Designing Access to Nature for residential buildings

Nick V Baker BSc PhD MA, Architectural Association, UK

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Abstract

The popular aphorism that "nature is good for you" is explored by reviewing a number of studies measuring the impact of nature, and its deprivation, on subjects. These range from well-being in dementia patients to the development of cognitive and motor skills in pre-school children. With sufficient evidence that access to nature is indeed good for you, and providing a pragmatic (if not rigorously scientific) definition of nature, the paper moves on to identify the key design parameters that have impact on our access to nature.

The work proposes a formal model that consists of *zones, links and qualities*. *Zones* can be *inside, edge, near* or *far*, these corresponding to the building interior, the building envelope, the immediate surroundings, and the distant landscape. Between these zones are *links* that are either *access or sensory.* All the above zones and links can be ascribed *qualities*. Whilst there is too little data at present to propose a quantitative calibration, the model may be useful to a designer for ordering and balancing various conflicting design decisions. Finally, other issues relating to nature are discussed. These include attracting wildlife into the near zone, and facilitating gardening and pet-keeping.

The case for nature access and evidence from the literature

People in the developed world spend 95% of their time indoors whereas 10 generations ago, our ancestors would spend most of their waking hours, outdoors. And whilst we may have made the cultural adjustments to life indoors, genetically we have not, since the genetic changes in 10 generations are insignificant. Our genes evolved for survival in the wild plains and forests, where hazards from the climate, the landscape, and the flora and fauna faced us every day. Could this explain our almost universal fascination with nature?[1]

Searches under "access to nature" yield a huge body of work from the recovery of post-operative patients to the literacy of schoolchildren. The studies have often sought to identify corrective measures in areas of deprivation, and often in subjects which are either already vulnerable, or showing signs of stress. For example we find studies on the development of pre-school children in poor urban environments, and the value of gardening to dementia patients.

Proximity of green spaces

Many of the studies on the impact of nature on wellbeing are concerned with the proximity and physical accessibility of open green spaces, of varying levels of "wildness" or more specifically bio-diversity. In a comprehensive review by Strife and Downey (2009) of over 150 articles, which specifically reviewed studies on the impact of deprivation on youth development, access to nature was claimed to have physical, mental, emotional and cognitive benefits – and a positive effect on children's overall development.
To quote specific studies, Fjortoft (2001) found that children using a forest as a play setting performed better in motor skills tests than children who used standard playground settings, although the latter contained modern

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Wilson's (1984) biophilia hypothesis is based on the premise that our attachment to and interest in animals stems from the strong possibility that human survival was partly dependent on signals from animals in the environment indicating safety or threat. The biophilia hypothesis suggests that now, if we see animals at rest or in a peaceful state, this may signal to us safety, security and feelings of well-being which in turn may trigger a state where personal change and healing are possible [4]

play equipment. Grahn et al (1997) found that children attending day-care facilities surrounded by natural woodlands, had greater attention capacity and motor coordination than those attending centres surrounded by tall buildings. In a longitudinal study Wells (2000) showed that cognitive functioning improved when children moved into housing with nearby green spaces.

Other evidence that emerge from studies is that view of natural landscape can be beneficial in itself. Faber Taylor et al (2002) reported a reduction in ADHD symptoms, and improvement in academic performance amongst Afro-American schoolchildren, when the natural areas were used as part of the school curriculum. It was also claimed that – green space generate social interaction and reduce violence, the continuing presence of "ambient" nature was more effective than one-off experiences, and people where sensitive to the quality natural environments, and the safety of the users.

Rather less research has been done on issues closer to the building itself. However Chalfont (2005), in a paper "Housing and connection to nature for people with dementia" identifies *building edge zones*, intermediate areas between inside and outside where the critical connection to nature can be made. He also reminds us of the phrase "out of sight – out of mind" implying the need to provide a visual connection between the interior and the beneficial natural surroundings. We use a similar approach to Chalfont as a model for access later in the paper.

Views of nature from the building

As early as 1967 Markus (1967) reports the preference of people for distant views, and for views that give them information about the weather. Ulrich (1984) reports the improved recovery from surgery in patients with distant views of trees compared with patients looking at a blank wall.

