at a local level?

LDF core strategies should reflect the importance of green infrastructure, especially its links to delivering more sustainable water management, but also to climate change adaptation and its role in ecological protection and enhancement. However, just as importantly, planners will need to gain an understanding of where there is a need to create new GI or ensuring existing GI provide additional social, economic or environmental functions. The spatial planning system also has a role to play in ensuring this is delivered.

The way forward for GI in the spatial planning system

There are a number of ways the spatial planning system itself can start to identify future GI needs. Firstly there is the strategic flood risk appraisal process as required by PPS25 and reinforced by RSS policy EM5. There should be outputs of SFRA around fluvial and surface water flooding, its speed and depths and the impacts of flooding from developments elsewhere in a catchment etc. SFRA should be able to provide guidance as to where certain locations would need SUDS, and also potentially the appropriateness of different techniques.

The SFRA process may also start to identify the potential need for large scale water storage solutions, even when this is outside of the individual authority itself. Any such sub-regional control solutions would obviously need early consideration and identification within relevant spatial plans. This information would start to point to geographic locations where it may be necessary to achieve additional flood risk management functions within new or existing GI.

Then there is the PPS3 requirement on LPAs to identify a 5 year supply of deliverable sites. A lack of capacity to connect to a foul sewer could affect whether there is a reasonable prospect of the site being delivered in 5 years. This therefore represents a key component of achievability and therefore deliverability as envisaged under PPS3.

There is also a stronger emphasis within emerging RSS around the need to ensure the location and timing of development is informed by water infrastructure capacity issues. Linking up the site allocation process with United Utilities catchment planning and investment activities is essential in addressing this. The early dialogue required by RSS policy EM5 will start to identify areas with sewer network capacity problems. In these specific locations there may be the possibility for GI to provide the necessary sustainable drainage functions which can help address these capacity issues and facilitate the delivery of sites.

The processes outlined above may start to identify geographically specific requirements for sustainable drainage and water management functions within existing or even new GI. This should result in the identification, by planners, of the need for specific policies which set out GI requirements relating to certain site allocations, within certain specific area action plans or site specific SPDs etc.



The picture above is representative of what could be achieved through the positive planning of our open spaces and green infrastructure, especially in an urban context. An area like this could provide many benefits including:

- a re-naturalised flood plain;
- reduced run off from adjacent development, helping manage urban diffuse pollution and reduce surface water and sewer flooding;
- the potential to help address other sustainability issues like climate change adaptation by providing evaporative cooling and respite from the hotter temperatures as well as providing specific ecological protection and enhancements through the provision of habitats and habitat continuity; and
- a high quality and visual resource and a possible route for more sustainable modes of movement.

Clearly one area of open space has many functions and benefits which can be maximised through careful consideration and making links between various spatial planning activities. As a result, GI represents a key sustainable development delivery mechanism for the region.



Sefton Greenspace Strategy

Steve Matthews, Sefton Council (Local Planning Manager)

Sefton Council adopted its UDP in 2006, but without an up-to-date open space and recreation study supporting its policies for requesting new greenspace. We decided to widen the scope of the study from ‘urban greenspace’ (a UDP designation) to ‘green spaces’, more akin to green infrastructure. It soon became clear that this approach would more easily meet wider corporate objectives (e.g. Sefton Borough Partnership).

A steering group was formed comprising representatives from within the Council (planning, leisure and technical services) and from outside (biodiversity manager, health, community safety, Sefton CVS). Free consultancy support was available in the form of a CABE Space advisor. This group brought a helpful, wider perspective than simply ‘planning’ or ‘leisure’ e.g. links with health, biodiversity, safety and how to involve the community.

The biggest challenge was how to develop standards for quantity, quality and accessibility, as recommended by PPG 17. Okay, perhaps, to do this for one type of green space, but PPG 17 lists about 10 types – that’s where ‘variety’ comes in, another key aspect of green spaces.

Quantity: we used a common approach of: ‘do you think the number of parks/ green space in your area is *too much / about right / too little?*’.

Quality: our approach is still developing, but is likely to be based on Green Flag criteria and, for other kinds of green space, the management plan approach.

Accessibility: we chose a hierarchical approach for parks and gardens, showing catchment areas and areas of deficiency. For natural areas, we used a variation of the Natural England model - ‘accessibility to natural greenspace’.² How do you measure ‘natural’? In addition to publicly accessible sites with a nature designation, we included sites with a minimum of 10% tree cover.

We faced practical issues like:

- the difference between using straight line distances as against actual walking distance
- measuring distance to the edge of a park or green space rather than an entrance point
- the effect of barriers such as busy roads, railways, canals.

Our conclusion was that these issues can be resolved, but often involve so much time that it is easiest to use a surrogate measure (e.g. 300m straight line distance equates to a 400m actual walking distance).

² <http://www.english-nature.org.uk/pubs/publication/PDF/Accessgreenspace.pdf>

We have consulted extensively – telephone survey of 60 people in each of our 7 Area Committee areas, followed up by focus groups in the regeneration areas; presentations to Area Committees, parish councils and a variety of other groups, questionnaires through our community empowerment network (400 groups....only 11 responses though!), after school clubs, and (soon) through a recently appointed youth advisor.

Our green space strategy is at key issues stage. This will lead to two documents:

- a green space and development SPD, and
- a corporate green space strategy.

Both of these documents will ultimately be underpinned by specific strategies on e.g. playing pitches, street trees, play, allotments, skateboard parks.

We hope that this will lead to a more creative approach to meeting the needs of communities. Perhaps commuted sums can be matched by other money to e.g. contribute to a play bus in areas deficient in play space or increase access to natural areas by contributing to a community wildlife garden project in school grounds.

