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The Case for High-Density Compact Cities

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As the UK's population and housing demand increases, harm to the environment can best be avoided through well-designed, sustainable, compact urban development, which promotes use of brownfield sites and avoids low-density urban sprawl. To this end, the role of the ecologist is more vital than ever to ensure that the increasingly densely populated urban realm does not become devoid of greenery and ecologically impoverished.

Figure 1. Relatively formal, non-native but nectar-rich, herbaceous courtyard planting within the Crest Nicholson Centenary Quay development in Southampton; design by Allan Scott Architects and Biodiversity by Design.

Introduction

Recently I was in discussion with a Local Authority ecologist who was bemoaning the high-density new developments in his city, and the apparent adverse implications for urban biodiversity and the environment more generally. Unthinkingly I nodded in solidarity, in opposition to the *'town crammers'* as they are disparagingly labelled (see Lock 2015).

To counter the wider trend towards urban densification, there has been talk of revitalising *'garden city'* living in the UK. The Town and Country Planning Association (TCPA) published *'Creating Garden Cities and Suburbs Today'* (2012); a recent Conservative-backed report has proposed a new *'Thames City'* – an expanded London zone featuring 40 new garden developments surrounding the capital; and the Chancellor of the Exchequer has established a Garden City Development Corporation at Ebbsfleet in Kent.

But is low-density *'garden city'* living really the urban development model that ecologists should be supporting? In this article, I argue that our profession should be more aware of the often under-acknowledged sustainability concerns linked with this approach, and instead make the ecological and wider environmental case in favour of high-density, compact city living. In taking this stance, I am not giving up on the wildlife of our towns and cities. Rather, I strongly believe that ecologists must be integral to the urban planning and design process. We must, though, become smarter in our efforts to integrate biodiversity into urban areas where space is increasingly at a premium.

History of the compact urban living movement

Low-density garden city living was first envisioned by John Ruskin and Ebenezer Howard in the nineteenth century in response to the pollution, poor sanitation and overcrowding of Victorian cities. The movement gained momentum in England after 1945 when urban housing densities declined markedly in response to changing aspirations, rising incomes, and planning policies supporting spacious urban extensions and the building of new towns (Whitehead 2012).

More recently, many economists and urban planners have challenged the merits of the post-war trend towards low-density living. They argue that well-organised, compact urban agglomerations achieve economies of scale, and are more economically productive and competitive (Glaeser 2012). Although counterintuitive, the creation of compact densely populated urban centres also has many environmental benefits, recognition of which is certainly not new and dates back at least to Jane Jacobs' seminal 1961 book *The Death and Life of Great American Cities*. Jacobs' ideas later inspired the Ahwahnee principles in the USA in the early 1990s followed by the New Urbanism and Smart Growth movements. All of these approaches to

Figure 2. Award-winning linear wildflower meadow created in the heart of Bristol in Crest Nicholson's Harbourside development; design by Grant Associates and Biodiversity by Design. Photograph courtesy of Grant Associates.

Figure 3. Living (green) roofs established across the London Olympic Athletes' Village at Stratford as analogues of four key priority habitat types; design by Vogt and Biodiversity by Design. Photograph courtesy of Olympic Development Authority.

urban design seek to avoid low-density urban sprawl by promoting compact, transit-oriented, pedestrian- and bicycle-friendly urban development.

Partly in response to these movements, the trend towards lower housing densities has been reversed in the UK. The mean density of new houses built in England nearly doubled between 2000 and 2009, from 25 to 43 dwellings per hectare, while densities for brownfield sites and in London rose even higher (DCLG 2010). This trend has been encouraged by demographic changes, i.e. a growing population and declining household size; government policy, especially protection of the greenbelt and a presumption in favour of brownfield development (the so-called *'brownfield first'* policy); and market pressures.