As part of her PhD thesis on Daylight and View, Helinga (2013) reviews over 50 papers under the heading of View Quality. A consistent view is that natural views are more highly valued . Of office workers, Kaplan (1993) (2001) reports that "those with a view of nature felt less frustrated and more patient, expressed greater enthusiasm, and reported higher life satisfaction as well as overall health". More specifically, Heschong Mahone (2003) reports a 10% – 25% better performance in mental tests amongst those with outside views, and fewer complaints of fatigue and environmental discomfort.

Helinga goes on to incorporate the evidence in her own study by defining a scale of view quality from occupied offices which ranged from zero for no nature to 4 for 100% "natural" view. However, qualifiers were added that enhanced the value of non-natural scenes due to factors such a depth and diversity. What is perhaps a more important conclusion of the study was that there was strong correlation between the perceived value and quality of daylight, and the quality of the view. This is consistent with observation of higher satisfaction with other environmental parameters, such as thermal comfort reported by Heschong Mahone, and with the claim by Nicol and Humphries (1973) that thermal satisfaction is influenced by views that have a climatic significance. For example, an occupant looking out on a snowy scene will be more tolerant of non-neutral (cool) temperatures and more prepared to take adaptive action to mitigate the discomfort.

To sum up, the literature provides overwhelming evidence to confirm that both physical and visual access to nature are an essential part of well-being.

A working definition of 'Nature'.

Before considering a design response to the need for access to nature, we must clarify, for this purpose, what we mean by nature. Dictionary definitions tends to agree on "all of the physical world that is not manmade". Immediately we run into problems with this since most the landscape that surround our conurbations and settlements are to a degree – manmade. And within those landscapes, many of the species – the crops and the animals, are themselves highly influenced by the breeding and selection of man. So too are the trees and plants found in our parks and gardens, as are the flowers which we place on our living room table.

Thus we adopt here a pragmatic definition that nature means that quality that gives an impression of being to a greater or lesser extent "natural". This could be at the extreme true wilderness, and at the other end of the spectrum, an urban landscape combining a minimal amount of vegetation and urban wildlife, but with distant views and sky, and a lack of obviously negative properties such as pollution and delapidation.

Proposed design parameters

Following Chalfont's (2008) approach, we propose here a model with a systematic vocabulary that although may not be used fully quantifiably, can be used as a structured checklist to assist design.
The model consists of ***zones, links*** **and** ***qualities*****.** The total environment is divided into four zones - **INSIDE, EDGE, NEAR** and **FAR**. The zones are *linked* in two ways ***Sensory*** and ***Access***

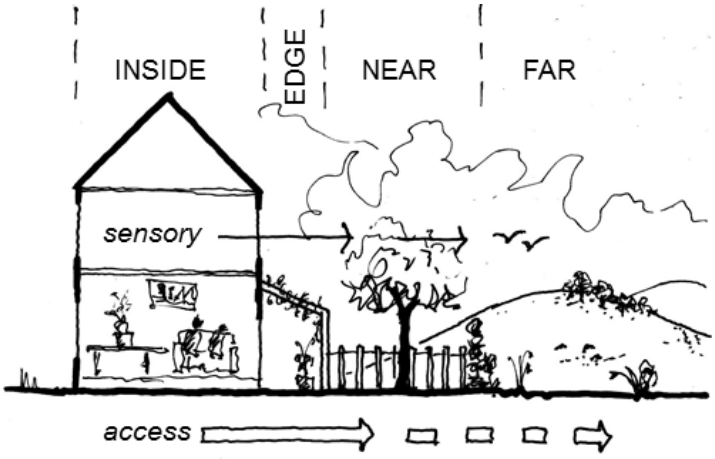

Figure 1 Section illustrating the configuration of zones and links for low-rise residence with contiguous NEAR and FAR zone.

INSIDE – is the building interior. It can have nature content itself e.g. indoor planting, indoor pet-keeping facility or even surrogate nature – e.g. photographs, paintings or sculpture.

EDGE – is the physical envelope and extensions of the building that links by means of doors, windows, balcony, porches, verandas. May have nature content itself.