The key thing we've learnt is that the work we've done is a process – we know roughly where we're going, but there are surprises along the way!



Extract from one of the GIS maps used to assess the accessibility of current greenspace provision.



The Economic Benefits of GI

Natural Value. Natural Economy.

Peter Wilmers, Natural Economy North West (Green Infrastructure Manager)

Natural Economy North West

Natural Economy North West is a three-year partnership programme (which formally started on 15th January 2007) that maximises the benefit from existing and new investment in the region's natural environment - delivering RES Action 113. It is a multi-agency/cross-sector partnership resourced by Natural England, the Northwest Regional Development Agency and the SITA Trust. The Shared Vision of these partners is: "*a prosperous economic future with a thriving natural environment*".

RES Action 113:

Develop the economic benefits of the region's natural economy through better alignment of environmental activities and economic gain.

The RES also calls for the development of a strategy for Green Infrastructure and Transport Corridors.

NENW's business plan sets out several programmes of activity ranging from promotional and influencing activity, training work, engaging with selected demonstration projects to commissioning reports and providing technical support. Two key strands of activity are the Natural Tourism Programme and the GI Programme.

The programme is managed by Natural England using funds comprising SITA and NWDA funding (with some from NE), which pays for the small staff team, on costs, plus a limited budget for pump priming, technical support, monitoring and communications. Formal governance is via a small Board representing the key partners. Wider NENW Steering Group includes the key stakeholders: NWDA; NWRA; GONW; EnvAg; Forestry Comm.; Community Forests and other NGOs; UU; Tourist Boards; Natural England.

The NENW GI Steering Group includes the organisations just listed, and has two key roles:

- a) to direct the GI Strand of the NENW programme; and
- b) to enable increasing coordination between the agencies on GI in the Region.

The NENW Natural Tourism Steering Group provides a similar function for the NENW Natural Tourism Strand. The NENW Staff are all seconded to the Programme.

The regionally agreed definition of GI (from the NW GI Guide) is:

The region's life support system; a network of natural environment components and green & blue spaces that lies within and between the Northwest's cities, towns and villages, and which provides multiple social, economic and environmental benefits.

The NENW programme is summarised below:

- Ecotec Policy and Economic Benefits Reviews, & City Greens study.
- Grey Infrastructure & Transport Corridors Review.
- Lancs GI Strategy.
- Work with the other 4 SRPs on Strategic Approach to GI
- Strategic Funding Review.
- Advice for Natural Economy Projects re maximising economic benefits.
- Regional GI Synergy/Inter-agency Coordination.
- Selection of 6 or more demonstration projects.

The underlying ecosystem services

Effective Green Infrastructure, and the economic benefits that accrue from it, are underpinned by *ecosystem services*. These can be split into four groups:

1. supporting services;
2. provisioning services;
3. regulating services; and
4. cultural services.

Supporting services are those necessary for the production of all other ecosystem services including soil formation, photosynthesis, primary production, nutrient cycling and water cycling.

Provisioning services are the products obtained from ecosystems, including food, fibre, fuel, genetic resources, biochemicals, natural medicines, pharmaceuticals, ornamental resources and fresh water.

Regulating services are the benefits obtained from the regulation of ecosystem processes, including air quality regulation, climate regulation, water regulation, erosion regulation, water purification, disease regulation, pest regulation, pollination, natural hazard regulation.

Cultural services are the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences – thereby taking account of landscape values.

The economic benefits of GI

A report on the economic benefits of GI is currently being finalised. It has been through many iterations, including external review by reps of the NWDA, NWRA, GONW and the NENW steering Group. The report is based on a thorough literature

review and identifies nine categories of economic benefit. It seeks to make the link between the NWDA's Tasking Framework and the 2 types of SAV – ie what they have to deliver.

For each category, the report encapsulates the benefits of GI, sets out a model or diagram and then summarises the evidence in a table (citing references). It also summarises the context and links to key policies: e.g. RES, RSS, sub-regional economic strategies, Sustainable Communities (DCLG), Ecosystem Services (DEFRA), Climate Change and the Sub-National Review.

The economic benefits of GI can be summarised thus:

- Flood alleviation and water management.
- Enhancing quality of place.
- Improved health and well being.
- Increased land and property prices.
- Creating a setting for inward investment.
- New opportunities for renewable energy production.
- Improving the tourism, recreation and leisure offer.
- New employment in land management and biodiversity.
- Climate change alleviation.

Flood alleviation and water management

Increased canopy cover, increased greenspace and 'soft surfacing' and sustainable urban drainage schemes (SUDS) reduce and control run off, improve absorption rates and provide storage capacity, resulting in less dramatic flood events for urban areas, thereby reducing the costs resulting from increasingly regular 'catastrophic' events.

Enhancing quality of place

Enhanced GI provides for an improved sense of quality of place, providing opportunities for recreation, empowerment through community ownership, and visual amenity, improving the attractiveness of a neighbourhood with effects upon property prices, investment, employment opportunities, and social capital.

Improved health and well being

Increased Green Infrastructure provides multiple health and consequent economic benefits, through improved air quality, reduced stress levels, increased opportunities for informal and normal physical activity and recreation, all contributing to the reduction of limiting long term illness, and cost to the health services, reducing days lost to industry through illness and improving productivity.

Increased land and property prices

Developing green space and undertaking environmental improvements in key locations has significant benefits for housing and land prices. Proximity to high quality and accessible GI directly impacts positively upon house prices. Greener cities increase visitors and spend on city centre retail and leisure, improving rental values and increasing employment opportunities.

