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# Living roofs and brownfield wildlife: towards a fluid biogeography of UK nature conservation

**Jamie Lorimer**
School of Geography, Oxford University Centre for the Environment, South Parks Road, Oxford OX1 3QY, England; e-mail: jamie.lorimer@ouce.ox.ac.uk
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**Abstract.** This paper follows the trials and tribulations of a loose alliance of urban conservationists seeking to create and maintain spaces for brownfield wildlife in East London. It focuses, in particular, on the construction of living roofs—an innovative conservation strategy where wildlife habitat is created on top of new and old buildings in the city. The paper identifies three obstacles that have challenged the development of brownfield conservation, which relate to the urban geographies, lively temporalities, and inconspicuous forms of brownfield wildlife and wild-living. These obstacles differ markedly from those of the nonhumans prioritised in mainstream conservation. Brownfield conservationists have developed a novel and fluid model of practice, whose emergence and characteristics can be linked to wider developments in UK nature conservation. This model chimes clearly with new approaches to theorising human – nonhuman interaction that have been developed in nonequilibrium ecology and relational geography. Drawing together these empirical and theoretical innovations, the paper concludes by outlining the parameters of a fluid biogeography of UK wildlife conservation to help understand and guide future conservation practice.

## Introduction

> "Difference is not diversity. Diversity is given, but difference is that by which the given is given."
>
> Gilles Deleuze (1994, page 222)

I took the photograph in figure 1 while standing fifty storeys up on top of a skyscraper in Central London with Dusty Gedge—former circus performer, keen amateur birder, and cofounder of 'LivingRoofs', an organisation dedicated to 'greening' UK roof spaces. Around us tower yet taller buildings, creating a landscape of sheer edges and abysses, of concrete, glass, and steel. It looks and feels a long way from nature, yet Dusty is grinning and seems pleased with himself, for underfoot there is a scrubby carpet of bare soil and browning vegetation, and when he crouches down to examine a pitfall trap, it is teeming with beetles, spiders, and myriad other invertebrates. Incongruous as it seems, this site is a verdant oasis for wildlife, set right in amongst some of the most densely populated and expensive real estate in the country.

Dusty is part of a loose alliance of urban ecologists and conservationists who have been working hard over the last ten years to protect and create sites like this for urban wildlife in London. These include a great diversity of places and geographies, ranging from living roofs in the Docklands to vast postindustrial brownfield sites in Essex. They encompass the complex network of railway embankments that cut across the city, alongside cemeteries, scrapyards, and sewage works—a panoply of unsightly and unseemly places, which the nature writer Richard Mabey (1999) has termed the UK's 'unofficial countryside'. This title nicely captures the marginal status of such sites, and distinguishes them from the official 'urban green' of the city's parks and gardens.

Thanks in part to advocates like Dusty, a broader collection of policy makers, journalists, academics, and other nature conservationists have also become more interested in urban natures and brownfield sites (see, for example, Barker, 1997; Harrison and Davies, 2002; Mathews, 2002; Urban Green Task Force, 2002; Whatmore, 2003).

**Figure 1.** A living roof in London's Docklands (author's photograph).

There is now a growing recognition of the value of this unofficial countryside for wildlife and of the important role such sites play in helping to slow down urban runoff and ameliorating a city's climatology. This campaign for urban wildlife has been hard fought and is far from won. It has brought urban conservationists into conflict both with the traditional enemies of conservation and with powerful elements of the conservation establishment itself.

In this paper I trace the trials and tribulations of urban brownfield and living roof conservationists in their efforts to advocate for spaces for wildlife and wild-living in the city. Focusing on achievements and innovations within this marginal current to UK nature conservation, I identify four trends to be cautiously celebrated. I link these to wider developments and tensions in UK policy and practice and explain how these unorthodox modes of conservation help to address some long-standing criticisms of UK nature conservation. Expanding on these trends and drawing on a collection of concepts from disequilibrium ecology and relational geography, I illustrate their broader significance for developing a fluid biogeography of wildlife conservation. This draws together new approaches to understanding and directing conservation practice that embrace both the patterns of existing diversity and the process by which they are renewed and differentiated.

Methodologically, the paper develops the findings of a three-year research project, which examined the scope, character, and recent history of UK biodiversity conservation (Lorimer, 2005). The specific case study that is central to this paper was carried out in the summer of 2003. It involved more than twenty-five transcribed, in-depth interviews with conservationists, architects, developers, and local residents, all involved with brownfield conservation in central London. It also draws on observations from

extended periods of participant observation and on textual analysis of key scientific, policy, and campaign documents. All of these interviewees are named in the account that follows where they are cited, as they requested.

**Brownfield land**

'Brownfield' refers to land that has previously been developed for housing or industry but has, to differing degrees, been abandoned and recolonised by different ecological assemblages. This definition encompasses a great diversity of types of land use—some sites may have been undisturbed by human activity for sixty years, while others may be visited and modified on a daily basis. Accessible brownfield land in cities is largely located in areas that have experienced deindustrialisation or suburbanisation. Such sites may be found in the heart of the inner city, or out along various industrial belts or dockland regions. Although they are often situated close to densely populated areas and adjacent to commercial centres, they are generally left in a contaminated condition, and have multiple owners, which raise the costs of and create obstacles for future development.

The UK National Land Use Database estimates that there were over 64 000 ha of brownfield land in the UK in 2004 (NLUD, 2004). Although this area constitutes an important resource in and around urban areas, brownfield land currently occupies an ambiguous position in contemporary UK urban policy and practice, and there is still no consensus on what it is best to do with it. Previously neglected by conservationists, planners, and developers in favour of the suburbs or the countryside, these sites are now subject to intense pressures from at least three different constituencies. The tensions between these three groups frame the broader issues discussed in this paper.