NEAR - is the space immediately outside the building such as a patio, yard, or garden. It can have nature content and structures that promote nature – e.g. planters, ponds, bird table etc. It will link with the **INSIDE** via **EDGE. NEAR** is usually private or semi-private.

FAR – is usually off-site, large in scale, and often public. E.g. parks, farmland, wild land such as marshes, moors or mountains. May be *contiguous* with **NEAR**, or *remote.*
Sensory – linked by vision, sound or smell. For sighted people, vision the most important. Can be seen as a property of **EDGE** through which the link passes. The links can exist from **INSIDE** to **FAR** via **NEAR** or direct from **INSIDE** to **FAR.**

Access – is the facility for the physical movement of the person from INSIDE to move to either **NEAR** or **FAR**. The link can exist between **INSIDE** and **NEAR** or **INSIDE** and **FAR**. If **FAR** is *contiguous*, then ***Access*** will be via **EDGE** and **NEAR** only. If **FAR** is remote, ***Access*** will be via **EDGE** and (possibly) **NEAR**, and then an off-site area such as pathway, street, highway or even transport system, which will influence the quality of the ***Access***. Distance will also be a key parameter. Vertical distance is also critical for the INSIDE to CLOSE link. It is far less likely that a person will have good use of a garden if they are living in a fourth floor flat than a ground floor flat. It might be better to put resources into a shared patio garden at fourth floor level, or even individual balconies.

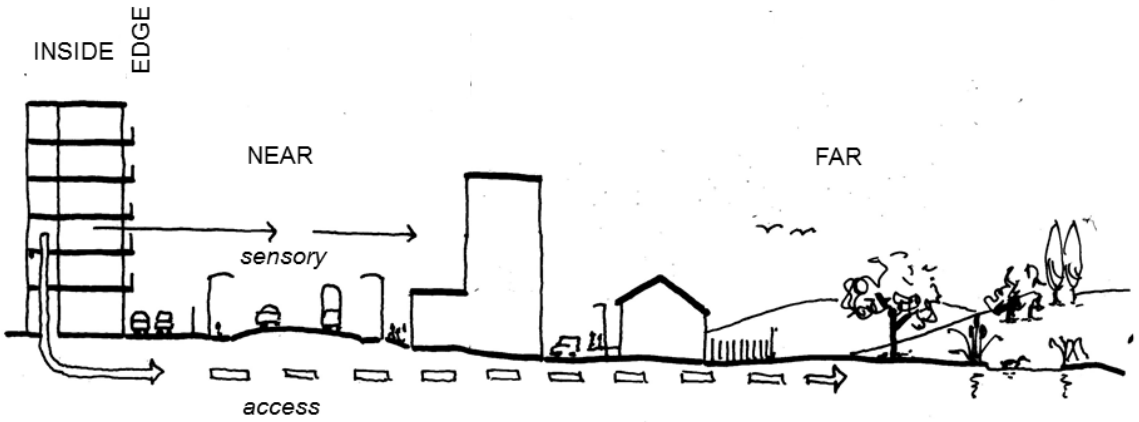

Figure 2 Section illustrating the configuration of zones and links for a high-rise flat showing balcony as EDGE, the NEAR zone with no nature value , and a remote FAR zone with high nature value. The sensory link to nature is compromised by the noise of the street and the obstruction of the buildings opposite. The **access** link is degraded by requiring a lift, crossing a busy road, and possibly an 'unsafe' neighbourhood.

QUALITY can be ascribed to all three environments and the links. In the case of the FAR environment this will include scenic variety and bio-diversity (the two being closely related). Clearly an area of rolling hills, outcrops of woodland and hedgerows is of greater restorative value both to view remotely and to walk amongst, than modern 'industrial' farmland. The NEAR environment is more dependent on architectural elements and the way that the immediate surroundings to the building attract wildlife and horticultural activity. For the INSIDE environment in domestic spaces the nature content is limited in architectural terms and relates more to occupant decisions about furnishing and contents. However in multi-residential blocks there may be opportunities for indoor planting, water features and nature-related art, in spaces such as foyers, staircases and other communal areas. Many studies on indoor planting indicate that it has significantly beneficial effects.