Creating a setting for inward investment

The creation and development of green space and landscaping can encourage and attract high value industry and workers. This can provide many benefits to urban areas in terms of improvements in quality of life and an improved green environment can increase opportunities for adding GVA to local economies.

New opportunities for renewable energy production

Increased GI provides substantial opportunities to generate and encourage the development of renewable sources of energy. Rural areas and the agricultural industry undergoing structural change are provided with diversification opportunities to supply local markets for biofuels and biomass, which in turn has mitigation effects for climate change through cleaner energy generation and reduced fossil fuel use.

Improving the tourism, recreation and leisure offer

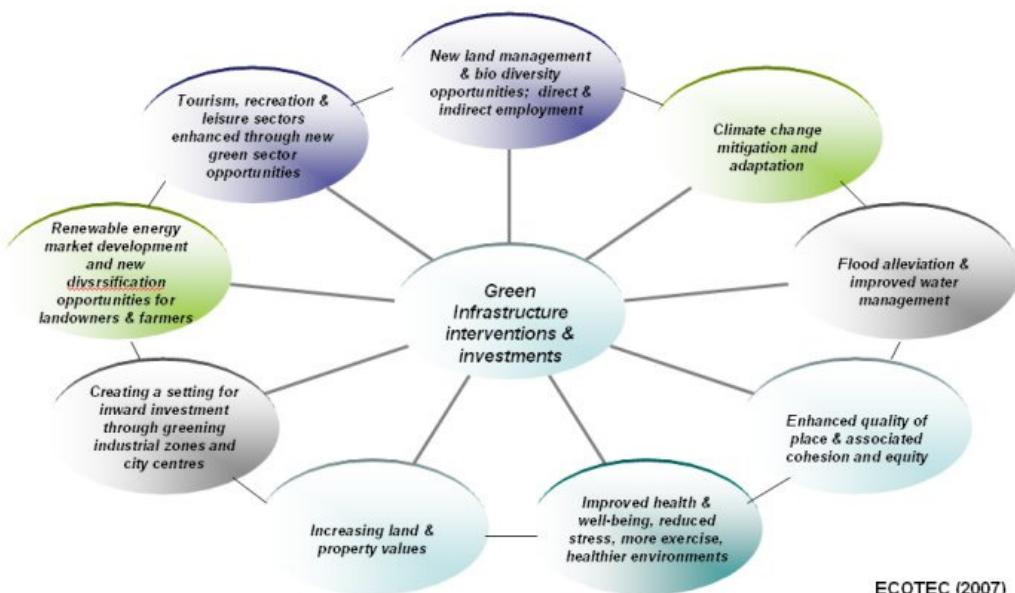
GI plays a strong role in the generation of new recreation and leisure opportunities and also stimulates economic activity within agriculture, forestry, and public services. The potential to create green spaces within built up areas reconnects urban communities with the land. Greening city centres attracts new visitors, in turn supporting urban retail and tourism sectors.

New employment in land management and biodiversity

GI plays a strong role in supporting direct and indirect employment in agriculture, forestry, land management and conservation industries. The potential to create green spaces within built up areas reconnects urban communities with the land and improves opportunities for local food marketing.

Climate change alleviation

GI provides natural air conditioning for urban areas (adaptation), reducing the need for power consumption for heating and cooling, alongside its contribution towards greenhouse gas absorption (mitigation) and longer term benefits in terms of managing the impacts of climate change.



Outstanding issues

There are a number of outstanding issues that GI strategists must deal with. For example: Quantifying the contribution GI makes to GVA - how do we compare the contribution investing in differing “bundles” of GI will make to closing the N/S GVA Gap as against other demands on economic development budgets? Free riding - how do we get all the benefiting agencies and other beneficiaries (e.g. the private sector), to invest to secure “their” benefits? Who pays to ensure the ongoing underlying ecosystem services - without which...??

Conclusion

NENW is working with key partners to encourage each of the sub-regional economic partnerships in the NW, including TMP, to initiate and lead a process to develop an agreed GI Strategy for each sub-region with the full engagement of all key stakeholders. Each SRP has included a request for resources to enable them to undertake this work in 2008/9. The Lancashire SRP is already piloting the process. It will be important for all those interested in GI to engage in this work.



Liverpool's Ecological Framework

Jane Hayward, Liverpool City Council

Background to the Space For Nature project

In 2005 Liverpool City Council completed an open space study which identified a number of different open space typologies and classified land into natural and semi-natural open space. Over 3000ha of open space were identified. Of this, 20% was protected through designation as local wildlife sites and the resource includes 4 Local Nature Reserves and the Mersey Estuary SPA/Ramsar site.

The outputs of this study informed the development of the 'Space for Nature Study' (due for completion in 2007) which has produced the Ecological Framework.

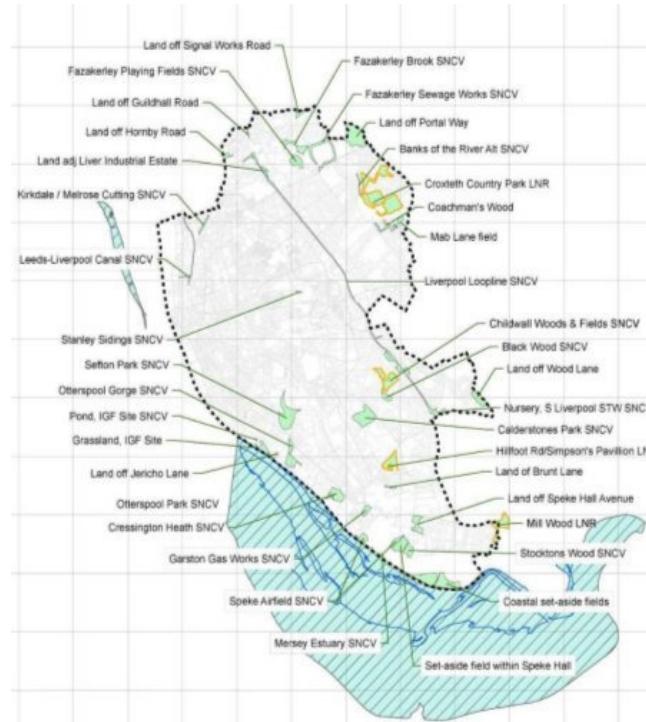
Following on from the open space study the need was identified for an up to date evidence base for LDF in line with national and regional policy. The consultants White Young Green were engaged to carry out the work. The project was managed by Merseyside Environmental Advisory Service with input from Liverpool Council's Nature Conservation Officer and the Lancashire Wildlife Trust.