First, brownfield sites are being targeted for development under the Labour government's projected 'urban renaissance' (Urban Task Force, 1999). This is especially the case in the southeast of the country, where there is a pressing regional housing shortage. Here the government has set a target of building 60% of new dwellings on previously developed land. Advocates for brownfield development, like Lord Richard Rogers, who leads the Urban Task Force, argue that it helps to generate compact and cohesive cities, minimises the need for transport and associated pollution, and reduces urban growth into and beyond the green belt—thus helping to protect wildlife and green spaces in the countryside (Urban Task Force, 1999).

Second, however, with the reinvigoration of interest in city-centre living, there has been an increasing policy focus amongst local planners and urban social movements on the provision of urban green space for leisure and for its psychological benefits (Dalgard and Tambs, 1997; Harrison et al, 1995; Urban Green Task Force, 2002; Woolley, 2003). Brownfield sites are often located near disadvantaged groups with little or no access to the countryside and, once they have been restored, they can serve as important educational and amenity resources. Emphasis here is placed on cleaning up brownfield sites and rendering them safe and attractive to the general public.

Third, and finally, this enthusiasm for urban natures has been pulled in a different direction by the urban ecologists and biodiversity conservationists introduced above. Research and advocacy NGOs like Buglife and the London Wildlife Trust have drawn attention to the importance of brownfield sites as unique havens for 'recombinant' (Barker, 2000), cosmopolitan urban flora and fauna and as vestiges of relict habitats that have disappeared from rural areas (Box, 1993; Chipchase and Frith, 2002; Gibson, 1998; Jones, 2003; Key, 2000; Wheater, 1999). They have produced a growing body of evidence that suggests that the distinct ecologies of certain brownfield sites accommodate some of the rarest species in the UK (Gibson, 1998), and have shown that the

average levels of biodiversity are often much higher in these 'brownfield rainforests' than in the rural deserts of the green belt, dominated by ecologically disastrous intensive agriculture.

**Living roofs**

One of the most successful strategies that has been employed by this third constituency in its efforts to campaign for urban biodiversity and brownfield conservation has been to compromise with developers of brownfield land and to persuade them to install wildlife-friendly mitigation technologies on buildings. Primarily, these take the form of 'living roofs' or walls, which are either left to be spontaneously colonised by wildlife or deliberately planted. Living roofs generally come in two types. 'Intensive' roofs have deep soil, large amounts of biomass, and require regular management. They are able to accommodate trees and shrubs, are green and aesthetic, and provide accessible green space for urban residents and office workers. They are usually designed to emulate a domestic garden or small public park. Intensive roofs also store large amounts of water, help to insulate the building they cover, and thus reduce the urban heat island effect (see figure 2) (EcoSchemes, 2003; Gedge and Kadas, 2005).

**Figure 2.** 'Intensive' living roof in Chicago (photograph courtesy of LivingRoofs).

'Extensive' roofs have thin substrate, less biomass, and can be left alone. They are much cheaper to build and manage than intensive roofs and are generally constructed either from a sedum mat atop a moisture-retaining membrane or from recycled, crushed brick. They favour ruderal vegetation and can thus be used to replicate the brownfield biodiversity that was in place before a development began (see figure 3). Extensive roof design is incredibly versatile and can create a vast diversity of habitats for different wildlife. It is this type of 'brown roof' that has been found to have the greatest potential for urban brownfield conservation (EcoSchemes, 2003; Gedge and Kadas, 2005).

Living roofs construction has only really taken off in the UK in the last five years and has been centred largely in London. This initiative has been driven almost exclusively by the eponymous organisation "LivingRoofs'—a group of consultants working not-for-profit to promote a green-roof renaissance. They have effectively collaborated with the Greater London Authority, English Nature (now Natural England), and a number of private developers and large companies both to promote living roof construction on new buildings and to advocate for their retrofitting on old buildings.

**Figure 3.** 'Extensive' living roof on top of the Laban Centre in East London (author's photograph).

LivingRoofs estimate that in 2006 there were 92.7 ha of green roof in the Greater London area, of which approximately 60 ha is 'intensive' and 32.7 ha is 'extensive' roof. A further 100 ha is currently in the pipeline (LivingRoofs, 2006). This is, however, a small percentage of the potential total number of rooftops, which cover some 24 000 ha, or 16% of the Greater London area (GLA, 2001). The vast majority of these could be subjected to some form of greening; indeed, the engineering company Corus recently estimated that 20 000 ha of existing urban roofs in the UK as a whole could be vegetated with little or no structural modification (Corus, 2001 in EcoSchemes, 2003). As a country, the UK compares unfavourably with Germany, where 13 500 ha of green roof had been installed by 2001 (EcoSchemes, 2003). Clearly, the ecological potential for green or living roofs in the UK is vast and has yet to be exploited to any significant degree.

**The trials and tribulations of brownfield conservation**

In spite of the recent reevaluation of the value of brownfield sites for wildlife and the growing interest in extensive roofing, it has not been easy for urban ecologists and brownfield conservationists to champion their cause against the opposing agendas of the urban green space and brownfield development lobbies. In the main section of this paper I trace some of trials and tribulations they have faced in their campaigning. I focus in particular on three obstacles, which relate to the character of the places and species they are championing and to how they are perceived and encountered by wider publics and the conservation establishment. Here, brownfield wildlife was found to be out of place, out of sync, and in the wrong form. Overcoming these obstacles required innovative theoretical and practical approaches and led to new forms of ecopolitics.

To help make sense of these obstacles and to explore the innovative responses adopted, I employ a range of conceptual resources from relational geography and nonequilibrium ecology, and engage with and develop recent critiques of nature conservation by natural and social scientists working in these two fields. I employ these concepts to help understand the approach to conservation being taken by these individuals and to identify and cautiously celebrate their unorthodox ethos and conservation practices.

