



UNIVERSITY OF  
GLOUCESTERSHIRE

This is a peer-reviewed, final published version of the following document and is licensed under All Rights Reserved license:

**Jones, Peter ORCID: 0000-0002-9566-9393 and Comfort, Daphne (2021) Ecosystem Services and Brownfield Land. Town and Country Planning, 90 (9/10). pp. 344-348.**

EPrint URI: <https://eprints.glos.ac.uk/id/eprint/10343>

### **Disclaimer**

The University of Gloucestershire has obtained warranties from all depositors as to their title in the material deposited and as to their right to deposit such material.

The University of Gloucestershire makes no representation or warranties of commercial utility, title, or fitness for a particular purpose or any other warranty, express or implied in respect of any material deposited.

The University of Gloucestershire makes no representation that the use of the materials will not infringe any patent, copyright, trademark or other property or proprietary rights.

The University of Gloucestershire accepts no liability for any infringement of intellectual property rights in any material deposited but will remove such material from public view pending investigation in the event of an allegation of any such infringement.

PLEASE SCROLL DOWN FOR TEXT.

# ecosystem services and brownfield land

**Peter Jones** and the late **Daphne Comfort** look at the some of the ecological services provided by brownfield land and outline some of the guidance on ecological issues available to planning authorities when considering applications for development on brownfield land

Much of the discussion of the benefits of ecosystem services has been focused on green space. In contributing to a handbook on sustainable sites, Venhaus, for example, argued that 'greenfield sites provide a variety of ecosystem services that are critical to the health, security and prosperity of humans and other organisms. Services such as air and water cleansing, climate regulation, food production and enhanced cultural identity are all provided in various capacities in both urban and rural locations'.<sup>1</sup> More recently, Forest Research claimed that 'greenspace is multifunctional – it provides social, economic and environmental benefits', and 'it supports many of the components of ecosystem services'.<sup>2</sup> However, many brownfield sites also provide a range of ecosystem services.

This article describes the characteristics of ecological services and brownfield land, explores some of the ecological services provided by brownfield land, and outlines some of the guidance on ecological issues available to planning authorities when considering applications for the development of brownfield land.

## **Ecosystem services**

Danley and Widmark<sup>3</sup> argue that ecosystem services is a phrase with many meanings. The Millennium Ecosystem Assessment succinctly defined ecosystem services as 'the benefits people obtain from ecosystems',<sup>4</sup> while for Fisher *et al.* 'ecosystem services are the aspects of ecosystems utilized (actively or passively) to produce human well-being'.<sup>5</sup> More extensively, for the UK National Ecosystem Assessment 'ecosystem services are the benefits provided by ecosystems that contribute to making human life both possible and worth living'.<sup>6</sup> It further asserts that 'examples of ecosystem services include products such as food and water, regulation of floods, soil erosion and disease outbreaks, and non-material benefits such as recreational and spiritual benefits in natural areas',

and that 'the term 'services' is usually used to encompass the tangible and intangible benefits that humans obtain from ecosystems, which are sometimes separated into 'goods' and 'services''.

A number of types of ecosystem services have been recognised. The European Environment Agency,<sup>7</sup> for example, has identified three categories – namely, provisioning services, maintenance and regulating services, and cultural services.

Provisioning services are the tangible products that people obtain from ecosystems: they are vital for the economy and include biomass, water and fibre, and energy, and many have well developed markets and valuation systems. Maintenance and regulating services embrace the ways that ecosystems control or modify the environment. They are not consumed as such, but they affect the activities of people and businesses, and they include soil formation and composition, pest and disease control, and climate regulation. Cultural services are the more intangible benefits that people derive from the natural world: they embrace the significance of nature within people's culture and include recreation, spiritual and intellectual sustenance, and a sense of place.

## **Brownfield land**

The term brownfield is generally taken to mean an area of land that has been used for industrial purposes, perhaps polluted, and then abandoned. The Scottish government, for example, defines brownfield land as 'land which has previously been developed', noting that 'the term may cover vacant or derelict land, land occupied by redundant or unused building and developed land within the settlement boundary where further intensification of use is considered acceptable'.<sup>8</sup>

For Alker *et al.*, 'a brownfield site is any land or premises which has previously been used or developed and is not currently fully in use, although it may be partially occupied or utilized. It may also



be vacant, derelict or contaminated'.<sup>9</sup> In many ways, brownfield sites are associated with environmental risks – for example, in terms of soil and groundwater pollution, which can have public health consequences. Within this context 'brownfield' seems to have been coined in the US in the early 1990s, and in 1993 the US Environmental Protection Agency established its first brownfield project to clean up former industrial land, previously occupied by a brewery, an automobile manufacturing plant and a foundry, in the outer suburbs of Cleveland, Ohio, on the southern shore of Lake Erie.