The project was divided into three main stages:

1. a preliminary survey of all Liverpool's green space to Phase 1 level and identify sites for further survey;
2. detailed botanical surveys on sites selected in Phase 1 and recommend sites for designation as Local Wildlife Sites; and
3. production of an Ecological Framework (see image) – recommendations for biodiversity enhancement within the city.

They preliminary survey (phase 1 habitat survey) identified 31 habitat types throughout the city dominated by grassland habitats followed by woodland. This survey also identified important areas of connectivity between habitat patches across the city reducing effects of fragmentation and providing opportunities for species migration

Selected sites identified in the first stage were then subject to detailed botanical surveys. Merseyside guidelines for the selection of Local Wildlife Sites were then



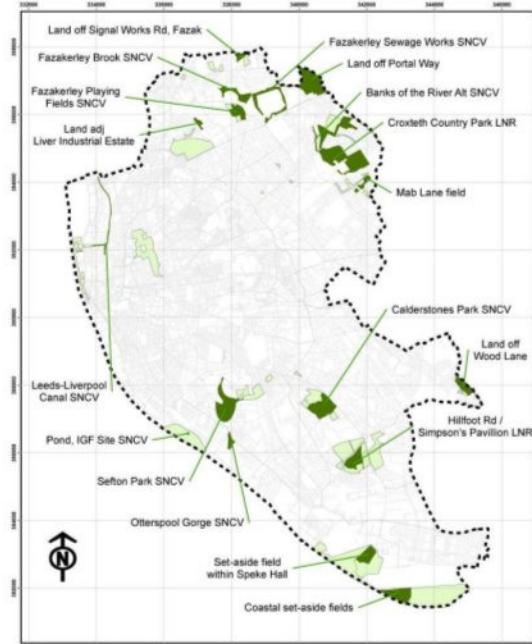
applied to the results of these surveys and qualifying sites recommended as new Local Wildlife Sites.

The production of the Ecological Framework is seen as a detailed local representation of the biodiversity resource and opportunity diagram in the Regional Spatial Strategy. Its purpose is to identify Core Biodiversity Areas (CBAs), potential linkages between CBAs and deficiency areas.

Key findings

The key findings and recommendations of the Space For Nature study are summarised below:

- Up to 700ha of green space has the potential to be enhanced to form a buffer for CBAs.
- The potential to create buffers benefiting woodland, aquatic, grassland and parkland habitats.
- A significant amount of green space in the City (over 2000ha) meets criteria for creating linkages between CBAs.
- Woodland CBAs are not easily linked but consideration should be given to role of urban trees, small woodlands, hedgerows and railway lines connecting these sites.
- Targeted management of railway lines could provide significant benefits.
- Lack of CBAs and natural and semi-natural green space in and around the City Centre.
- 726ha of semi-natural green space exists within deficiency areas which is suitable for ecological enhancement.
- The most appropriate habitats to create in deficiency areas are those targeted by, or which contribute to, NMBAP including ponds, reedbeds, urban trees and woodland, urban grassland and heathland.
- Novel urban landscape features such as roundabouts or green roofs may provide additional opportunities for habitat creation.



As an example of how the framework can be used, the map above shows CBAs with aquatic habitat (dark green). The light green areas are potential greenspace buffers around these sites identified from the Ecological Framework.

Benefits & applications of the Ecological Framework

The Space For Nature project has been the most thorough appraisal of Liverpool's biodiversity to date. It will provide an up to date evidence base for the LDF and fulfil RSS requirements. Recommendations arising from the study will enable the City

Council to contribute to NMBAP targets. The Ecological Framework highlights the ecological function of Liverpool's green infrastructure and contributes to wider green infrastructure objectives.

One output from the study is a set of guidelines that enable consideration of biodiversity issues when drafting development plan documents. This will promote:

- the integration of biodiversity with wider social and economic priorities for the city;
- the protection of the most important biodiversity areas in the city;
- recognition of green spaces outside the CBAs for their actual and potential contribution to connecting and buffering sites and thus assist in preventing fragmentation and isolation of wildlife habitats;
- informed decision making for development proposals; and
- determination of priorities for developer contributions for open space.

They way forward

The way forward now is to link the findings with those from the open space study and ensure that the outcomes are fed into:

- Area Action Plans
- Developer Contributions SPD
- Technical Policies DPD
- Land Allocations DPD

To do this effectively, we will need to address these questions:

- How to balance and integrate biodiversity with regeneration priorities?
- What level of protection can be afforded to the Local Wildlife Sites?
- What level of protection should be afforded to buffers and green corridors?
- What should the focus of biodiversity improvements be in the City?
- What are the open space priorities for Liverpool?

Biodiversity enhancements must contribute to the regeneration of the City as well as contributing to the creation of a multifunctional green network within Liverpool.



