

# What a waste

## What is the biodiversity value of urban brownfields?

*Richard A. Jones*

*A lecture given at Birkbeck College, 9 March 2012.*

Derided as economically useless ‘wastelands’, brownfields are often portrayed as being little more than bulldozed heaps of rubble, twisted metal and rubbish — dirty, smelly, ugly, dangerous. Brownfields, truly, have an image problem.

It starts with the name. Brown is not a cool colour; it is the colour of dirt, the colour of excrement. More importantly, brownfields are seen as *not* green. And, conversely, green is *the* colour of the moment, the colour on everyone’s lips. Green is the colour of the countryside; it’s the colour of nature, the colour of goodness. More than this, green has been misappropriated by anyone wanting to link into these aspirational attributes; green has become a powerful brand. Leaving aside the Green Party, which has commandeered the word as part of its very name, even in general parlance the environmental movement is usually described as a green movement, companies are keen to show off their green credentials, we all aspire to green living. Green is so cool. I wouldn’t like to contemplate for a moment what might be the response if I said I was part of a brown movement.

Brownfields are, nevertheless, very important for wildlife; in particular they are important for invertebrates — insects especially. The trouble is that insects are imbued with their own image problem. When Ridley Scott needed a model for his blood-thirsty, parasitic, shiny, armored *Alien*, he leant heavily on the imagery of insects. If insects were the size of cats or dogs, they would be the most terrifyingly awful creatures on Earth. Unfortunately, even though insects *are* very small, many people think they are already quite awful enough thank you. Trying to show that brownfield sites are worthy of ecological study and even environmental conservation because of their invertebrate interest, is a doubly uphill struggle. But I will try.

A great part of the difficulty in trying to get across the wildlife importance of brownfields is that the idea of a ‘beautiful’ landscape, rolling hills and a chequerboard of woods and meadows, is still uppermost in many people’s minds. It is what something looks like that affects opinions most — some sort of romantic bucolic idyll, or pre-Raphaelite aesthetic still dominates what we think of as ‘natural beauty’. It is all, very much, to do with greenery.

The distinction, though, between brown and green is far from black and white, though. It may come as a surprise to some, that many brownfields are, in fact, green, so maybe, we need to begin by considering what exactly is a brownfield. I don’t want to be exhaustive here. Definitions may change, or be subject to certain legal technicalities, so without going into any planning jargon, or referring to any particular planning documents or policies, it is the general perception of brownfields, those derelict sites sometimes called ‘previously used’ or ‘previously developed’ land, that I want to address.

As I said before, I accept that brownfields are often dirty, smelly, ugly. Because they are not ‘occupied’ by still-functioning buildings (these may be derelict or demolished), these crumbling and decrepit spots are often called ‘wasteland’ and accordingly valued as empty and worthless. The emptiness often attracts antisocial behaviour. This may be in the form of vandalism, or fly-tipping — sometimes this is

done on the scale of organized criminal activity when hundreds of tons of rubble, many lorry-loads, are dumped in a well-coordinated drop on a single night. No brownfield seems complete without the requisite burnt-out car.

Working on brownfield sites can be dangerous — discarded hypodermic needles from drug-users and dumped belongings from burglaries and robberies are frequently encountered, showing the sorts of people likely to inhabit these places. Whilst digging into the tough rubble-strewn soil of Rochester Riverside to put in pit-fall traps I was approached by a man in a smart suit, carrying a clip-board. He was, not as I first imagined, a planner, developer or architect, he was a detective inspector with the local murder squad and he pointed to the line of his colleagues carrying out finger-tip searches where the sawn-off shotgun was found earlier. Occasional unexploded munitions can also cause a stir. It is best to exercise a certain amount of personal care when visiting brownfield sites.

Brownfields, though, also cover a very broad range of habitats. Gardens have sometimes been included. As have road verges, cemeteries, railway cuttings and embankments, playing fields. Even the cooling lagoons of power stations, which are mostly water, can still be considered brown fields.

One feature of brownfield sites is that they are almost all out of bounds to the general public. Not only do they look uninviting, the owners positively try to prevent anyone going in. They lack public footpaths, they are often discouragingly fenced, and intimidatingly signposted, there may be security guards; there is no easy access. These are not places to go and explore for wildlife. They are obviously places to be left alone.