**Relational geography and nonequilibrium ecology**

Although there have been a diverse number of engagements by social scientists with nonequilibrium ecology (Cronon, 1990; Demeritt, 1994; Gillson et al, 2003; Scoones, 1999; Zimmerer, 1994), there has not yet been a systematic appraisal of the parallels between this subdiscipline and relational geography. And, in spite of their overlaps, they are not often employed together for this sort of political-ecological analysis. Indeed, a lot of environmental social science still fails to satisfactorily account for nonhuman or ecological agencies (Whatmore, 2002), or when it does so remains firmly wedded to an equilibrium understanding of nonhuman geographies and temporalities (Harvey, 1996; Scoones, 1999).

Broadly speaking, relational geography understands identities—such as 'nature' and 'society', or 'the urban' and 'the rural'—as fluid, complex, and emergent from situated interactions and interconnections, rather than as fixed as immutable essences. It unsettles the bounded coordinates and linear trajectories of positivist space–time by concentrating on networked interconnections. A relational—rather than absolute—approach to space has a long history in geography (Harvey, 1969; Murdoch, 1998). In its more recent manifestations, it first flourished through the discipline's engagements with Marxism (Harvey, 1996; Massey, 1991). Its later cultural turn can be linked to encounters with poststructuralism—in particular, the work of the French philosophers Michel Foucault and Jacques Derrida. Most recently, relational geography has been undergoing a 'posthumanist', materialist turn (Anderson and Tolia-Kelly, 2004; Bakker and Bridge, 2006; Castree et al, 2004; Jackson, 2000). In part, this has occurred as a result of an engagement with the philosophy of Gilles Deleuze, which has focused attention on lively nonhuman agencies and on the relational topologies and ontologies that characterise an 'amodern' world (Hinchliffe and Whatmore, 2006; Lorimer, 2007; Lulka, 2004; Whatmore, 2002).

Nonequilibrium (or disequilibrium) ecology was, until relatively recently, a marginal countercurrent to the main tenets of 20th-century orthodox equilibrium ecology. Although both approaches have a long history within the discipline, come in varying guises, and are not necessarily incommensurable, nonequilibrium ecology can now be understood to be in the ascendancy (Botkin, 1990; Scoones, 1999; Worster, 1993). This reinvigorated nonequilibrium ecology is often referred to as the 'new ecology'. To briefly summarise their differences, while equilibrium ecology understands the development trajectory of an ecological complex as one convergent upon a single end-state, nonequilibrium ecology argues that such points are illusory and are rarely achieved for significant periods of time (Wu and Loucks, 1995). Instead, such complexes are dynamic, characterised by a multitude of competing and 'discordant harmonies' (Botkin, 1990) operating over numerous scales (De Angelis and Waterhouse, 1987; Levin, 1992), with no one single balance of nature. This theoretical shift has far-reaching implications for practical conservation as well as for the popular understanding of the role of the conservationist in environmental management (Adams, 1997; 2003; Zimmerer, 2000).

**Wildlife out of place**

The first challenge that faced brownfield conservationists in East London was to persuade local residents and policy makers that valuable species and ecological assemblages could be found inhabiting brownfield sites in the city. The majority of these areas are shut off from public view and are perceived as wastelands, degraded and abandoned by successive waves of wartime bombing and industrial decline. Many of the planners and developers I interviewed explained how they were genuinely surprised to discover that rare and harmless wildlife could be found in the city. For them urban wildlife largely comprised pigeons, rats, and foxes—resilient and feral species that should be either ignored or destroyed. Similarly, Dusty recounted how his campaign for brownfield biodiversity was ignored by many of the larger environmental NGOs, who saw little wildlife in the inner city that would interest their suburban memberships. Off the record, several policy officers for these organisations confirmed to me their personal frustrations at not being able to do more for such areas.

Mathew Frith, a self-described 'urban conservationist' who used to work for the London Wildlife Trust, explained why this anti-urban bias to mapping nature might have come about. He argued that:

"The English village is the archetype that the science is actually being encouraged to work towards and work back to. The English village is held up, rather than trying to bring out what are the actual intrinsic benefits of an urban brownfield."

A similar sentiment was expressed by Richard Jones, a freelance 'urban entomologist', who has been actively involved in championing brownfield conservation. Richard explained that:

"Brownfield sites look ugly. Though quite often they are very flowery, they don't fit this image of the rural idyll with hedgerows and rolling hills and woods and streams and lakes. There aren't any Constable pictures of derelict rubble strewn landscapes. Brown is the colour of dirt and they are seen as dirty and grimy and fly tipped with rubble. Not very nice."

Dusty, Richard, and Matthew all identify a powerful binary geography amongst urban developers and planners. This elevates a particular, fixed cultural ideal of the English landscape and imposes a colour-coded ranking on wildlife. Rural green spaces are valued at the expense of ruderal brownfields, whose lively inhabitants are deemed to be out of place.

This spatial myopia supersedes the actual distribution of biological diversity in the UK and leads to the neglect of certain threatened urban species. Such anti-urbanism would help to explain the absence of any brownfield or postindustrial locations in the sites designated under the European conservation legislation that supports the implementation of the UK Biodiversity Action Plan. Although this is an unrealistic expectation for some urban species, which occupy some of the most expensive real estate in the country, designations would assist several threatened thermophilic invertebrate species which live on marginal brownfield land (Gibson, 1998; Key, 2000).