Green Infrastructure for Climate Change Adaptation

Dr Susannah Gill, The Mersey Forest

Our climate is changing. Warming of the climate system is unequivocal with coherent changes in many aspects of the climate system - not just temperature. The changes we are seeing go beyond natural variability. The temperature change in the last 50 years is very likely (>90% chance) due to increase in anthropogenic greenhouse gas concentrations (IPCC, 2007).

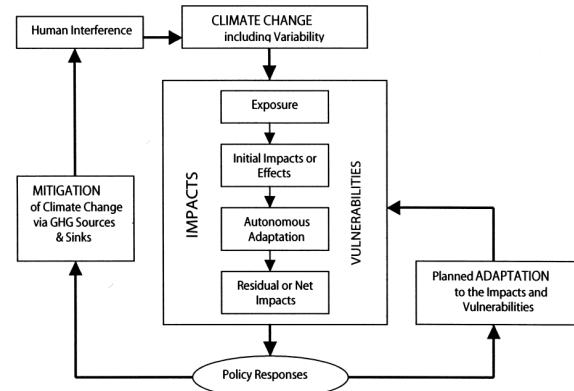
In the UK, climate change scenarios (UKCIP02) assign a high confidence level to the following impacts:

- Average temp increases
- High temp extremes increase in frequency
- Low temp extremes decrease in frequency
- Sea-surface temp warms
- Thermal growing season lengthens
- Winter precipitation increases
- Winter precipitation intensity increases
- Greater contrast between summer & winter
- Snowfall decreases
- Summer soil moisture decreases
- Sea-level rises

In the North West, the average summer maximum temperature and the average winter precipitation are both projected to rise over the next century whilst the average summer precipitation is projected to fall. The two key strategies open to us are mitigation and adaptation. Mitigation is achieved by taking steps to control the underlying drivers for climate change such as green house gas emissions and carbon sinks. Adaptation is achieved by modifying our circumstances to lessen the impact of climate change on us such as greening our cities. Whilst it is essential to mitigate climate change, we will also have to adapt to likely changes due to the presence (and long life time) of historic greenhouse gas emissions in the atmosphere.

Green Infrastructure can play a role in both mitigation and adaptation. In terms of mitigation, reducing greenhouse gas emissions and concentrations now impacts on the magnitude of future climate changes. GI has a limited but important role to play in such mitigation through:

- carbon sequestration & storage;
- direct fossil fuel substitution;



- material substitution; and
- providing high quality landscapes near to where people live, and providing alternative routes to travel - reducing the need to travel by car.

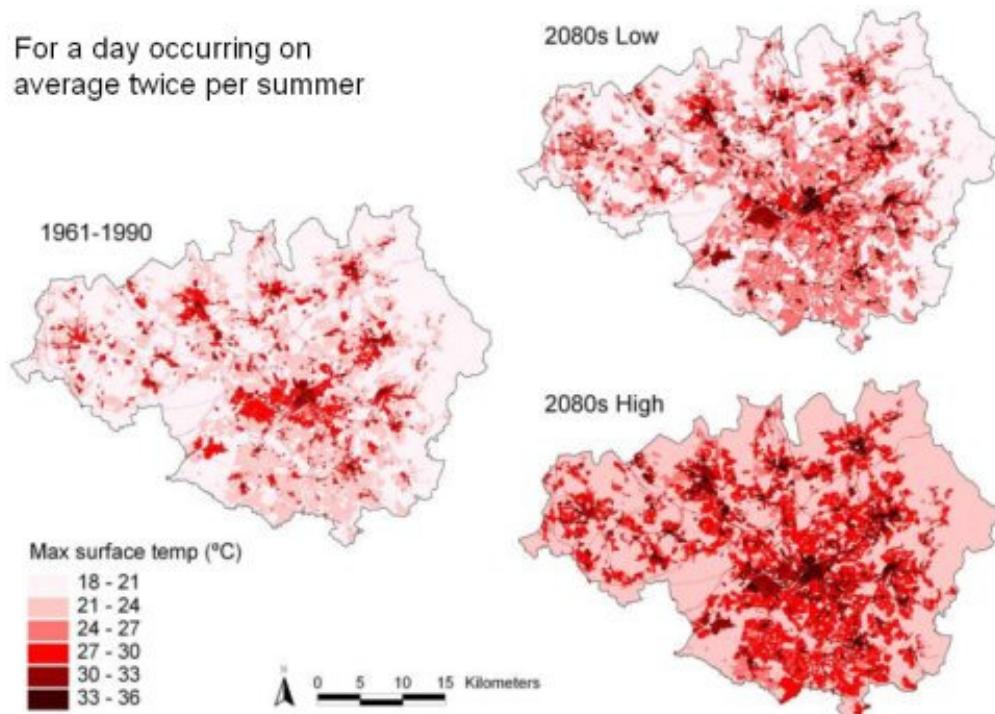
Climate change over next 30-40 years is already determined by historic greenhouse gas emissions. It is therefore essential that we adapt to the likely changes. GI has a crucial role to play in adaptation through:

- moderating temperature extremes, especially in urban areas;
- reducing volume and slowing rate of rainwater runoff;
 - flood management;
 - soil erosion;
- providing wildlife corridors; and
- providing recreation spaces e.g. high capacity landscapes which are less sensitive than other areas to climate change.