There are several reasons why brownfields are made so deliberately unwelcoming. It may be to prevent damage — that vandalism, fly-tipping and joy-riding for example. There may be national or local security issues about a site — power stations, gas storage tanks, covered reservoirs, railways, mobile phone masts and broadcasting transmitters are often surrounded by brownfields rightly secured against suspicious trespassers.

There may be worries about ‘visitors’ accidentally coming to harm, then starting negligence law suits for compensation. It may also be (and here is the terrible cynic in me rearing one of its many ugly heads) to keep the wildlife a secret. For a developer, sometimes, wildlife can be a financial liability, it can have real cost implications in terms of having to carry out prolonged and expensive professional surveys; there may be delays to already precariously tight schedules, it might mean that planning permissions require costly or inconvenient mitigation or, heaven forbid, it may completely scupper heavily invested money-making building schemes.

### ***What is this brownfield wildlife? And why is it so special?***

Once through the chainlink gate or over the perimeter barrier hoardings, brownfields are surprisingly rich — in both plants and animals (Jones, 2003). Brownfields, it turns out, are more floristically diverse than chalk downland; they are also alive with invertebrate life, and home to more red-data-book and nationally scarce insects than ancient woodlands. I know many colleagues who bemoan the lack of insects in the wider countryside, blaming the decline on intensive agriculture and widespread pesticide use. Brownfields have escaped these, at least.

A major part of the biodiversity equation is artificial surface geology. A typical ‘previously developed’ brownfield has large quantities of crumbling tarmac, bulldozed rubble, crushed brick and concrete, and usually only a thin dusting of topsoil. This creates a substrate that is well-drained, sparsely vegetated and with many

areas of bare ground bathed in sunlight. This, in turn, gives rise to a very warm dry habitat. Summer drought becomes the driving environmental force and brownfields are unlikely to become dominated by the rank growth of nettles and coarse grasses. Instead, annual plants tend to thrive, they grow from seed in early spring, flower, seed, but then die off. Brownfields are kept at an early successional stage by this harsh dry microenvironment. Sometimes this habitat is described as ‘ruderal’ from the Latin *runderarius* (small broken stones) and meaning ‘growing from rubble’; it’s jargon, but still a very useful word, in that it is not immediately associated with words like ‘waste’, or ‘brown’.

The well-drained, warm, dry, sparsely vegetated ruderal habitat with areas of bare ground favours many insects that are more often associated with ‘natural’ or ‘semi-natural’ habitats like chalk downs, coastal cliffs, undercliffs, lowland heaths, sand dunes and duneslacks — habitats that are also well-drained, warm, dry, sparsely vegetated, with areas of bare ground. These are often warmth-loving (or heat-tolerating) species which are on the very northern or western edges of their European ranges here in Britain. Ordinarily, these creatures don’t survive very well in our relatively cool damp temperate oceanic climate, but they can get a toe-hold on the almost Mediterranean microclimate of our otherwise uninviting brownfield sites.

Bees and wasps are often vaunted as brownfield specialities — the shrill carder (*Bombus sylvarum*) and brown-banded (*B. humilis*) carder bumblebees are often mentioned. Both are biodiversity action plan (BAP) species, in serious decline in the wider countryside because of destruction of their former flower-rich hay meadow habitat. A small picture-winged fly *Dorycera graminum* is another BAP species, but is sometimes common on Thames Estuary brownfields. A red data book parasitoid fly *Gymnosoma nitens*, once known only from the chalk at Box Hill and the sand at Deal is now often abundant on London’s brownfield sites, and although parasitizing a small secretive ground-dwelling shield bug, is often seen visiting the heads of wild carrot, a typical brownfield flower. The bombardier beetle (*Brachinus crepitans*), once widespread in southern England is now becoming increasingly scarce and only commonly found on these same Thames Estuary brownfields.

Among my own brownfield favourites are the bishop’s mitre shieldbug (*Aelia acuminata*) elsewhere predominantly a chalk downland or breckland species, the Adonis ladybird (*Hippodamia variegata*) once mainly a coastal species, the leaf bugs *Stictopleurus abutilon* and *S. punctatonevrosus* once thought extinct in Britain, but now recolonized and thriving on derelict sites inside the M25, and the large and dramatic wasp spider (*Argiope bruennichi*) spreading into London and the Thames Basin after years of being confined to a few sites along the south coast. I never see a green hairstreak, except on brownfields.