Environmental effects of urban sprawl

The environmental rationale in favour of high-density compact cities gained momentum with the arrival of the *'Urban Millennium'* in 2007, when the majority of the world's population became urban for the first time in human history (UNDESA 2009; the figure is 82% in England and Wales). David Owen (2011) and Edward Glaeser (2012) have in particular championed the cause, highlighting how the post-war growth in low-density urban sprawl (including commuter settlements beyond the suburbs) has resulted in higher car usage per capita in these areas compared with more densely populated urban centres. People drive significantly more to work, shop, and take their children to school, increasing congestion and air pollution. Transport accounts for 21% of UK greenhouse gas emissions (DECC 2015), whilst other exhaust output, including nitrogen oxides, particulates, carbon monoxide and hydrocarbons, has a much more immediate and local impact on both the health of people and wildlife. Low-density, leafy, residential development may include lots of green space but the environmental benefits are undone because the residents drive so much (Glaeser 2012).

By contrast, those living in urban centres are far less inclined to drive because services are readily accessible by foot or public transport. Policies are also in place to constrain car use in cities, e.g. restricted and costly parking charges; road capacity not being expanded to ease congestion; and a congestion charge in London. Car use in London, and in many other densely populated cities in the developed world, is no longer growing and may be declining relatively as population densities increase – the so called *'peak car phenomenon'* (Metz 2015).

In low-density suburbs, homes tend to be larger and predominantly detached or semi-detached. They use more energy because heat consumption is correlated with floor area (Palmer and Cooper 2012). These homes also have a higher wall area to floor area ratio compared with flats and terraced housing and thus have greater heat loss in winter. In 2010, the residential sector accounted for 31% of the UK's carbon emissions (DECC 2010).

Taking a global environmental perspective, urbanisation is continuing apace in the developing world, led by India and China. Global carbon emissions could soar were these countries also to adopt leafy suburbs, large homes and the cars those suburbs entail (Glaeser 2012).

Brownfield or greenfield development?

In 2000, the UK Government introduced the *'brownfield first'* policy as a strategic tool for controlling urban sprawl, as well as for promoting urban regeneration (Payne 2013). In addition to prioritising brownfield over greenfield development, the policy also encouraged higher density housing on brownfield sites (see *Planning Policy Guidance 3 Housing* from 2000). Consequently, the mean number of new houses per hectare has risen most sharply on brownfield sites, increasing 75% from 28 to 49 between 2000 and 2009 (DCLG 2010).

While previously established housing density targets have not been taken forward in the new *National Planning Policy Framework* (NPPF), concentrating new development on brownfield sites wherever suitable has remained a priority for Government (HM Treasury 2015). For various reasons, including perceived viability issues, developers generally also still favour higher density development on brownfield land (Payne 2013).

While *'brownfield first'* is broadly supported from an ecological perspective (CPRE and Natural England 2006), some environmental groups have questioned the policy, highlighting the notable ecological value of some brownfield sites compared with many ecologically impoverished greenfield alternatives (Buglife 2009). Others highlight that most of the countryside has not, contrary to popular rumour, been paved over with concrete, and so can accommodate many more homes (TCPA 2003). Unfortunately, however, the proponents of greenfield development frequently neglect to fully consider the wider sustainability concerns which are discussed here. The environmental balance between greenfield and brownfield development must not come down to a simplistic comparison between their respective ecological characteristics, or be decided on the basis of unqualified urban-rural ratio statistics. Much bigger

Figure 4. Restoration of the formerly canalised River Wallington within Grainger's Berewood residential development in Waterlooville; design by Mayer Brown, Fabrik and Biodiversity by Design. Photograph courtesy of Mayer Brown.

environmental considerations are at play. With regard to the carbon footprint of the alternative urban development models, it is particularly important that ecologists remind themselves that climate change is the biggest threat to UK and global biodiversity.

In 2004, the Barker review concluded that the UK needed to construct 250,000 homes annually for 25 years to deal with the nation's housing crisis (Barker 2004). As the area of suitable available brownfield land is insufficient to accommodate these numbers, it is recognised that further greenfield development will also be needed (Dixon and Adams 2007). The Government's proposal to concentrate new development around commuter hubs with good public transport links is therefore welcomed.