Adaptation in the urban environment

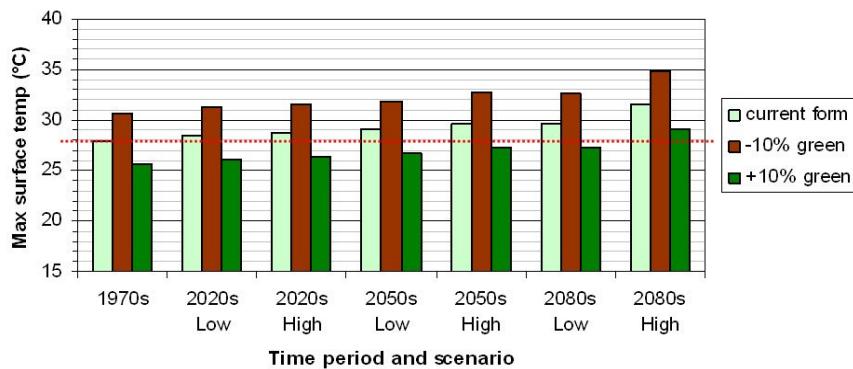
A collaborative university study called Adaptation Strategies for Climate Change in the Urban Environment (ASCCUE), taught us a lot about what we can expect in our urban areas as a result of climate change and how we might adapt to it.

The built environment is distinctive. Its high building mass and low greenspace cover leads to urban heat islands, whilst an increased surface sealing increases the rate and volume of rainfall runoff. Climate change strengthens this distinctiveness. There is potential for urban greenspace to help to moderate these impacts. An analysis of the land and surface cover in Greater Manchester found that residential areas account for a large proportion of all urban greenspace. For example, 30% of all urban tree cover is found in medium density residential areas – i.e. in private gardens and as street trees.



The maps above show how the maximum surface temperatures in Greater Manchester are predicted to change under scenarios of both low and high greenhouse gas emissions. The graph below shows how, under both scenarios, the maximum surface temperatures in high density residential areas would be effected if we left the area of green cover i) as it is; ii) decreased it by 10%; and iii) increased it by 10%. Even under the High emissions scenario, we could keep the maximum surface temperatures at about where they are now by taking the adaptive step of increasing our green cover by 10%. This clearly demonstrates the potential role of GI in adapting urban areas to climate change.

High density residential



Climate change will also impact on the *functionality* of urban greenspace. Even under the Low emissions scenario, urban grassland is predicted to become much more water-stressed (i.e. suffer from drought) over the coming decades. When grass is water-stressed it ceases to evapotranspire effectively and so its cooling effect is reduced. This could lead to an increase in surface temperatures of 4.7-5.7°C in high density residential areas and 13.8-15.6°C in schools. Mature trees can play a critical role through the shade they provide in these situations – with a difference in the region of 13°C between surface temperatures in and out of the shade of the canopy.

The predicted rise in winter precipitation will present problems of surface runoff. Under the High emissions scenario, a high precipitation events occurring, on average, one day per winter will result in 56% more rain, but the amount of surface runoff resulting from this will go up by 82%. Adapting to this will need us to consider the different infiltration capacities of the various soils underlying our urban areas. Where areas have a high infiltration capacity there is a case for conserving, creating and enhancing green cover, to allow rainwater into the ground. Ways of storing rainwater, which can then be used to irrigate green space in times of drought, should also be sought.

The ASCCUE project has pointed the way forward for climate change adaptation in urban areas. Some of the major findings can be summarized thus:

- Greenspace moderates temperatures through evaporative cooling & shading;
 - mature trees are critical for shading.
- High infiltration soils are most effective in regulating surface runoff.
- We should aim to increase rainwater storage.
- There is an opportunity to use stored water for irrigation in times of drought.

The role of spatial planning

GI planning has an important role to play in climate change (especially adaptation) and the functional importance of GI must be reflected in planning policy. Green Infrastructure has a number of functions to play in both mitigation and adaptation to climate change.

Mitigation functions of GI include:

- biofuels production;
- timber production;
- food production;
- carbon storage;
- recreation;
- green travel routes;
- shading from sun; and
- evaporative cooling.

Adaptation functions of GI include:

- shading from sun;
- evaporative cooling;
- water storage;
- water interception;
- water infiltration;
- soil stabilisation;
- storm protection;
- habitat for wildlife;
- corridor for wildlife; and
- recreation.

The role of GI in mitigating and adapting to climate change must be considered at all levels of spatial planning including national (e.g. PPS1 supplement, Climate Change Adaptation by Design [TCPA, 2007], Adapting to Climate Change – a checklist for development [GLA, 2005] and Guidance for Local Authorities on Implementing the Biodiversity Duty [Defra, 2007]), Regional (e.g. RSS) and local (e.g. LDF) levels. Sub-regional levels and non-planning documents will also be important.

Planning for Green Infrastructure should be an integral part of the LDF with climate change mitigation and adaptation functions forming a crucial part. Developer contributions should play their part towards delivering a GI plan. The GI plan should deliver:

- an audit of what GI there is and what functions it provides;
- protection of GI that is critical environmental capital e.g.
 - that in urban centres,
 - flood plains and

- private gardens on high infiltration soils;
- creation of GI where there is a need due to lack of functionality, e.g.
 - in high density residential and built up areas and
 - low green space cover with human vulnerability;
- enhancement of GI where management changes could improve functionality, e.g.
 - water storage capacity,
 - wildlife corridors and
 - SuDS;
- maintenance of GI so that it continues to provide that function e.g.
 - during times of water stress.

There are some examples of GI policies beginning to be incorporated into LDFs around the country.

Sheffield City Council have proposed a green roof policy where green roofs:

- are required on all medium and larger developments (more than 15 dwellings / over 1000 m² gross internal floor space)
- are encouraged on all other developments
- must be compatible with other design and conservation considerations and
- must cover at least 80% of the total roof area.