I was particularly pleased to find the European paper wasp, *Polistes dominulus*, near London’s Thames Barrier. This previously vagrant wasp had nested here among the ornamental shrubs of the nearby landscaped Thames Barrier Park, but it was foraging on the brownfield site next door. Around the same time it was found nesting under the roof tiles of a building at Ham House, the National Trust property near Richmond, but at the Thames Barrier it had created its delicate paper nests out of doors, the first such recorded occurrence in the UK.

### ***Brownfields are doomed from the start***

The delights of finding unusual insects on a brownfield site are often shortlived. Most such sites are already destined to be destroyed under this and earlier governments’ proposals to target brownfields for development in favour of building on greenfield

sites. It is not uncommon for destruction to occur before the environmental surveys have been completed, sometimes before they have even started. On several occasions I have arrived at a promising site only to find that ‘remedial’ work is underway. This is no mere tidying up around the edges, or removing those burnt-out cars. A site can be bulldozed flat, and all topsoil and vegetation removed, indeed all life erased. Checking in to the site office I have often been enthusiastically greeted by managers and civil engineers telling me how they love wildlife, how they enjoy watching badgers gambol about on their garden lawns or recalling a bird they noticed in the car park earlier that morning. But they fail to notice any irony as I set off to look for insects in the scoured barren inhospitable landscape of what is now, effectively, a recently ploughed field.

In much of London and the Thames Gateway (the estuary outlines of South Essex and North Kent), brownfield sites are the most important wildlife sites on offer. A 3-year survey of Thames Gateway brownfields carried out by Buglife (Buglife, 2008a, 2008b) was the basis for its recent booklet on brownfield planning (Buglife, 2009). An oft-quoted figure is that 12-14% of all Britain’s red data book and national scarce insects are found on brownfield sites (Gibson, 1998). So the fauna of a brownfield site is not just a coincidentally long list of common and widespread species, it comprises many uncommon and unusual species that occur nowhere else in the area, sometimes nowhere else in the country.

Unfortunately, this wildlife worth is often not appreciated until the developers’ bulldozers move in. By which time it is too late. This is not a new phenomenon. One of the earliest studies of ‘ruderal’ ecology came during and after the Blitz, when members of the London Natural History Society wandered the City bombed sites. They had their own concerns over safety and ease of access, and no small worries that, skulking about with pen and notebook, they might be arrested at any minute as spies. They found all manner of interesting and unusual plant and animal life, but there was never any doubt that the destroyed buildings would be rebuilt. The wildlife was, perhaps, an interesting aside to take minds off the difficulties of war and the hardships of rationing. Their findings are meticulously recorded in the pages of *The London Naturalist* and make fascinating reading, but the wildlife is gone, the organisms themselves destroyed, that biodiversity is now reduced to a footnote of history.

This mind-set continues. The former docklands of Poplar, Silvertown and the Isle of Dogs, derelict and an all-too-visual sign of social deprivation in the country’s capital city, were swept aside during the building boom of the 1990s as the steel and glass cathedrals to capitalism were built around Canary Wharf. The same has taken place for the Olympics. There was never any doubt that these sites would be developed. The wildlife, what there was, was seen as incidental, curious, interesting even, but ultimately worthless. It has always been difficult to put a cash value on biodiversity.

It has slipped out of favour, slightly, in recent years, but brownfields used to be more regularly referred to as ‘wastelands’, up until at least the 1980s. They were, quite literally, a waste of space — a space that could be put to better use. There are interesting parallels to another habitat type, one also once considered wasted. Anyone reading the novels of Thomas Hardy will immediately feel his intimate personal and emotional sympathy with the Dorset landscape, but there is also a sense of foreboding gloom over the desolate heather-topped heaths — that they were regarded as dark and dangerous places, the haunt of highwaymen, outlaws, vagabonds. Most importantly, they were useless for agriculture — the main currency of land worth at the time.

