



MAPPING THE BENEFITS OF THE GREEN NETWORK: A NEW TOWN CASE STUDY

Illustrating the use of the EcoServ-GIS toolkit to quantify the benefits of nature and the green network across Cumbernauld, North Lanarkshire.

- For anyone interested in how nature and the green network provides multiple benefits for people.
- Outlines the approach taken and gives example results.
- Can be used to inform an Ecosystem Services assessment or Natural Capital stock check.

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CASE STUDY: A NEW TOWN

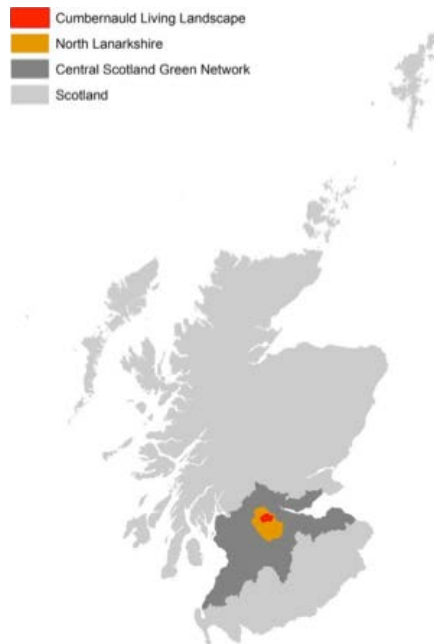
There is an increasing weight of evidence about the benefits that the natural environment and 'green networks' can provide people. Land managers, planners and decision makers are now considering how their actions influence the provision of these 'ecosystem services' and where they are most needed.

This case study uses the **EcoServ-GIS toolkit** to explore the supply and demand of benefits in the new town of Cumbernauld, North Lanarkshire. It maps management priorities using existing data and will be used as part of the Cumbernauld Living Landscape's suite of decision making tools.

CENTRAL SCOTLAND GREEN NETWORK

The town of Cumbernauld, situated in North Lanarkshire, lies within the Central Scotland Green Network (CSGN). The CSGN initiative was officially launched in 2009 following its inclusion in the second National Planning Framework (NPF2), with the aim of transforming the environment of central Scotland and making it a more attractive place to live, visit and do business.

By building on existing initiatives in the area and working with local stakeholders, CSGN aims to deliver improved livelihoods by providing environmental, social and economic benefits to the community.



In the heart of the central Scotland green network

CUMBERNAULD LIVING LANDSCAPE



More than 50% of Cumbernauld's town centre is made up of greenspaces (parks, woodlands and gardens), but these are often disconnected and are not as good for people or wildlife as they should be. Greenspaces are crucial to the health and well-being of both people and wildlife and as such should be at the heart of the town's future.

Cumbernauld Living Landscape is a partnership project that aims to enhance, restore and reconnect these areas within the town for the benefit of the local population and wildlife.

CASE STUDY: A NEW TOWN

WHY ARE GREEN NETWORKS IMPORTANT?

The town of Cumbernauld, situated in North Lanarkshire, lies within the Central Scotland Green Network (CSGN). The CSGN initiative was officially launched in 2009 following its inclusion in the second National Planning Framework (NPF2), with the aim of transforming the environment of central Scotland and making it a more attractive place to live, visit and do business.

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CUMBERNAULD'S GREEN NETWORK



Woodland Network

Cumbernauld lies 14 miles north east of Glasgow in North Lanarkshire; its wider area encompasses 5,900 hectares with 55,000 residents. The town underwent rapid urbanisation in the late 1950s as part of the new town movement. Large greenspaces are a feature within Cumbernauld and separate the main neighbourhoods. Cumbernauld is notable for its woodland and access networks with routes between the residential areas and the town centre. It is home to four of the Scottish Wildlife Trust's largest lowland wildlife reserves, a Country Park and a number of other greenspaces.