In their different ways, both nonequilibrium ecologists and relational geographers have exposed and critiqued the prevalence of such fixed and dualistic understandings and geographies of nature, and their thinking chimes with the concerns of brownfield conservationists. Relational geographers and other social theorists have battled against binary forms of identity and geographical imaginations—what actor-network theorists have called 'regional topologies' (Mol and Law, 1994). Anne Marie Mol and John Law explain how a regional topology is founded upon:

"[A] version of the social in which space is exclusive. Neat divisions, no overlap. Here or there, each place is located on one side of the boundary. It is thus that an

inside and an outside are created. What is similar is close. What is different is elsewhere" (1994, page 647).

A regional topology involves the 'purification' (Latour, 1993) of space according to a set of binary dualisms. These order the messy hybridity of the world into exclusive spatial categories with essential identities leaving no room for difference. Developing this general analysis, several relational geographers have focused their critiques on the urban–rural spatial dualism outlined above. This is understood as the 'regional' spatialisation of a modern nature–society binary, which elevates a purified and unsustainable model of untrammelled nature as the touchstone of conservation (Cronon, 1996; Hinchliffe, 1999; Whatmore and Thorne, 1998) and relegates urban areas to 'ecological sacrifice zones' (Wolch, 1998).

Similarly, new ecologists like Daniel Botkin (1990), who are aware of the ontological implications of the universal reach of global climate change, recognise the futility of appealing to a pure realm of nature as the touchstone of environmental policy. Instead, they argue that nature in the 21st century will be a nature that we make (Botkin, 1990; see also Budiansky, 1995). Future natures will be hybrid; their concern is the degree to which this moulding will be intentional or unintentional, desirable or undesirable.

What is most refreshing about urban brownfield conservation and living roof construction in London is the way in which its practitioners have gradually overcome the regional topology that characterises much orthodox UK nature conservation, and have begun to develop more fluid and networked geographies of wildlife. This has involved a concerted effort to 'reenchant' the city (after Bennett, 2001), to draw attention to the presence of urban nonhumans and the vital role they play in the composition and everyday living of cities. This has been achieved through coordinated media campaigns and careful lobbying of the key local politicians.

Furthermore, in creating manifestly manufactured environments, green roof architects are not constrained by a need to stay consistent to a historical land use or purified natural archetype. In their ecological restorations and enhancements, they have much more room for experimentation than is generally granted to rural conservationists, and can tailor their hybrid coconstructions to create novel spaces for nonhuman difference.

Giving urban wildlife a place has involved recasting the topological imagination of the city away from a lost space to one of flows and connections. This has required a radical rethinking of the nature of conservation territories, and a great deal of attention in brownfield conservation is now dedicated to the maintenance and creation of wildlife corridors, mosaics, and networks that cut through the city (Barker, 1997), allowing the passage of nonhumans from the rural to the urban and back again. Such networked conservation geographies blur the distinction between the urban and the rural and echo a broader movement in conservation towards the creation of ecological networks, buffer zones, and 'amodern' territories, characterised by sustainable forms of land management (Adams, 2003; Murdoch and Lowe, 2003, Zimmerer, 2000).

**Wildlife out of sync**

When pushing for spaces for wildlife in the city, brownfield conservationists also had to negotiate with the urban green space movement. In some ways, there is already a long history of recognising urban natures in London that transgress the binary geography outlined above. The city has a wealth of public parks and gardens, and, although these are concentrated in the west, they provide a powerful bridgehead for campaigns for the further introduction of nonhumans into the postindustrial east of the city. Those campaigning for the urban green could be natural allies. However, the problem for

brownfield conservationists and living roof campaigners is that this official urban green is characterised by a distinct temporality of environmental management, which in many ways is the corollary of the binary geography outlined above, and is of little help to brownfield wildlife.

The majority of urban parks and gardens are stable climax communities, managed to a state of equilibrium as close approximations of an idealised landscape. In contrast, hybrid brownfield sites in London are often far from ecological (and social) equilibrium. They are constantly changing, becoming different in a range of dynamic, complex, and unpredictable fashions a long way removed from the ecological stability of the idealised English village and associated countryside. This dynamic temporality has created a second set of obstacles for brownfield conservationists. In many cases, brownfield sites are understood as both ugly and risky—the venue for feral social activities (Harrison and Davies, 2002; Harrison et al, 1995; Key, 2000). Accordingly, when brownfield land is set aside for conservation or ecological restoration by the urban green space movement there is a tendency for environmental management to emulate a sanitised version of the rural idyll. As Mathew Frith and Dusty Gedge (2000) put it:

> "They [brownfield sites] are rarely seen as anything other than eyesores or derelict spaces by planners and developers. Furthermore, it is often perceived as preferable and easier to create new habitats in these locations that are supposedly analogous with the *far-flung countryside* than to protect and conserve wildlife communities that reflect a relationship with the city" (page 383, emphasis in original).

Mathew and Dusty draw attention to the pervasive power of the rural archetype in ecological restoration. Habitats and places far from equilibrium, like postindustrial 'wastelands', are to be ordered and placed in an artificially maintained equilibrium, adhering to a 'gardenesque aesthetic' (Harrison and Davies, 2002). This occurs through a series of processes that have been dubbed 'greenwashing' (Chipchase and Frith, 2002).

On brownfield sites, which are generally distinguished by their ecological complexity, exposed earth or concrete, and thermophilic, weedy species, this greenwashing usually results in a complete relandscaping (Box, 1993; Key, 2000). Roger Key (2000) explains how greenwashing leads to the destruction of all the intrinsic ruderal value of the site and its replacement with open, homogenous parkland landscapes, comprising deciduous trees and conservation grasses—a transcendent archetype of a climax community. More generally, several of my interviewees identified a colour coding to this policing of ecological complexity whereby green is good and brown is bad (see Jones, 2003). In a UK context, green is the colour of a historically consistent climax habitat, while brown sites are more obviously anthropogenic and are far from a state of equilibrium. Ironically, though opposed to the logic of much urban development, this greenwashing mentality can do as much damage to the preconditions for biodiversification as those wishing to make brownfields grey (Hengeveld, 1994).