Within the UK, the focus on brownfield land has largely been tied up with planning policies and new housing development. In England, the National Planning Policy Framework (NPPF), for example, suggests that 'planning policies and decisions should promote an effective use of land in meeting the need for homes' and 'strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or 'brownfield' land'.<sup>10</sup> The Planning White Paper, *Planning for the Future*, emphasised the need to build more homes on brownfield land and within *Scottish Planning Policy* one of the 'policy principles' aimed at directing 'the right development to the right place', is 'considering the re-use or re-development of brownfield land before new development takes place on greenfield sites'.<sup>8</sup>

Estimates of the extent of brownfield land vary widely. In England, Sustainable Build,<sup>12</sup> for example, reported in 2006 that there were over 66,000 hectares of brownfield land, while in 2019 CPRE<sup>13</sup> estimated that some 26,000 hectares had been assessed by local planning authorities as being suitable for housing development. A corresponding estimate for Scotland is 11,000 hectares, but recent estimates are not readily available for Wales or Northern Ireland. Geographically, while brownfield land is found throughout England, it is concentrated in

towns and cities, with just 13% being in rural areas. The heaviest concentrations are in London and the conurbations of the West Midlands, the North West, West Yorkshire, and the North East.

While there is no formally recognised classification of brownfield land, four categories can be identified – vacant land, derelict land, contaminated land, and partially occupied or used land. More simply, Wong and Baing<sup>14</sup> have identified three types of brownfield land being re-used for housing – residential land, vacant and derelict land, and previously developed land. In 2006, *National Land Use Data Base: Land Use and Land Cover Classification*,<sup>15</sup> issued by the erstwhile Office of Deputy Prime Minister, identified four types of previously developed land – vacant land and buildings, derelict land and buildings, defence establishments, and unused land. The first category excludes land previously used for mineral extraction or waste disposal, and land that has been, or is, in agriculture, woodland or open countryside use, while the fourth category includes semi-natural areas of land that are not routinely used for agricultural purposes and have never been used for development.

A variety of problems are often associated with brownfield land, including damage to foundations and structures, settlement and subsidence, while contaminated land may harbour a range of hazards that include threats to human health, the presence of toxic metal compounds, and the migration of contaminants to adjacent sites. In some cases site histories may not be fully known, and here there may be problems in establishing the chemical history of such sites.

### **Ecosystem services and brownfield sites**

While brownfield land is often seen to have a number of negative associations, it can also provide a range of ecosystem benefits and can be an important driver for sustainable development. Washbourne, for example, claimed that 'brownfield

site redevelopment presents an opportunity to create urban green spaces that provide a wide range of ecosystem services',<sup>16</sup> while Hunter argued that brownfield sites may 'have the potential to provide significant ecosystem services'.<sup>17</sup> More specifically, Mathey *et al.* argued that 'vegetation-covered urban brownfields provide a number of ecosystem services to help tackle current urban challenges, such as preventing a loss of biodiversity, adapting to climate change, and fostering recreational and healthy urban environments'.<sup>18</sup>

Morel *et al.*<sup>19</sup> examined the range of ecosystem services provided by soils in urban, industrial, traffic, mining and military areas. The authors proposed a categorisation of such soils based on the ecosystem services that they provided, identifying food production, non-food biomass, mineral reserves and fresh water supply as provisioning services associated with such soils. Regulating services provided by the named soils included water storage, run-off and flood control, local climate, air pollution, pollution attenuation, noise control, and biodiversity, while cultural services included recreation, archives of human history, and education. The authors also proposed a four-point, no-/limited-/medium-/high-value scoring system to identify the extent to which the different groups of the selected soils contributed to ecosystem services – vegetated sites were classed as having high value for biodiversity, while such sites were classed as having medium value for run-off and flood control.

Examining the role of the many ecosystem services provided by brownfield land would be a lengthy task, but a focus on cultural services and biodiversity provides some flavour of their varied contribution.

Biodiversity is widely seen to be important in providing a range of ecosystem services, including nutrient recycling, carbon sequestration, pest regulation, and pollination, and here brownfield land plays an important role. More specifically, Buglife suggests that there is 'a lingering perception that brownfield sites are neglected wastelands that are devoid of interest, either for people or wildlife', and that there is often 'a low awareness of the ecological value of brownfield land', but argues that 'biodiversity-rich brownfield sites should be recognised for their potential to deliver high quality green infrastructure, for people and wildlife'.<sup>20</sup> Furthermore, Buglife claims that 'brownfield sites can provide valuable opportunities for people to have access to the wildlife on their doorsteps, and if managed properly can be a powerful driver of sustainable regeneration [and also] play a part in maintaining the biodiversity of the wider area'.