Across Cumbernauld Living Landscape the green network is a mosaic of natural and semi-natural habitats: woodlands, wetlands, peatlands and natural and semi-natural grasslands which together comprise 40% of the total area. This includes nationally

important areas of ancient woodland and internationally important over wintering grounds for bean geese. In the wider Living Landscape area, forestry and agriculture cover large areas, however there are very significant areas of semi-natural grassland, heaths and mire. Other types of greenspaces such as amenity and recreation areas occupy a further 14% of the total area, whilst gardens cover 6%. Significant clusters of amenity grassland occur to the north and west of the landscape. In these areas, gardens form a very substantial component of the local green network.

MAPPING THE BENEFITS

This case study evaluates nine types of benefits delivered by Cumbernauld's green network:



ECOSERV-GIS TOOLKIT

The **EcoServ-GIS toolkit** was used to map where the green networks benefit the local population and areas where these benefits are most needed. The toolkit refers to the range of benefits from green networks as “ecosystem services” and for each service it examines the capacity of the natural environment and human demand to produce **maps of benefiting areas** and suggested **management zones**. The toolkit does this using nationally available datasets and published peer-reviewed modelling methods that will be available in a forthcoming Scottish Natural Heritage (SNH) commissioned report. Using GIS techniques, it creates a map of greenspaces, overlays it with built environment data (housing, roads, pathways, schools etc.) and then matches it against local population characteristics (e.g. Scottish Index of Multiple Deprivation).

The toolkit was used to run an analysis for North Lanarkshire, with a 3km buffer, to provide a regional context for the Cumbernauld results. In this case study, maps were produced at the scale of the Cumbernauld Living Landscape, and three local sites (Cumbernauld Glen, Carbrain and the Town Centre) were selected as a focus. It is important to note that all the quantification and analysis is relative to the main North Lanarkshire study area and cannot directly be compared between different study areas.

MEAN MULTI-FUNCTIONALITY

For each site, the results were used to calculate a mean multi-functionality score. The score divides the number of services for which there is some capacity per cell by the number of services with predicted demand in each cell.

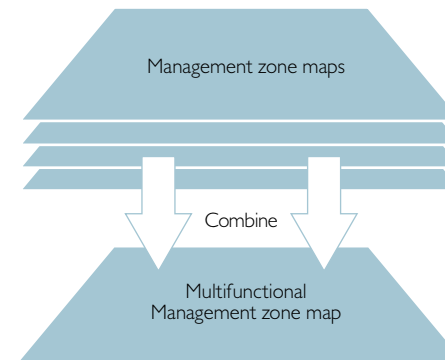
For example, capacity for three services / demand for six services = 0.5, whilst capacity for one service but demand for five services = 0.2. This simple method should be used alongside the management zones maps.