In different ways both relational geography and nonequilibrium ecology provide useful resources for critically understanding such fixed and static temporalities of social and ecological process, and for thinking human–environment interactions differently. In place of transcendent fixity, they theorise form and temporal dynamics as immanent from a socioecological assemblage. In line with the broader influences of both Spinoza and thermodynamics on the philosophy of science (Clark, 2000; De Landa, 2002; Prigogine and Stengers, 1984), both approaches are concerned more with becomings and processes than with stable and universal end-states. Their thinking chimes strongly with the approach to conservation taken by brownfield conservationists.

The greenwashing approach to urban ecological restoration is grounded in equilibrium ecology. This places a Platonic emphasis (Kearns, 2003) on the tendency of any ecological complex towards the expression of universal forms—the climax communities of the UK's National Vegetation Classification System, for example—and employs a Newtonian understanding of time which is characterised by linear and reversible temporal dynamics. Greenwashing in environmental management holds an ecological community fast through heavy and detailed interventions that fix its dynamics at a culturally defined point of equilibrium.

In contrast, nonequilibrium ecology draws attention to the inherent nonlinear dynamics of any ecological community. Nonequilibrium ecologists emphasise flux and contingency and the importance of particular events, occurring over multiple time frames, in explaining the development trajectory of an ecological complex (Botkin, 1990; Wu and Loucks, 1995). They argue that any ecological complex rarely has time to return exactly to a previous condition after any past ecological event. Instead, they are always changing across interwoven scales. Ecological complexes, and the organic nonhuman entities from which they are composed, are understood as always engaged in a series of dynamic interactions, which encourage the exchange of properties and the emergence or evolution of new and complex forms, over a multitude of irreversible time frames. New ecologists therefore question many of the archetypes of equilibrium ecology.

Such an immanent understanding of ecology and conservation is reflected in the design and management of extensive living roofs. In contrast to the prescriptive management strategies inherent within the static temporality of greenwashing, conservation on green roofs is much more open ended. In creating and managing extensive green roofs, attention is largely directed at the soil to create diversity in the basic substrate. Rather than seeking to fix the roof at a moment of equilibrium, by forcing it towards a final assemblage of plants, these ecological complexes are allowed to develop through colonisation by local flora and fauna (EcoSchemes, 2003; Gedge and Kadas, 2005).

In part, this fluidity relates to the limited resources available to urban conservationists and the inaccessible nature of the roofs themselves, which prevents protracted habitat management. However, it also suggests a deeper difference in ecological management philosophy. Dusty captures this as follows:

> "Brownfield species are opportunistic and I am quite an opportunistic person. You create opportunity and nature fills it, especially in an urban situation where things are always changing. That is the changing dynamic of the city and that is how urban conservation has to work. It is ironical that nature is always changing but most of conservation is about holding fast, it is conservative."

Dusty explains that the chaotic nature of urban process and ecology makes it virtually impossible to predict a static end state for a brownfield site. Instead, he advocates for extensive roof spaces with room for opportunity, immanence, and the expression of biological processes. This radical approach to practical conservation management echoes developments elsewhere in the field—in particular, the growing interest in large-scale and open-ended 'rewilding' projects (ECOS, 2004; RSPB, 2001; Taylor, 2005) and the recasting of the UK into large 'natural areas' (King et al, 1996), for sustainable but open-ended land management. Such an open-ended approach to conservation territories and management regimes is also being advocated as a means of adapting to the ecological changes that will accompany climate change (Berry et al, 2002; 2006).

Concerns with immanence in brownfield conservation and extensive roof construction also echo recent work associated with the materialist turn in relational geography,

especially that which has sought to engage with the vitalist ontology of Deleuze (Braun, 2003; 2006; Clark, 2000; Hinchliffe and Whatmore, 2006; Hinchliffe et al, 2005; Lulka, 2004; Whatmore, 2002). In contrast to the idealism and anti-ontological stances of Derrida and Foucault (and the cultural geographies they have informed), Deleuze outlines an ontology of 'intensities' (1988; 1994; Deleuze and Guattari, 1987) that is concerned with 'immanent morphogenesis'—the open-ended possibilities inherent within matter to forever become otherwise (see Ansell-Pearson, 1999; De Landa, 2002; May, 2005). Todd May provides an accessible description of Deleuze's ontology:

> "Here is a way of seeing the world: it is composed not of identities that form and reform themselves, but of swarms of difference that actualise themselves into specific forms of identity. Those swarms are not outside the world; they are not transcendent creators. They are of the world, as material as the identities formed from them. And they continue to exist even within the identities they form, not as identities but as difference. From their place within identities, these swarms of difference assure that the future will be open to novelty, to new identities and new relationships among them" (2005, page 114).

In this 'flat' (Marston et al, 2005) ontology, Deleuze distinguishes between the actual and the virtual. The actual is the present: what we see around us, while the virtual is comprised of 'swarms of difference' which hold within them the potential for 'divergent actualisation'—for generating difference beyond what we consider to be possible (De Landa, 2002; May, 2005). In stark contrast to a Platonic collection of transcendent pure forms—woman, panda, buttercup, etc—the menagerie of Deleuze's immanent ontology is lively, infinitesimal, and yet to be (Hansen, 2000).