Hull City Council are proposing development control and policies to reduce flooding impact and flood-proof new development by:

- removing permitted development rights to control loss of private gardens;
- lowering development densities and higher green space and public open space requirements; and
- building flood proofing into any new development.

In summary:

- Our climate is changing.
- We need to mitigate and adapt;
 - the mitigation role of GI is limited but important and
 - the adaptation role of GI is substantial.
- Spatial planning has an important role to play in climate change adaptation;
 - planning policy must reflect the functional importance of GI at all levels.
- We need to know what we have and how it functions in order to protect, create, enhance, and maintain our Green Infrastructure.

Output from the workshops

Three short workshops were run in the afternoon with the following broad themes:

- Spatial links, integration and cross-boundary working.
- Working with developers and partners to deliver spatial ecological networks.
- What does GI deliver for communities?

For each of the three workshops comments minuted at the time and points made on the workshop feedback forms have been examined for common threads in terms of issues and opportunities for Green Infrastructure concepts in spatial planning.

These are summarised below in three sections corresponding to common themes which emerged.

Strategic considerations

Integrating with other strategies

- GI should be promoted as a means of helping to deliver *other* strategies.
- GI is a way to deliver existing objectives.
- RSS should lead the way with respect to GI and the roles of LAs in promoting it through their LDFs.
- Can GI concepts be integrated into Local Area Agreements?

Enlisting support

- We need an evidential basis for GI.
- We need to engage leaders, chief execs etc with the idea of ecological frameworks and GI.
- If GI needs are clearly identified and publicly agreed, then it will be easier to get developers and partners to sign up.
- Brief and lobby the Mersey Partnership about the importance of GI.

Partnership working

- Planning can only deliver so much: partnerships are what is needed to deliver GI within community strategies, area action plans, LSP etc.
- We need to formulate policy with partners and stakeholders to ensure consensus (as far as possible).
- We need to get support from outside bodies.
- Getting partners involved can bring GI up the agenda and assist with delivery.
- We must work together at a Merseyside-wide level to identify the value of what we have and to agree priorities for increasing GI.

Developing technical expertise in GI

- We should have a process for the demonstration of best practice.
- Work to develop GI should use existing knowledge and resources in the region rather than relying on consultancies since it demonstrates commitment and retains knowledge in the area.
- We can learn about GI from abroad.

- We should use the same typology as laid out in PPG17 so that we are speaking the same language.

Sub-regional & cross-boundary working

Cross-boundary links

A number of people pointed to the fact that boundaries of ecologically functional units (e.g. water catchment areas) do not correspond with administrative boundaries.

- We need to link up at boundaries.
- We must share best practice/knowledge between LAs
- LDFs need to be seen to have synergy with those of neighbouring LAs.
- Ecological networks should be tied in with landscape character, so for example links with LAs in Mersey Forest area, but also West Lancashire and Wigan.
- Ecological networks work at a landscape level rather than at the ‘artificial’ level of district boundaries etc.
- A sub-regional GI plan is needed as a framework for LAs which can then develop further at a local level for local needs.
- We need a mechanism in place to share information across borders (GONM?) when looking at LDFs etc?
- There could be a role for GONW to share information and provide guidance for cross-boundary working. Funding mechanism?
- Should a GI strategy planned and managed at the regional level?

Practical obstacles to cross-boundary working

- Differing timescales of neighbouring LAs mean that they are often forced to work in isolation.
- All LAs at different stages with core strategies LDFs etc
- Timing – different authorities working to different timescales.
- Potentially a problem with complicating the issue. There are a lot of people to involve even within a single authority – working across authority boundaries could bring in even more.
- Timescales and processes can make cross-boundary working difficult.
- In Wirral the natural linkages are with Cheshire – not Merseyside.

Local Authorities and GI now

Where does GI fit within the LDF?

- GI needs to be taken forward by core strategies.
- GI needs to be related to development – not just green space.
- Core strategies could be used to establish key strategic policy, supplemented by SPDs. DPDs may be better because they allocate sites and carry more weight.
- LDFs are slow in preparing up to date plans incorporating GI policies. It’s an issue of resources, specialist skills and political will.
- How does development fit within GI and how does it affect the functionality of GI. We need some measure of GI function and value of green space.

Where does GI fit within the LA?

- GI has to be a corporate strategy, not just planning.
- GI must be properly owned within LAs by a broad church including, for example, architects as well as environmentalists.
- GI needs to be wider than just planners – must be in LDF but also community strategy and endorsed by LSP.
- LAs need a department for GI!

What's the current LA position on GI?

- Several LA people said that the concept of GI is not fully understood within LAs.
- LA Officers are not looking at the whole GI picture – each is operating within their own silo.

On relating GI to green space

- GI delivers green space that has been created or managed with multi-functionality in mind.
- GI is about networks and multi-functionality.
- GI is more holistic, robust and integrated than green space in terms of socio-economic benefits.
- GI can be viewed as a resource much more than 'green space' is.
- Physical linkage is more stressed in GI than with green space.
- Green space is often viewed as 'that patch of green at the end of the road'.
- Street trees and private gardens are often left out of thoughts about green space, but they are treated integrally by GI.
- GI is a more useful concept to planners than simple green space because it embodies the concepts of functionality and linked networks.
- A lot of groundwork already going into green space, e.g. in SPDs, can inform the development of GI strategies.

GI and climate change

Adapting to climate change

Most people seemed to view the connection between climate change adaptation and the development of GI as synergistic. The view was often expressed that GI is a useful mechanism of delivering climate and that the need for climate change adaptation is an opportunity for the promotion of GI.