Hardy may not have used it to describe them, but they were, in a word, wasteland. We don't have very many of them left, something like 95% have been destroyed in the last 250 years. What remains are now a shadow of their former 'glory', small remnants, relics of a once widespread land form. These pockets are now important nature reserves, sites of special scientific interest (SSSIs), and the wildlife they contain is recognized for its important biodiversity value.

It's interesting to contemplate whether future generations of biologists will look back with horror at the current redevelopment of our urban brownfield sites. Will they think we missed an opportunity to incorporate these great open spaces into the valuable biodiversity of our cities? Will they wonder why we did not adopt and embrace this miraculous wildlife habitat? Why, instead we infilled it, reducing it to smaller and smaller islands, just like the tiny pockets of Dorset heath we now treasure?

### ***Is there any way to conserve brownfields? Or their insect faunas?***

Much has been made of living roofs, often called green roofs — not brown roofs, note. Placed on top of new builds, they can provide a brownfield-like habitat; they are hot and dry and well-drained, but this is not conservation, it is replacement. The brownfield is completely destroyed and the roof added much later. Some would argue that this is little better than gardening.

There are moves afoot, led by Buglife, the Invertebrate Conservation Trust, and others, to try and prevent significant brownfields being destroyed. Ironically, one of the major legal arguments they have to make use of is not necessarily the intrinsic insect biodiversity, but almost a legal loophole — the fact that a site has become greened over to such an extent that it can be regarded as having reverted back into the landscape. Again, it's what the site looks like that seems to have paramount importance — its greenness.

Of course, with absorption back into the landscape, it is more than just the outward appearance of a site that changes. With that re-greening also comes a recolonization by insects. The longer a site remains untouched, the more insect species have a chance to get back in. Like the annual plants that so characterize brownfields, many of the typical brownfield invertebrates are highly mobile, adventitious species, and by analogy to island biogeography you can very often see a relationship between insect biodiversity of the fauna, the size of a derelict site, its proximity to other brownfield 'waste' spaces, and the length of time it has been left derelict.

The glow-worm (*Lampyrus noctiluca*), a widespread, but declining beetle is a good example of a long-time-greening insect species. The females are wingless, larviform, so cannot fly to colonize or recolonize sites, they have to crawl. They find it difficult to crawl over a newly tarmacked road or through a recently laid out car park. Finding glow-worms on a brownfield is a sure sign that it was once connected to a larger expanse of some sort open rough grassland — maybe former meadows, field edges, hedgerows or at least some sort of less fragmented, less industrialized landscape.

This argument for trying to conserve long-time re-greened brownfields is a good approach, but it does not always work completely. One of the first brownfields I ever visited was a covered Victorian reservoir at Honor Oak. When it was built, 125 years ago, a huge scar was cut into the hillside and the cavernous brick colonnaded water tank was built. Then it was back-filled, covered over with soil, landscaped and allowed to revert back into the rough grassy hillsides between the villages of Honor

Oak and Forest Hill. At the time these would have been small grazing meadows, maybe some arable land, small-holdings, and fallow. The reservoir, itself, was grazed by a lone horse at least until the mid 1960s. However, by the 1930s it was already engulfed and surrounded by houses. All of those surrounded meadows had been built on, but the reservoir had reabsorbed its flora and fauna and become a downland relic.

In 1995 it was a green gem, home to many fascinating insects, including a pretty picture-winged fly, *Acinia corniculata*. At the time this fly was only known from a handful of other UK sites, all national or local nature reserves. I like to think that this fly, and the other insect evidence given at the public enquiry helped prevent this site from being developed. The application was thrown out. Unfortunately, 4 years later another application was made. By now, the site had been, for several years, home to 6 horses, brought in ‘graze’ it. Some argued that they had trashed it. The green sward and flowery slopes were now churned-up mud. The new argument from the developers was something along the lines of “there’s no wildlife value now, is there, so we may as well build houses on it”. The application was turned down by a second public enquiry, but the environmental damage had been done. Who knows whether the fly is still there, clinging on?

So what future is there for brownfield nature conservation? There are small advances — Buglife managed to help Canvey Wick in South Essex to SSSI status. But there are also large retreats — the Olympic village and stadiums. Financial and political value always seem to win out over biodiversity value at every stage.