Where Deleuze's ontology chimes most with brownfield biodiversity conservation and new ecology is in the emphasis he places upon immanence in his theory of temporal dynamics and genesis. In Deleuzian terms, the actualisation of time–space made possible on extensive living roofs closely approximates what Deleuze and Guattari (1987) term a 'smooth space', which they differentiate from a 'striated space'. Smooth spaces are more amenable to the divergent actualisation of the virtual and the becoming-otherwise of existing entities. Nonhumans on living roofs are understood through an immanent ontology that creates space for multiple and diverse becomings. Governed this way, green roofs embody a more open-ended understanding of wildlife. In contrast, in striated spaces most possible becomings are foreclosed by their forced adherence to transcendent formations and the static temporality of equilibrium (see Lulka, 2004; Maskit, 1998). As we saw with the foreclosure and homogeneity of greenwashing, such a model of conservation is fixated with diversity at the expense of difference (Deleuze, 1994) and essentialises existing spatial patterns over immanent temporal dynamics (Adams, 1997; Zimmerer, 2000).

In spite of the rise of nonequilibrium ecology, an equilibrium temporality of wildlife is still common in nature conservation, where reference is made to and management is often directed towards *the* balance of nature (Botkin, 1990; Budiansky, 1995). Here, the definite article, loosely justified by equilibrium science, naturalises a particular mode of human–environment interaction (Demeritt, 1994), which is generally concerned with slowness and resistance to anthropogenic changes. We humans are too fast; we are out of sync. Those subjected to this timeless temporality are encouraged or coerced to maintain a balance, which is generally identified as historically consistent yet contemporaneously threatened. This process risks freezing time and effaces the history and political-ecological relations that comprise it (Lulka, 2004; Neumann, 1998; Willems-Braun, 1997).

In a UK context, this conservative temporality interweaves with the dualistic geography of the urban–rural. Here, the city is understood and governed as in a perpetual state of flux and continuous becoming. The city is the geographical locus of modernity (May and Thrift, 2001) and an anathema to natural rhythms, or is occupied by feral beings out of sync and thus beyond consideration. In contrast, the countryside is counterposed as the timeless redoubt of tradition (Williams, 1973). Idealised rural natures (and by association societies) are held in balance: they are taken to represent *the* balance of nature (and of the nation), and are governed accordingly (Agyeman and Spooner, 1997; Halfacree, 1996).

In practice, however, the fluidity encouraged by brownfield conservationists is never totally open-ended or equally negotiated. In his descriptions of his fluid management philosophy, Dusty indulges in hyperbole. Green roofs do actually require some basic management, or 'striation', to produce their broadly defined desired ecological outcomes. Certain species like buddleia are judged to be overly competent, or 'invasive' in their colonising ability, to the detriment of the greater diversity of the green roof itself, and are regularly weeded out.

Furthermore, Dusty acknowledged that many of the developers he works with do suffer from the 'visual impairment' of the colour-coded aesthetic morality identified earlier, and need to be persuaded of the aesthetics of their roofs. Those roofs that can be seen from above often have to be made green and tidy (like the one shown in figure 2). In contrast, roofs that are out of sight may escape this greenwashing effect. Instead, they can be landscaped with 'rubbish', such as old aggregate, bricks, and bits of scrap metal, to better replicate ruderal brownfield ecology. They are often actually brown in colour (see figure 3). Dusty explained that he calls the roofs 'green' even when they are brown to emphasise their environmentally beneficial or 'green' credentials, the irony being that brown roofs are often 'greener' than their green counterparts.

**Wildlife in the wrong form**

The third obstacle urban brownfield conservationists encountered in their efforts to campaign for urban wildlife in London was the lack of accessible icons to trigger public support. The majority of brownfield wildlife is invertebrate or floral and is small, brown, and indistinguishable—a long way removed from the menageries of charismatic birds and mammals beloved of media-savvy environmental NGOs and their fee-paying memberships. The species that inhabit urban brownfields and living roofs therefore come in the wrong shape and form to win widespread public support [see Lorimer (2007) for more on the character and consequences of nonhuman charisma in conservation].

Fortunately, however, many of the urban brownfields in East London are occasionally inhabited by the elusive black redstart—an attractive, robin-sized bird with a distinctive orange-brown tail (Frith and Gedge, 2000). By some accounts, the black redstart is the rarest bird in the UK and it has been given legal protection under the Wildlife and Countryside Act 1981. This bird has a certain charisma and it was this that first got Dusty interested in urban wildlife. However, rather than fixating on the bird itself, Dusty and his colleagues from the London Biodiversity Partnership have mobilised the possible presence of the bird, and the legal obligations this confers, as an urban flagship species to help protect its habitat. Developers have been persuaded to provide environmental mitigation on new buildings by constructing living roofs for black redstarts. Many of these roof spaces may never actually be inhabited by the bird, due to their small size and altitude, which makes nesting unlikely (Gedge, personal communication). However, their construction has maintained or opened new spaces for brownfield biodiversity.

In mobilising the black redstart as a flagship species for less charismatic brownfield biodiversity, black redstart conservationists have strategically employed a fixed identity—the species—in the broader interests of the processes of differentiation. In so doing, they have worked within the orthodox ontology of British nature conservation, which is largely configured around a 'typological' (Rojas, 1992) understanding of the species, to create space for nonhuman forms and processes. Rather than understanding the species—the black redstart—as transcendent, timeless, and natural; as the final equilibrium point of a teleological tree of evolution (see De Landa, 2002), they employ the species as an evolutionary unit in the process of speciation (Rojas, 1992).

Here, the understanding of wildlife at the heart of brownfield conservation more closely approximates the original ethos of biodiversity, and the revolutionary intentions of those who advocated a shift from 'nature' to 'biodiversity' conservation in the late 1980s and early 1990s. The neologism biodiversity emerged from a wave of scientific enthusiasm for reframing the foundational ontology of conservation, beyond a narrow collection of species, to embrace the processes of differentiation (Gaston, 1996; Takacs, 1996; Wilson, 1992). In a Deleuzian sense, the rethinking of the temporalities of nature conservation that accompanied the rise to prominence of biodiversity moves away from a past preoccupation with the categorisation and perpetuation of the present 'actual'. Instead, they open space for the divergent actualisation of the host of virtual possibilities inherent within an ecological complex. When 'biodiversity' is applied in contexts like urban brownfield conservation—even under the flagship patronage of the black redstart—it becomes the science of immanent differentiation concerned with future becomings rather than existing beings.