- GI has a growing profile and the PPS1 supplement on climate change will be a shot in the arm to it.
- Climate change action plans can promote GI as a way to cope with climate change.
- Climate change may be an opportunity to make links.
- GI has the potential to raise awareness of climate change.
- Ameliorates the affects of climate change on communities.
- The general public is becoming more appreciative of the need to adapt to climate change and very often the LAs are dragging their feet. Sometimes the private sector is seen to be leading the way in this.

- The link between GI and climate change adaptation and mitigation has not yet been made by communities.

Community and citizen buy-in

Benefits to communities

- At the highest level, the ability to create sustainable communities in the long term – literally to enable communities to survive.
- Access to green space has the potential to improve health.
- We can promote GI as a network for communities to get from one place to another and from one service to another. We can make the physical links between green and grey infrastructure.
- There are opportunities to change things ‘at the margins’ for example health and safety on the way to school – green routes could help.
- Benefits of GI for communities must be measured to highlight best practice and increase take-up of GI planning in other areas.

Engaging individuals and communities

- Schools have a huge role to play in engaging children with the environment. Children so engaged before the age of 10 will often re-engage with the environment in later life.
- The more we talk about how GI benefits individuals and communities the better: people are basically selfish; if they can see what’s in it for them, then they will buy in.
- Being green used to be a matter of personal choice, but how it’s a matter of survival. We need to get that message across when talking about GI.
- Development of GI could engage the community and encourage partnership working.
- We need to make the connection between health issues and use of GI.
- Getting people and networks to work together successfully.
- Identifying what can be done by individuals or small groups (e.g. in gardens).
- The issue of private gardens has traditionally been thought of as tricky: no one really knows how to deal with them.
- Not enough effort is put into trying to get people to improve the GI functions of their gardens (e.g. more trees and less hard surfacing).
- LAs should engage with communities on GI issues from the early stages of any plan.
- It is resource-hungry to explain to communities all the implications of GI planning, so a balance needs to be struck.

Negative perceptions

- Some green spaces - e.g. canals in Sefton - are not looked upon in a positive light because of historic perceptions.
- There are ways of altering people’s perceptions. Engaging communities with local GI is important.
- Anti-social behaviour often happens on green spaces and the spaces themselves are frequently seen as the problem.
- Community safety is a problem – some GI might be seen as the cause of anti-social behaviour and security problems.

- People want safe leisure space, but they are not usually happy with the provision. Some green space is perceived as being without function and regarded as ‘green wasteland’.
- Some contributors thought that GI is not accepted at the community level.

Conflicting interests

- Balancing flood risk with creation of wetlands for biodiversity in relation to water storage. There can be conflict between hydrological engineer’s and ecologist’s expectations.
- Quality green infrastructure could attract investment but there could be conflicts between the interests of individuals and businesses.
- Competing needs – need to provide a range of services/facilities for the community.
- Managing conflicting demands on green space will be an issue (e.g. pressure for more housing).
- Government could address the issue of the role of gardens in GI. We shouldn’t densify housing.

Costs and funding GI

The problem of funding

Funding the development and, more particularly, the management of GI is seen as a huge problem expressed through many comments like those below.

- We need investment in delivery services e.g. the LA ranger services.
- Resources are a big problem because you need ranger services and the police to look after green space.
- GI needs to be cost-effective and economic work and evidence is required to show how this is the case.
- There’s a need for underlying economic evidence to support cost.
- Long-term maintenance will always be an issue with builders who want to finish a job and then forget about it.
- There are difficulties in getting revenue when maintenance is the key issue.
- Maintenance of green space is an issue, e.g. getting the relevant council department to adopt and maintain new areas.
- Who will maintain SUDS developments? This must be considered early in the development stages.
- How do we justify GI to developers?
- GI is not properly resourced – all the community ‘tick boxes’ are about education etc.

Section 106 agreements

- With a GI plan in place, developers can contribute through S106.
- S106 is traditionally viewed as capital funds for a ‘ring-fenced’ site, but it can be used for revenue to use for other areas (perhaps employing a warden for example).
- There is the possibility of creating employment from S106 revenue.

- A social enterprise company could carry out the maintenance and long term monitoring of GI funded through S106 etc.
- It is important to monitor how S106 funds are spent. Developers can ask to see evidence of how the funds have been used (and ask for it back with interest if not used properly).
- Can investment be made from S106 agreements on a regional level to enable districts to draw from?

Other possibilities for resourcing

- Some Newlands money is ring-fenced for revenue and can be used to look after GI in the longer term.
- Worklessness – could be a resource for maintaining GI.
- Defra want UU to take responsibility for SUDS.
- Any new planning charge might be useful.
- Biodiversity funding is often small, so links to other funds through GI are welcome.
- Existing programs are strengthened as GI develops links and draws funding from a large number of pots which add up to a significant amount.
- There might be scope for the use of covenants/management agreements to maintain open spaces and habitats in housing developments.
- Could NWDA aid funding?
- There are lots of users of GI, but very few providers and maintainers. For example, no health money goes into GI development and maintenance even though it has clear health benefits.
- We need to explore ways to get money from all ‘users’ of green space.

Costing the benefits

- It might be best to concentrate one or two major functions when costing the benefits of GI – probably the ones that are most easily quantified.
- We need to develop the means of identifying value for money of GI, e.g. effective SUDS could lead to cheaper property insurance.
- We need to talk in economic terms in the short term because that’s the way politicians are thinking. In the medium to long term, we may not have to couch community benefits in terms of economics.
- There is a cost to *not* doing anything about climate change and therefore the cost of GI needs to be looked at in that context.
- It can be hard cost the benefits of protecting habitats and species within GI in pure economic terms.

Workshop attendees

Participants in the Green Infrastructure Training Workshop are listed below together with their contact details.

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