MAPPING THE BENEFITS

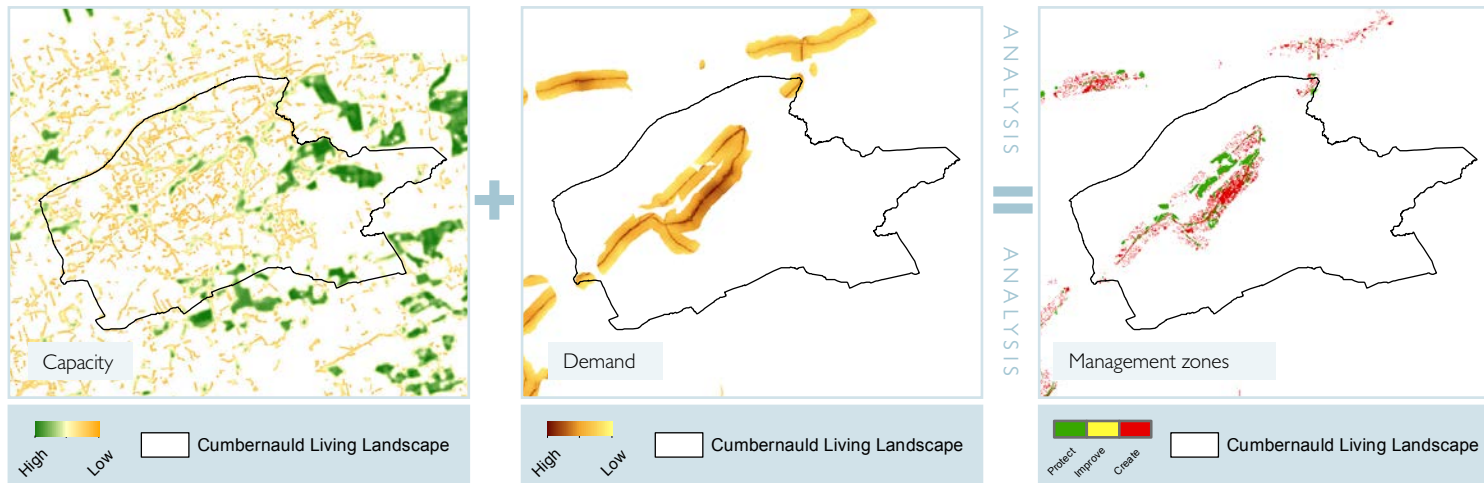
MANAGEMENT ZONE MAPS

A large number of maps and GIS data are produced by the toolkit. The focus here is on the individual benefits and **Multifunctional Management Zones** maps. The toolkit uses graded importance categories to define the categories of benefits and type of management zones. The individual services are combined into a multifunctional management zone map. For land managers and policy makers there will be most interest in the mapped zones with higher certainty, or those with predicted higher importance for management.

Additionally, land managers will be interested in the size of areas of land available for management. To improve map clarity, lower importance categories or management zones, or very small areas of benefits, have been omitted from the final maps and analysis. Therefore, whilst many benefits may often be delivered to some extent by a greenspace site, this toolkit focuses on those that are of most importance when considering site management.



Air purification example



STUDY AREA: THREE CONTRASTING PLACES

MULTI-FUNCTIONALITY MANAGEMENT ZONES

This map indicates where different management options could apply to provide multiple benefits. To improve map clarity the lowest categories of each zone are not shown. Protect zones are overlaid over maintain, improve and create zones. This map is a simplification, in order to highlight potential areas where management would benefit several different benefits.

1 CUMBERNAULD GLEN

Multifunctionality score = 0.85



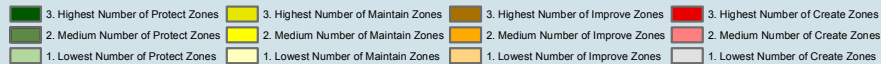
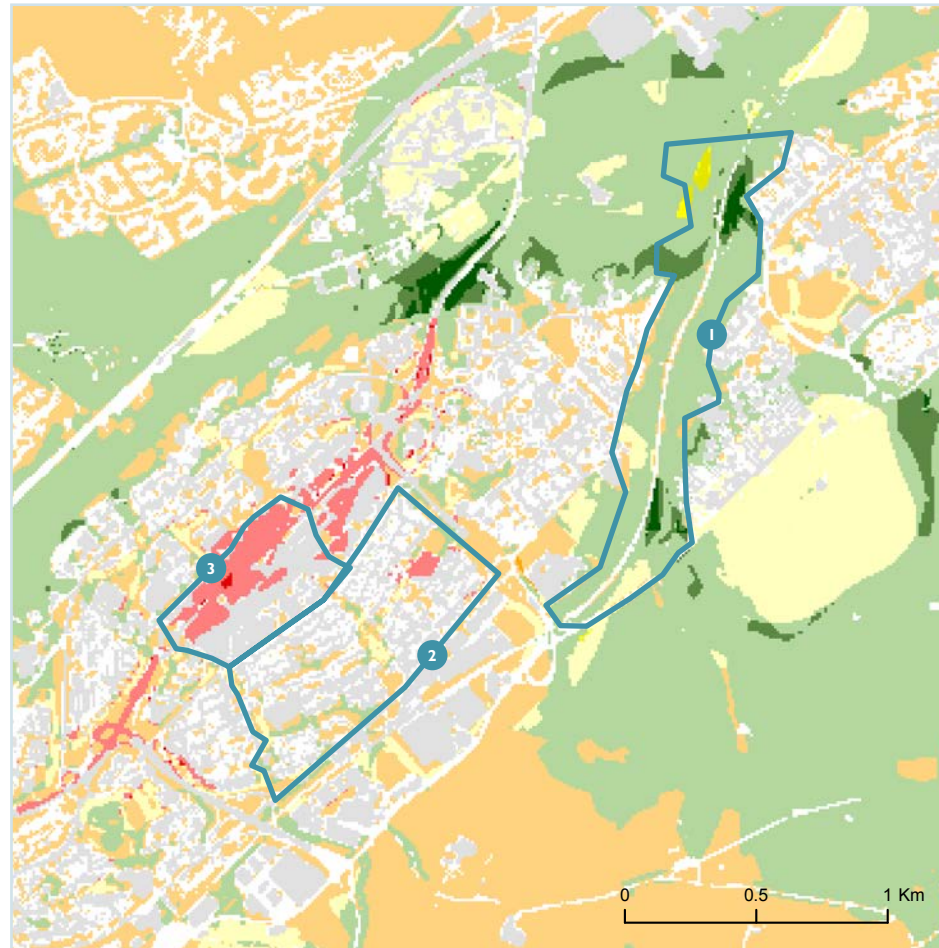
2 CARBRAIN