Even when biodiversity edges ahead, it is not an easy road, and the path is paved with misunderstanding and doubt. Sue Godfrey Nature Park in Deptford is the site of a former pottery and works; the buildings demolished long ago, the site has been used as an open space and rather than being landscaped as an ornamental park, has been left for the contemplation of nature. With much buried rubble and crushed brick in the soil, it was a perfect brownfield nature reserve. When part of the site, a municipal depot, was to be converted to a children’s playground, soil contaminants meant that much of the topsoil and all the crushed brick and concrete brownfield substrate had to be removed, not just from the depot end, but from the entire park. It was all to do with legal liability, once the contaminants were discovered. But to maintain its brownfield feel a plan was hatched to remove half the park’s soil, reinstate new crushed brick and concrete geology and allow it to self-colonize from the untouched half. A year later the process was repeated on the second half of the site. In this way at least some of the local brownfield biodiversity would remain. The plan went ahead, but the organizers and the local authority were constantly beset with complaints from local residents who failed to understand the basic biological principle at stake, and who complained endlessly to their local MP that Sue Godfrey Nature Park was being concreted over. It all still comes down to that difference between greenery, greenness, what a site looks like, and the difficult concept that sparse vegetation and patches of bare ground can be so important for insects.

I’d like to finish by considering what might be Britain’s rarest insect. The streaked bombardier beetle (*Brachinus sclopeta*) was only known from a few square metres of brownfield near the Thames Barrier, where it was discovered in 2005 (Jones, 2006). The site was due for development into prestigious riverside flats. There were some doubts about whether this was a truly native British insect hanging on in the Thames Gateway, or a recent colonist from the Continent. There are tenuous links to old records from the Thames Estuary — Southend in Essex in 1820 and Margate, Kent, in 1830, but it was long considered to be missing, presumed extinct. Here at the Thames barrier there was a thriving population, but it was restricted to a single dry

slope of sparsely vegetated bulldozed brick and lime mortar from when the site was last cleared. To avoid any head-to-head legal conflict between developers, planners and conservation organizations, the landowners agreed to create a special nature reserve for the beetle using a mound of rubble from the same neighbourhood. Volunteers then fingertip-searched the site and carefully translocated 60 streaked bombardiers to the new mound.

The mound is now fenced, and more or less greened up — it needs a bit of a trim, actually, to prevent it becoming too overgrown. And the streaked bombardier was still there in May 2010 when I shinned over the chainlink fence. This must rank as Britain's smallest (and ugliest) nature reserve, all for a beetle.

But there is no visitor centre, there are no wardens or volunteers, no dedicated website or interpretation board. The mound is built on land technically owned by the Environment Agency, a narrow 'buffer' strip next door to the Thames Barrier itself. At the moment the Thames Barrier's boundary fence is being replaced or reinforced — part of a security scheme to make all such pieces of nationally important infrastructure protected from potential terrorist attack. This is mere metres away from the *Brachinus sclopeta* reserve. I can't help but remain very nervous about the future of the streaked bombardier beetle. It is still an incredibly vulnerable species and despite having its own nature reserve, it could be eradicated, on a whim, because the tiny plot of land it calls home does not look right — it's not natural enough, not pretty enough, not green enough to be obviously worth saving.

### **References**

- Buglife (2008a) *Assessing brownfield biodiversity*. Peterborough: Buglife – The Invertebrate Conservation Trust.
- Buglife (2008b) *Thames Gateway brownfields: invertebrate diversity and management*. Peterborough: Buglife – The Invertebrate Conservation Trust.
- Buglife (2009) *Planning for brownfield biodiversity: a best practice guide*. Peterborough: Buglife – The Invertebrate Conservation Trust.
- Gibson, C.W.D. 1998, *Brownfield: red data. The values artificial habitats have for uncommon invertebrates*. Peterborough: English Nature.
- Jones, R.A. 2003. A celebration of urban entomology. The 2001 Presidential Address—part 2. *British Journal of Entomology and Natural History* **16**: 109-121.
- Jones, R.A. 2006. *Brachinus sclopeta* (Fabricius) (Carabidae) confirmed as a British species. *The Coleopterist* **15**: 29-34.