Bannigan has claimed that 'the cultural ecosystem services that brownfield sites provide are seen as greatly beneficial when included in urban development', and 'the recreational services they provide reflect the needs of urban residents which

aren't always met by more conventional public green spaces'.<sup>21</sup> Morrison's doctoral dissertation<sup>22</sup> found that unmanaged urban brownfields enabled cultural activities such as play and exercise; creating and expressing; producing and caring; and gathering and consuming. More generally, she argued that the brownfield settings, and the cultural practices they enabled, combined to produce a number of cultural ecosystem benefits, including 'belonging', 'sense of place' and 'rootedness', and 'experiences' such as 'tranquillity', 'inspiration', and 'discovery'.

## Planning guidance

The Westminster government's Planning Policy Guidance recognises that some brownfield land 'is of high environmental value, providing habitats for protected or priority species and other environmental and amenity benefits'.<sup>23</sup> At the same time, the NPPF recommends that local planning authorities' strategic policies should make 'as much use as possible of suitable brownfield sites' and should recognise that some brownfield land 'can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production'.<sup>10</sup> More positively, Bannigan argued that 'a major benefit of integrating brownfield sites within urban planning is in the absence of heavy management they provide a network of sites with different successional stages' and that 'brownfield sites offer an ecosystem [...] that cannot be found in formal gardens and parks where ecological processes like succession and erosion are controlled'.<sup>21</sup>

By way of a general introduction to planning authorities' approaches to brownfield sites, Washbourne *et al.* recognised that 'brownfield site redevelopment presents an opportunity to create urban green spaces that provide a wide range of ecosystem services' and argued that 'it is important, therefore, to understand which ecosystem services are demanded by stakeholders and whether there are trade-offs or synergies in this demand'.<sup>16</sup> The authors surveyed a range of urban stakeholders in an attempt to quantify the relative importance of various ecosystem services to different brownfield stakeholders. One of the principal findings was that stakeholders' views were in many ways diametrically opposed, in that they either prioritised development or a range of other ecological uses that a brownfield site might perform. By way of conclusion Washbourne *et al.* concluded that these findings were 'important in informing urban planning that engages in the development of brownfield sites, to improve the 'ecological function of human-dominated landscapes''.<sup>16</sup>

Since April 2017 all local planning authorities in England have had a duty to prepare, maintain, update annually and publish a register of brownfield land that is suitable for residential development. The aim is to provide developers and communities with

information to clarify the nature of brownfield land development opportunities and to encourage investment in local areas, and the registers are used to monitor commitment to the delivery of brownfield sites. In assessing potential brownfield sites in England, local planning authorities are required to take account of the NPPF, and they must also take account of the policies in their Local Plan documents and ensure that a site can be made suitable for its new use. Some of the local authorities' brownfield registers include, or have links to, maps which show the location of such land within their jurisdiction.

Essentially, Local Plan policies are required to reflect the desire to redevelop brownfield land, while recognising that such land can be more expensive, and take a longer period of time, to develop. Here, the costs of preparing such land for development can include demolition of existing buildings, the treatment and remediation of contaminated land, the importation of new soil, and the re-engineering of services and facilities for future use. Where sites are considered likely to produce a competitive return for landowners and developers, planning authorities can often approve developments that meet a range of policy objectives. Local planning authorities often look to work with Local Enterprise Partnerships to promote the development of brownfield land and use a range of funding mechanisms to help to bring such land back into productive use.

There is specific guidance on ecological issues when considering planning applications for brownfield land. Nationally, the Department for Environment, Food and Rural Affairs' *Open Mosaic Habitats on Previously Developed Land* documentation<sup>24</sup> can be used to enable local planning authorities to identify brownfield sites that are important for biodiversity when considering development proposals.

More locally, a number of local authorities have produced their own guidance. Chichester District Council's guidance on ecology or biodiversity in the planning application process,<sup>25</sup> for example, advises that planning permission will be granted where it can be demonstrated that a number of criteria have been met. These criteria include safeguarding the biodiversity value of the site; avoidance or mitigation of harm to habitats and species which are protected or deemed to be important to biodiversity; the incorporation of features that enhance biodiversity and aim to protect, manage and enhance the network of ecology, biodiversity and geological sites within the local authority's jurisdiction; and the benefits of development outweighing any adverse impact on the biodiversity of the site.