Multifunctionality score = 0.28



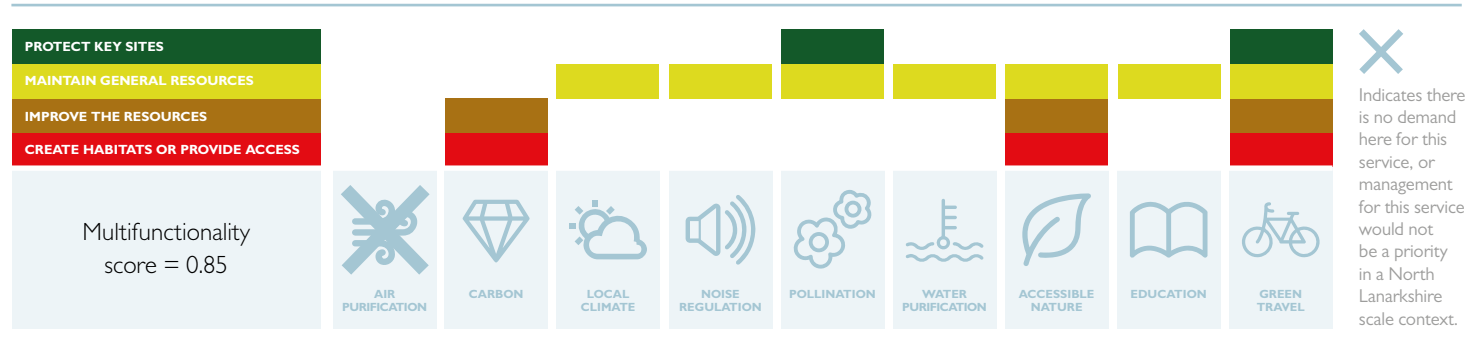
3 TOWN CENTRE

Multifunctionality score = 0.06



CUMBERNAULD GLEN: AN URBAN WOODLAND GLEN

Significant site management opportunities and priorities.



GREEN NETWORK BENEFITS

The glen provides a variety of benefits to nearby residents with a high overall multifunctionality score of 0.85. The toolkit identified a wide range of important benefits in the well managed woodland habitat.

The mature, well-established, regenerating, multi-layered woodland canopy is able to deliver these benefits. 45 ha of the wood is indicated as a carbon store with 5 ha occurring adjacent to roads and housing helping to regulate noise. The significant areas of woodland edge habitat and proximity to allotments means it is likely to be of importance to local pollinators. Being in an area of high demand for accessible nature means that the areas large woodland, accessibility and proximity to people make it a key resource for accessible nature experiences. Within walking distance of local schools, the wood represents an excellent outdoor education opportunity, as well as providing a safe route to schools or the town centre (9 ha in areas of highest or high demand). Green travel routes can be most effective where they occur away from the road edges, with a good cover of nearby vegetation. Very small areas of the site are also indicated as supporting local climate regulation and water purification.

CUMBERNAULD GLEN: AN URBAN WOODLAND GLEN



PRIORITIES FOR MANAGEMENT

All of the benefits delivered in Cumbernauld Glen should be maintained or enhanced. Specific consideration should be given to the following opportunities which are important in the context of both Cumbernauld and North Lanarkshire:

Green Travel – Due to the accessibility, density of housing and community facilities surrounding Cumbernauld Glen is a key site for green travel. Routes through the glen need to be maintained and the resource enhanced or expanded for all users.