'Density done well' philosophy

If the more sustainable trend towards compact city living is to continue, new residential areas will need to meet a wide variety of household aspirations – applying Jane Jacobs' (1961) *'density done well'* philosophy. These aspirations include creating a sense of *'place'*; provision of good quality public services, e.g. efficient public transport; walkable neighbourhoods; high-quality architectural design (avoiding volume-built *'featureless boxes'* and including water/energy efficient technologies); and providing attractive, high-quality green spaces.

Maximising opportunities for biodiversity in high-density cities

Given the need to provide attractive, high-quality green space, the role of the ecologist in urban design is more vital than ever in ensuring that the increasingly densely populated urban realm does not become ecologically impoverished and devoid of associated ecosystem services. To this end, it is imperative that ecologists become smarter at integrating biodiversity within high-density development. This becomes increasingly challenging where seemingly opposing types of green infrastructure are competing for space. For example, should limited green space be provided for children's play or for wildlife?

In response to these challenges ecologists should:

- Work effectively with architects and landscape architects to maximise opportunities for biodiversity in small green spaces, including those intended to have relatively formal appearance, e.g. courtyards, squares, the streetscape and pocket parks, where ecologists have typically been excluded from the design process (Figure 1). To achieve this partnership, ecologists must champion multifunctional green infrastructure, and develop a better appreciation of the wildlife value of non-native planting, plant sourcing, seasonal appearance, maintenance requirements, design of nature-inspired play features, etc. Even within seemingly formal green space settings, it may be possible to incorporate native Section 41 Habitats of Principal Importance (Figure 2).
- Promote living architecture, the opportunities for which are increasing due to the shift towards building more flats (Figure 3). Living (green) roofs and façades provide multiple ecosystem services and have high value as invertebrate habitat, thereby helping to compensate for brownfield losses.

Figure 5. Multifunctional, biodiverse, sustainable drainage at the award-winning London Olympic Athletes' Village, Stratford; design by Vogt, Arup and Biodiversity by Design.

- Maximise the ecological value of areas considered sub-optimal for development, e.g. promote river restoration along flood-prone canalised river corridors (Figure 4).
- Contribute to the design of truly multifunctional SuDS, maximising their value with respect to biodiversity, amenity and landscape, in keeping with the new SuDS Manual (CIRIA 2015) (Figure 5).
- Better integrate newly created green space with existing green infrastructure networks, thereby creating a more permeable landscape for wildlife and enhancing ecological carrying capacity, e.g. see the *All London Green Grid* strategy (Greater London Authority 2012).
- Define measurable targets for high-density, ecologically rich urban environments (Wells *et al*. 2011).
- Ensure long-term, ecologically informed management of green infrastructure (TCPA and The Wildlife Trusts 2012).

While urban green spaces must be designed to *'work harder'* to achieve multiple functions for both people and wildlife, it will become more challenging to adequately compensate for ecological losses entirely on-site as cities become increasingly dense. In an urban context, however, net change in ecosystem service provision may be a more useful criterion of success. Further, biodiversity offsetting can provide a mechanism for compensating for residual impacts, although where applied it should be implemented as close as possible to the habitats and human populations most affected by relevant developments (Garland and Wells 2009).

Conclusions

There has been recent talk of revitalising Ruskin and Howard's dream of garden city living, in opposition to the trend towards urban densification. If garden city living were to become widely implemented, however, and fails to achieve sufficient density and economies of scale to support good infrastructure, accessible by public transport, bicycle and on foot, then the dream of garden living could turn into an *'ecological nightmare'* (Glaeser 2012).

Greener, sustainable city living that reduces CO_2 emissions, and benefits biodiversity and the environment more generally, will only be achieved by minimising urban sprawl and championing more-compact urban living. High-density urban environments must also be attractively designed to include high-quality, biodiverse green space. Ecologists must contribute to these design goals, seeking new and innovative ways to integrate biodiversity within the limited spaces of an increasingly compact urban realm.

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