**The novel politics of brownfield conservation**

Finally, the relatively marginal position of nature conservation in the political ecology of East London means that Dusty and his colleagues have to employ a collaborative and deliberative model of public engagement and decision making, while championing brownfield wildlife. For example, in campaigning for living roofs, Dusty worked with the developers and brought them into contact with existing users of brownfield sites to get around the traditional antagonisms of urban conservation. At first, he was accused by several more conservative conservationists of 'selling out' to developers and easing the passage of ecologically degrading projects that might otherwise have been prevented outright on purely ecological grounds.

In other words, by demonstrating that 'nature' can be constructed in rubbish on the roof of a building, Dusty and his colleagues undermine the political power of appeals for ontologically pure natures held in historically consistent forms, like greenwashed parks. In the geographical context where much of the green roof activity is occurring, this critique is both unfair and unrealistic. The political momentum for construction on brownfield land in London's Docklands is such that the developments would have gone ahead anyway. Without their intervention no habitat would have been created, and many of their early critics now acknowledge what has been gained and are looking to take the recreation potential further.

To raise the profile of the flagship black redstart and to engage the users of brownfield sites, Dusty coordinated the first public response survey of the bird. On one level, this was not very successful as few birds were spotted. However, bringing these volunteers together helped to raise awareness and build a coalition to support future advocacy and engagement. Similarly, regular visits are arranged to living roofs for local schools and residents. Such a participatory approach to conservation echoes wider developments in British nature conservation, where increased attention is being given on numerous fronts to the democratic as well as research potential of various forms of citizen science.

While there is a long history of 'amateurs as experts' (Ellis and Waterton, 2005) in British conservation, statutory and NGO organisations are now actively courting their involvement in species surveillance and land management—for example, in the development of the National Biodiversity Network for volunteer recorders as well as in the boom in media-driven public response wildlife surveys. These developments undermine past elitist tendencies amongst conservationists to shortcut politics with science (Latour, 2004) and work towards the redistribution of expertise in a 'cosmopolitan' model of environmental citizenship (Hinchliffe and Whatmore, 2006).

**Towards a fluid biogeography of wildlife conservation**

This tour through the trials and tribulations of living roof and urban brownfield conservation has charted the emergence of an alternative approach to wildlife conservation, which has a radically different set of geographies, temporalities, ontologies, and politics to much past conservation practice, about which social scientists have been rightly critical. However, it has not developed in a vacuum, nor is it divorced from wider developments in the field, and it is important to understand the rise of urban brownfield conservation in the context of broader shifts underway in UK nature conservation policy and practice.

I made reference to these shifts throughout the paper and explained how they relate to developments that are both social and ecological. These include the rise of urban conservation and wildlife movements, the reorientation of nature conservation towards biodiversity and 'rewilding', and the diagnosis of climate change and the need to adapt to its ecological implications. In their different ways, these broader shifts demand a more spatiotemporally fluid approach to conservation, and have revealed the degree to which much past conservation practice in the UK was often too conservative—wedded to fixed geographies and trajectories for nature.

This growing theoretical and practical awareness of the dynamic and networked character of UK wildlife brings to the fore the politics of conserving British landscapes, which are inherently hybrid, historical, and invariably contested. As Bruce Braun has recently remarked, if landscapes such as urban brownfield sites are understood as open-ended, rather than closed and 'natural', then a future progressive ecopolitics can not be orientated towards conservation as it is traditionally defined, for the world will not hold still or true to fixed archetypes. Instead, conservation must be directed at "the possibilities and consequences of a 'new earth' and 'new humanity' that is still to come" (2006, page 219). A fluid conservation for the 21st century must look to the future cast off from the certainties of immutable natures.

Recent developments and innovations in living roof and brownfield conservation provide a number of important pointers to guide future conservation practice, which chime strongly with similar theoretical developments and innovations in nonequilibrium ecology and relational geography. Figure 4 draws these empirical and theoretical overlaps together and sketches out the theoretical foundations for a fluid biogeography of wildlife conservation that would help to guide a move towards a more open-ended model of conservation. The key principle behind this fluid biogeography is a focus on difference, rather than diversity. Here, difference is understood as a hybrid process rather than as a collection of fixed forms. Existing diversity is important but only as a vehicle for preserving the potential for future immanent differentiation. While it will be strategically important to fix upon charismatic species and diverse landscapes, conservation should not lose sight of the vital forces the drive political-ecological change.

Spatially, a focus on urban brownfield sites and living roofs amongst some UK conservationists can be understood as evidence of a much broader shift that is

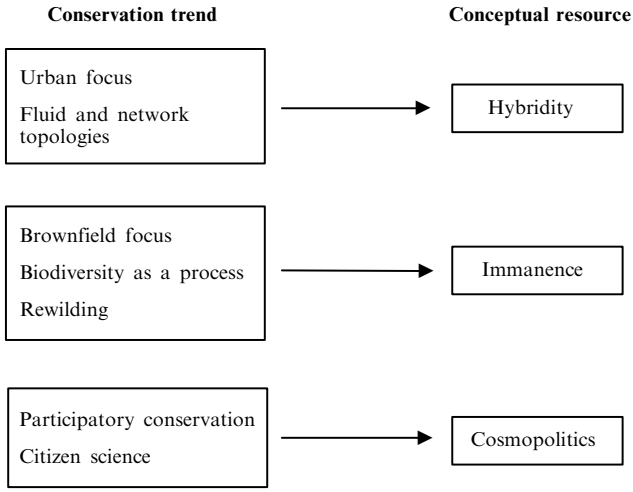


**Figure 4.** Conceptual resources for a fluid biogeography of wildlife conservation.

underway in the topologies of conservation, away from a regional imagination of fixed territories, defined in opposition, to more open geographies of interpenetrating and overlapping networks. Impossible pure territories are being replaced by hybrids, which are peopled *and* have spaces for wildlife. No longer is conservation to be directed only at purified regions far removed from centres of civilisation. Instead, lively urban natures and living cities are increasingly on the agenda.