Education – This area of the Glen is adjacent to several schools and currently provides excellent opportunities for outdoor education. This can be built upon by providing a diverse mix of habitats that complement the woodland setting. Woodland and habitats such as glades, rides and meadows offer excellent opportunities for environmental study and outdoor learning.

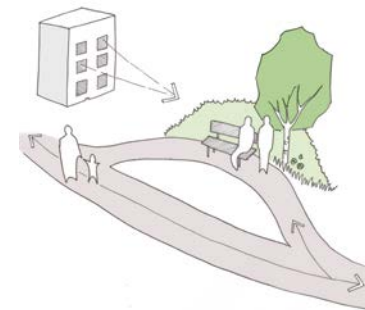
Carbon – The existing woodland provides a carbon store and should be managed to protect forest soils.

AREA CHARACTERISTICS

- Important ancient woodland, a haven for local wildlife
- Impressive displays of bluebells in spring
- Owned and managed by the Scottish Wildlife Trust with community involvement
- Connections to the local community, surrounded by housing and schools

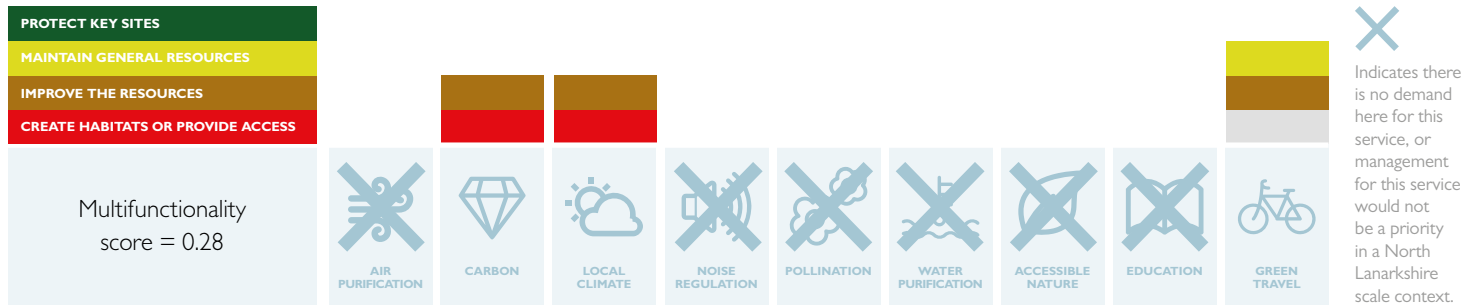
LIVING LANDSCAPE ACTION

Paths through the woodland can be improved to make them accessible to all. Providing resting place and passing places will encourage green travel. These should be located to minimise antisocial behaviours.



CARBRAIN: A “NEW TOWN” HOUSING SCHEME

Significant site management opportunities and priorities.



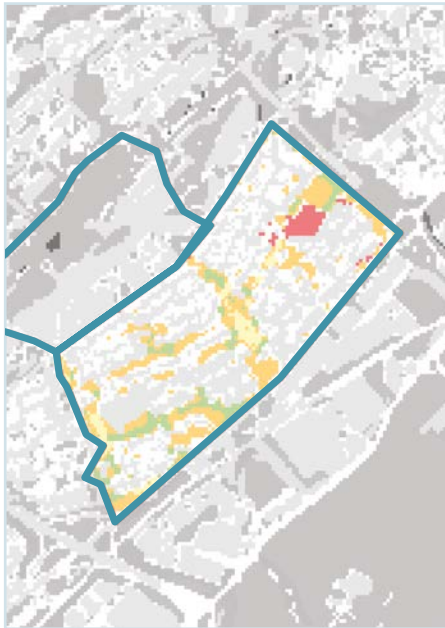
Carbrain Housing

GREEN NETWORK BENEFITS

Only a small number of needs are being met in Carbrain and the multi-functionality score is very low. This means the areas of greenspace are delivering only a limited number of benefits. Given that neighbourhoods within this area are some of the most deprived in Scotland, it is expected that there would be a high demand for many of the services. However, due to the type of greenspace (mostly amenity grassland), there is limited opportunity to provide these services.