## Conclusion

In one way or another, human beings have always implicitly recognised the importance of the natural environment in sustaining life – for example, in providing the air we breathe and the water we

drink, and in helping to grow the food we eat. More recently, as the pressures on that environment have intensified, there has been an explicit focus on the role that ecosystem services play in helping to provide and support those life-sustaining elements. Brownfield sites play an important role here, in that they provide a range of ecological services, including green infrastructure for people and wildlife, opportunities for people to have access to wildlife on their doorstep, carbon storage, flood control, a cooling effect on the local environment, a cleaning effect on the air, and a reduction in audible noise levels.

● **Peter Jones** works in the School of Business at the University of Gloucestershire, as did the late **Daphne Comfort**. The views expressed are personal.

## Notes

- 1 H Venhaus: 'Predesign: site selection, assessment and planning'. In M Calkins (Ed.): *The Sustainable Sites Handbook: A Complete Guide to the Principles, Strategies, and Best Practices for Sustainable Landscapes*. Wiley, 2012, pp.33-63
- 2 'Benefits of greenspace'. Webpage. Forest Research. [www.forestresearch.gov.uk/tools-and-resources/urban-regeneration-and-greenspace-partnership/greenspace-in-practice/benefits-of-greenspace/](http://www.forestresearch.gov.uk/tools-and-resources/urban-regeneration-and-greenspace-partnership/greenspace-in-practice/benefits-of-greenspace/)
- 3 B Danley and C Widmark: 'Evaluating conceptual definitions of ecosystem services and their implications'. *Ecological Economics*, 2016, Vol. 126 (C), 132-38
- 4 *Ecosystems and Human Well-being: Synthesis*. Report of the Millennium Ecosystem Assessment. World Resources Institute, 2005. [www.millenniumassessment.org/documents/document.356.aspx.pdf](http://www.millenniumassessment.org/documents/document.356.aspx.pdf)
- 5 B Fisher, R Costanza, RK Turner and P Morling: *Defining and Classifying Ecosystem Services for Decision Making*. CSERGE Working Paper EDM, No. 07-04. Centre for Social and Economic Research on the Global Environment, University of East Anglia, 2007. [www.econstor.eu/bitstream/10419/80264/1/571829937.pdf](http://www.econstor.eu/bitstream/10419/80264/1/571829937.pdf)
- 6 'Concepts: Ecosystem services'. Webpage. UK National Ecosystem Assessment. <http://uknea.unep-wcmc.org/EcosystemAssessmentConcepts/EcosystemServices/tabid/103/Default.aspx>
- 7 *Natural Capital and Ecosystem Services*. Briefing. European Environment Agency, Feb. 2015, revised May 2020. [www.eea.europa.eu/soer-2015/europe/natural-capital-and-ecosystem-services](http://www.eea.europa.eu/soer-2015/europe/natural-capital-and-ecosystem-services)
- 8 *Scottish Planning Policy*. Scottish Government, Jun. 2014, revised Dec. 2020. [www.gov.scot/publications/scottish-planning-policy/](http://www.gov.scot/publications/scottish-planning-policy/)
- 9 S Alker, V Joy, P Roberts and N Smith: 'The definition of brownfield'. *Journal of Environmental Planning & Management*, 2000, Vol. 43(1), 46-69
- 10 *National Planning Policy Framework*. Ministry of Housing, Communities and Local Government, Jul. 2019. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf)
- 11 *Planning for the Future*. White Paper. Ministry of Housing, Communities and Local Government, Aug. 2020. [www.gov.uk/government/consultations/planning-for-the-future](http://www.gov.uk/government/consultations/planning-for-the-future)
- 12 'Brownfield sites'. Webpage. Sustainable Build, Sept. 2006. [www.sustainablebuild.co.uk/brownfieldsites.html](http://www.sustainablebuild.co.uk/brownfieldsites.html)