This spatial reorientation towards hybridity and networked topologies goes hand in hand with a rethinking of nonhuman temporalities—insights from new ecology, pressures from brownfield conservationists, and the need to adapt to climate change have fundamentally unsettled old certainties in the balance of nature, while the push for biodiversity conservation has broadened the scope and questioned the forms of current practice. New immanent temporalities of conservation are emerging, expressed, for example, in the management of extensive living roofs or in the strategic use of the black redstart as a flagship for the scrubby heterogeneity of brownfield habitats. These new temporalities are more open ended and process orientated, focused less on the preservation of extant species diversity than on the conservation of the processes that secure future difference. Finally, on the margins such ontological shifts are also having marked epistemological and political repercussions—conservation is gradually being democratised and made cosmopolitan.

The implications for theorising conservation practice of these moves towards more lively temporalities, hybrid spatialities, and convivial environmental politics in conservation can be summarised under the three conceptual headings of hybridity, immanence, and cosmopolitics that are listed in figure 4. A fluid biogeography of nature conservation that is grounded in these concepts advocates fluid geographies and temporalities. Ontologically, this fluidity echoes the theoretical ethos of biodiversity and affirms the immanent potential for differentiation inherent within any ecological complex. It seeks to remain open to unintended outcomes, avoiding foreclosure in its management strategies. Spatially, it would not reduce the forms of conservation to fixed identities—urban, rural, anthropomorphic, etc—but would celebrate their hybridity, their existing diversity, and their potential for further differentiation. Temporally, this fluidity is open to multidimensional 'timescapes' (Adam, 1998) of nonhuman rhythms that are out of sync with both the linear clock time of modern life and the fixed cycles of equilibrium models.

Such lively temporalities and hybrid spatialities have many similarities with the ethos of the new biogeographies emerging in more-than-human cultural geography (Braun, 2006; Spencer and Whatmore, 2001; Whatmore, 2002) and in particular with Sarah Whatmore and Steve Hinchliffe's (Hinchliffe and Whatmore, 2006; Hinchliffe et al, 2005) recent work on hybrid geographies, living cities, and a politics of conviviality. Their work further develops the Deleuzian approach to the 'bio' in biogeography that is central to this paper, which is sympathetic to their concerns but seeks to take further a concern for immanence in conservation and its practical and ontological implications. Such a lively approach to theorising human–nonhuman interactions is still unfamiliar to much environmental social science, which often overlooks the diverse agencies and rhythms of nonhumans, or, if they are included, remains firmly wedded to an equilibrium temporality of the nonhuman realm.

Politically and epistemologically, a fluid biogeography departs from the orthodoxy of much contemporary nature conservation. Conservationists often reduce the nonhuman realm to the objective status of a resource best conserved through commodification and utilitarian management by experts (Castree, 2003; Escobar, 1999). This process forecloses debate on the value of nonhumans and the techniques through which they come to matter. In this way, to use Bruno Latour's (2004) terms, wildlife becomes a 'matter of fact' rather than an open-ended 'matter of concern'. In contrast, a fluid biogeography draws attention to the cosmopolitanism of the nonhuman realm and the diverse communities that inhabit and claim to speak for it.

Such an approach may also be disorientating to much political ecology. It is less certain, less fixed, less traditionally critical—in the dogmatic black-and-white sense of some contemporary approaches. The critical ethos encouraged in this paper is more positive and celebratory. It seeks to welcome and encourage marginal countercurrents and to chivvy their arrival (see Hinchliffe, 2004; Hinchliffe and Whatmore, 2006).

However, it is important to ensure that these new, fluid, and immanent models of conservation are not co-opted by a reactionary desire for wilderness and ontological purity. In the background to some of the recent appeals for rewilding, for example (see Taylor, 2005), we can hear echoes of older antihumanist thinking. As several commentators have pointed out, conservation should be about wildness not wilderness (Cronon, 1996; Maskit, 1999; Whatmore and Thorne, 1998) and the territories that conservationists create will always be striated—the smoother spaces they might enable will be thoroughly hybrid. Counterintuitively, maximising biodifference and thus biodiversity is now an inescapably human endeavour.

The challenge is to convert these philosophical precepts into the specific parameters of a 'smoother' or more liberal model of conservation that would be open to the actualisation of the processes of biodifferentiation, without jeopardising the preconditions for their survival. Although urban brownfield conservationists have given us a precedent, there is a risk that a liberal model of conservation, which looses the certainties and authority of the older conservative model, may dovetail nicely with the imperatives of neoliberal economic globalisation—broadly defined—and with the destruction of social and ecological difference for which it is often responsible (Soule and Lease, 1995). This happens either advertently through homogenising development practices—as can already be seen happening with the spread of identikit living roofs—or inadvertently through the proliferation of a small number of invasive species along global trade networks (Clark, 2002). The key challenge for those who govern and theorise nature conservation is to find ways to cultivate, channel, and celebrate this open-ended ethos in the face of those humans and nonhumans who would dramatically reduce the potential for biodifferentiation.

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