Carbrain Gully is a notable exception and provides important green travel benefits. This area of urban grassland with pockets of trees contributes to the route between the town centre and the Cumbernauld train station. Further areas of greenspace also provide carbon storage and limited local climate regulation, although these benefits could be improved. The toolkit indicates significant, unmet need for local climate regulation and carbon storage and the opportunities to improve the capacity to deliver this. There are 29 ha of greenspace and buildings where appropriate management can help improve carbon storage and 2 ha of greenspace and buildings within areas of highest demand for local climate regulation.

CARBRAIN: A “NEW TOWN” HOUSING SCHEME



PRIORITIES FOR MANAGEMENT

The map of management zones for multi-functionality identifies the area around Carbrain primary school as a location that could deliver multiple priority benefits (red). The following actions could improve this areas capacity to deliver:

Carbon storage - Appropriate management of the existing greenspace or, where possible, conversion to habitats with higher storage capacity (such as woodlands or wetlands) would help store more carbon. The creation of green roofs could also help with carbon storage.

Local climate regulation - Increased tree or woodland cover would improve local climate regulation. There is a further 1 ha of buildings within areas of highest demand where creation of green roofs could help with local climate regulation. However, because this area is mainly residential, the opportunities for green roof creation are likely to be limited.

AREA CHARACTERISTICS

- High density housing area
- Disadvantaged communities in the lower 10% of Scottish Index of Multiple Deprivation
- Bounded by roads, crossed via underpasses and bridges
- Open space is mainly shelterbelt woodland or amenity grassland

LIVING LANDSCAPE ACTION

Including green roof on Carbrain Primary Schools regeneration project would bring multiple benefits in an area they are needed most.



TOWN CENTRE: AT THE HEART OF THE TOWN

Significant site management opportunities and priorities.

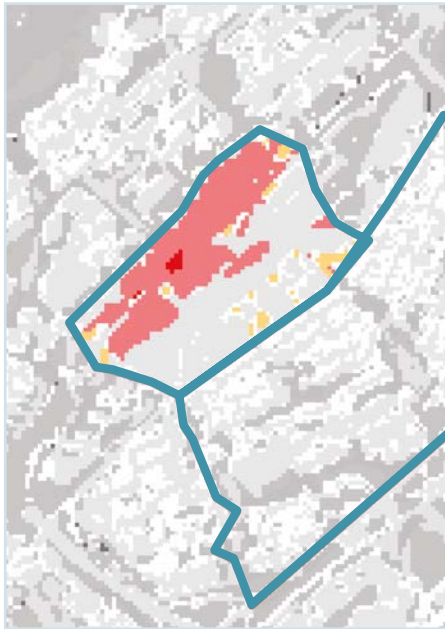


GREEN NETWORK BENEFITS

The multi-functionality score of the town centre is the lowest of any of the areas assessed. The town centre is very built up with significant areas of sealed surfaces, such as car parks and buildings, the greenspace is very limited and there are few street trees. Currently, no priority benefits are provided by the small areas of natural spaces in the town centre. However, despite their limited extent, the existing areas of greenspace do provide some carbon storage and local climate regulation.

There are opportunities to improve existing areas but the largest benefits will come from changing the habitats present. For example, de-paving and re-greening walkways as well as vacant and derelict land will increase the capacity of this area to deliver benefits. This will require a large amount of effort but should be considered in any future regeneration of the town centre. The toolkit could be used to select the larger individual buildings within this area, such as office blocks or shopping centres, where projects such as green roof creation may be possible.

TOWN CENTRE: AT THE HEART OF THE TOWN



PRIORITIES FOR MANAGEMENT

The highest priority area for the creation of habitats and the improvement of resources is around Central Way, the busy road that passes underneath the main shopping centre and the car parks that surround it.

Air Purification - Within this small area there are 12 ha of sealed surfaces and built up areas close to busy roads. Here, increasing general levels of vegetation next to roads, installation of street trees, hedges, living walls and green roofs could help with air purification.