- 13 *State of Brownfield 2019: An Updated Analysis on the Potential of Brownfield Land for Housing*. CPRE, Mar. 2019. [www.london.gov.uk/sites/default/files/ad\\_114\\_state\\_of\\_brownfield\\_2019.pdf](http://www.london.gov.uk/sites/default/files/ad_114_state_of_brownfield_2019.pdf)
- 14 C Wong and A Shulze-Baing: *Brownfield Residential Development in England: What Happens to the Most Deprived Neighbourhoods?* Joseph Rowntree Foundation, 2010. [www.jrf.org.uk/sites/default/files/jrf/migrated/files/brownfield-residential-redevelopment-full.pdf](http://www.jrf.org.uk/sites/default/files/jrf/migrated/files/brownfield-residential-redevelopment-full.pdf)
- 15 *National Land Use Data Base: Land Use and Land Cover Classification*. Office of the Deputy Prime Minister, Feb. 2006. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/11493/144275.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/11493/144275.pdf)
- 16 C-L Washbourne, MA Goddard, G Le Provost, DAC Manning and P Manning: 'Trade-offs and synergies in the ecosystem services demands of urban brown field stakeholders'. *Ecosystem Services*, 2020, Vol. 42, 101074. [www.sciencedirect.com/science/article/pii/S2212041620300164](http://www.sciencedirect.com/science/article/pii/S2212041620300164)
- 17 P Hunter: 'Brown is the new green: Brownfield sites often harbour a surprising amount of biodiversity'. *EMBO Reports*, 2014, Vol. 15(12), 1238-42. [www.ncbi.nlm.nih.gov/pmc/articles/PMC4264926/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4264926/)
- 18 J Mathey, S Rossler, J Banse, I Lehmann and A Brauer: 'Brownfields as an element of green infrastructure for implementing ecosystem services into urban areas'. *Journal of Urban Planning & Development*, 2015, Vol. 141(3), A40150001. [www.researchgate.net/publication/276175860\\_Brownfields\\_As\\_an\\_Element\\_of\\_Green\\_Infrastructure\\_for\\_Implementing\\_Ecosystem\\_Services\\_into\\_Urban\\_Areas](http://www.researchgate.net/publication/276175860_Brownfields_As_an_Element_of_Green_Infrastructure_for_Implementing_Ecosystem_Services_into_Urban_Areas)
- 19 JL Morel, C Chenu and K Lorenz: 'Ecosystem services provided by soils of urban, industrial, traffic, mining and military areas (SUITMAs)'. *Journal of Soils & Sediments*, 2015, Vol. 15(8), 1659-66. [www.researchgate.net/publication/280287348\\_Ecosystem\\_services\\_provided\\_by\\_soils\\_of\\_urban\\_industrial\\_traffic\\_mining\\_and\\_military\\_areas\\_SUITMAs](http://www.researchgate.net/publication/280287348_Ecosystem_services_provided_by_soils_of_urban_industrial_traffic_mining_and_military_areas_SUITMAs)
- 20 *Planning for Brownfield Diversity: A Best Practice Guide*. Buglife – The Invertebrate Conservation Trust, 2009. <https://cdn.buglife.org.uk/2019/08/Planning-for-Brownfield-Biodiversity.pdf>
- 21 K Bannigan: 'Brownfield sites: a wildlife haven'. Blog entry. Groundsure, 13 Aug. 2018. [www.groundsure.com/resources/brownfield-sites-a-wildlife-haven/](http://www.groundsure.com/resources/brownfield-sites-a-wildlife-haven/)
- 22 K Morrison: *Exploring the Cultural Ecosystem Services Associated with Unmanaged Brownfield Sites: An Interdisciplinary (Arts and Science) Approach*. PhD Thesis. School of Environmental and Life Sciences, University of Salford, Jun. 2015. <http://usir.salford.ac.uk/id/eprint/36752/1/k.morrison%20PhD%20Thesis%20sept%202015.pdf>
- 23 'Natural environment'. *Planning Policy Guidance*. Ministry of Housing, Communities and Local Government. Para. 003, Ref. ID: 8-003-20190721, Revision date: 21 Jul. 2019. [www.gov.uk/guidance/natural-environment#agricultural-land-soil-and-brownfield-land-of-environmental-value](http://www.gov.uk/guidance/natural-environment#agricultural-land-soil-and-brownfield-land-of-environmental-value)
- 24 See *Definition and Mapping of Open Mosaic Habitats on Previously Developed Land: Phase 1. Final Report*. ADAS UK, for Department for Environment, Food and Rural Affairs, Mar. 2010. [http://randd.defra.gov.uk/Document.aspx?Document=WC0722\\_9022\\_FRP.pdf](http://randd.defra.gov.uk/Document.aspx?Document=WC0722_9022_FRP.pdf)
- 25 *Guidance on Ecological Surveys and Planning Applications*. Chichester District Council, Mar. 2018. [www.chichester.gov.uk/CHttpHandler.ashx?id=8167&p=0](http://www.chichester.gov.uk/CHttpHandler.ashx?id=8167&p=0)