Carbon storage - Improving existing pockets of trees with shrubs and multi-layer canopy wherever possible will maximise the carbon storage capacity. There are 13 ha of buildings where creation of green roofs could help with carbon storage.

Climate Regulation - Improving the extent and composition of urban greenspace with additional tree cover would help with local climate regulation. There is also a large area of buildings (18 ha) within the zone of highest or high demand where creation of green roofs could help with local climate regulation.

AREA CHARACTERISTICS

- An iconic brutalist 1960s town centre design
- Civic functions and large retailers within the shopping centre
- Segregated cars and pedestrians, linked through underpasses and footbridges
- Large areas of car park and sealed surfaces

LIVING LANDSCAPE ACTION

The adoption and re-greening of footway in front of the Tryst sports centre would help create habitats and improve the environment in the town centre.



STANDARDISED, EVIDENCE-BASED APPROACH

VISUALISING BENEFITS

Developed by The Wildlife Trusts in partnership with SEPA, SNH, and GCVGNP, EcoServ-GIS provides a standardised approach to mapping the benefits of nature, ecosystem services and natural capital. The results of the analysis supply evidence for planning and strategic conservation, where the value of the environment can be more clearly highlighted.

The management zones and multi-functionality maps are helpful when formulating green infrastructure strategies, assessing strategic planning documents and discussing neighbourhood development plans with community groups. They also provide a useful tool during consultations, raising awareness, or in supporting management options or funding bids.

FUTURE USE

Within the Cumbernauld Living Landscape the maps have already been used to plan a survey of urban greenspace and to help locate and map habitats along green travel routes. The outputs from EcoServ-GIS will be used as part of a Green Routes Feasibility Project that seeks to identify deliverable interventions to improve the function of the green network.

This information will also be used in the Living Landscape's advocacy work on North Lanarkshire Councils Green Infrastructure Strategy and the South Cumbernauld Community Growth Area, providing an additional layer of evidence for the integration of a green network into the development of 600 new homes. The work has had a wider impact within North Lanarkshire Council and will be considered Biodiversity Action Plan partnership for future plans.

HOW YOU CAN BENEFIT

The full set of results maps are available at both the North Lanarkshire and Cumbernauld Living Landscape scale on requests from the Scottish Wildlife Trust, please contact Ian Mackenzie (imackenzie@scottishwildlifetrust.org.uk, 0131 312 7765).

The EcoServ-GIS toolkit comprises GIS models together with a user guide and additional resources to allow an analysis to be conducted by GIS staff and is available to partners of the Wildlife Trusts.

Please contact the toolkit administrator at ecoserv-gis@outlook.com for further information.

Acknowledgements - Thank you to the EcoServ-GIS Steering Group and Louise Bond, Phil Baarda, Ian Mackenzie, Karlene Hill, Scott Ferguson, Peter Glaves and Gill Dowse.

WHAT DOES NATURE DO FOR US?



AIR
PURIFICATION

Air purification – trees and woodlands in towns and cities help to clean the air by absorbing air pollution chemicals and particulate matter



WATER
PURIFICATION

Water purification – wetland vegetation and woodland close to streams helps to prevent polluted run-off water from causing aquatic pollution



CARBON

Carbon storage – growing vegetation and developing soils remove carbon from the atmosphere, helping to slow climate change



ACCESSIBLE
NATURE

Accessible nature – greenspaces near to where people live provide opportunities for active and quiet recreation, leading to healthier local communities



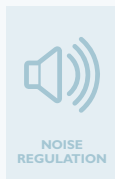
LOCAL
CLIMATE

Local climate – trees and vegetation help to cool urban areas through shading and evapotranspiration



EDUCATION

Education – greenspaces provide opportunities for learning and education, informally via observation or formally as part of school visits and outdoor education



NOISE
REGULATION

Noise regulation – trees and vegetation help to absorb and diffuse noise pollution



GREEN
TRAVEL

Green travel – greenspaces can provide safe, traffic and pollution free travel routes, encouraging active travel to schools or town centres



POLLINATION

Pollination – semi-natural habitats, linear habitats and woodland edges provide feeding and nesting sites for wild pollinators which help pollinate crops