QUALITY is just as important applied to links. ***Sensory*** INSIDE / NEAR and INSIDE / FAR mainly applies to windows. The importance of positioning windows in relation to views and to seating areas is well known to architects, but is often neglected in response to demands for standardising layouts or even structural constraints. Special consideration should be given to supervision of children from within the house. A garden or patio that can be supervised from inside (possibly a kitchen) by a parent will be much more used by young children, that one where the parent has to enter the garden area in order to check up on the children.

QUALITY applied to the ***Access*** link is very important. It may be associated with the EDGE – i.e. the design and location of the door or doors into the NEAR environment, relative to the occupancy of the rooms. For example good access would be where the main living area is linked to the garden or patio by doors also providing a visual link. This is not uncommon, often involving wide openings with sliding patio doors.

The QUALITY of the ***Access*** link to the FAR environment is equally important. If the FAR and NEAR environment is contiguous the link will be short – i.e. a gateway in the boundary of the NEAR environment. This is highly desirable but probably a luxury that few urban dwellers enjoy. Far more frequently, the link will involve a journey through a built up area of no nature value and generally used by the public. It may also involve dangers from road traffic and perceived or real dangers to children and vulnerable people from anti-social and criminal behaviour. Or it may simply be unpleasant due to ugly surroundings, noise and atmospheric pollution.

Another critical factor is the distance. In the Strategy for Improved Nature Access for London (Greater London Authority 2008), the target maximum distance is set at 1km. This equates to about 10 – 15 minutes walking. Clearly, distance and environmental quality interact – a longer walk in pleasant urban surroundings could be regarded as being equivalent to a short unpleasant one. However, for vulnerable people, e.g. children, or the old, a single feature such as a dangerous road crossing, or a steep hill, might be critical.

Access for Wildlife

This refers to the access of wild life *to* the NEAR zone. Sensory contact (usually visual) with active wildlife – birds, animals and insects, is greatly valued. Most birds have access by air, and even the common urban species such as pigeons provide a valuable nature resource in otherwise dire urban environments.

There is already much design guidance (English Nature 2005) available on provision for birds to nest and feed on or close to buildings. Indeed, much of the loss of common garden species is blamed on changes of building design which deny birds roosting and nesting places, and changes in garden style that replace flowerbeds planted with flowering annuals and shrubs, with tarmac hard-standing for a car, and paved patios with gas heaters.

Whilst designers cannot guarantee that the occupants will become avid gardeners, there is much that can be done to encourage it – the provision of planting opportunities, even in confined spaces such as balconies, and even providing surfaces with easy access where birds can be fed. Gardening activity will also have an impact on insect population, which in turn will attract birds. Whilst many insects may be of limited interest to the average occupant, and some regarded as pests, there is almost universal appreciation of butterflies, moths, and dragonflies.

In public areas of high nature value, interpretation boards are found to have positive effect on nature appreciation. This principle could be extended to a more local level in multi occupancy buildings, providing information on wildlife likely to be seen from the building.

Keeping Pets

Pet-keeping is widespread in Europe. In 2012 the European Petfood industry Federation claimed that about 25% of households have a dog or cat. Fish, reptiles, birds, and small mammals together constitute approximately another 25% of households. This statistic is fairly uniform across European states.

There seems to be universal agreement that pets are of therapeutic value. Studies have shown (Wells 2011-review) that many human disorders, including behavioural, emotional and physical conditions have improved with regular contact with pets, particularly dogs or cats. There are many cases where animals (typically dogs) provide actual physical assistance; the most well known example is the Guide Dog for blind people. Increasingly dogs are being used for hearing, detecting medical conditions, and general assistance. Whilst there main role may be utilitarian, there is no doubt that the animals frequently fulfil an emotional role for their disadvantaged owner.

Pet owning may be of particular value in urban populations where density and lifestyle create stress. However, it is just these urban situations that make pet-keeping more difficult. Provisions that facilitate pet-keeping often overlap with nature-promoting design of the NEAR and FAR environments. The provision of a secure outdoor space and access to it may be a critical factor in cat or dog ownership, and the provision of space for a pond, rabbit cages or aviary similarly important. Dog-walking, an almost essential part of dog-ownership, has needs in terms of access to FAR nature environments, but also has great benefits since it in itself promotes health through exercise, as well as exposing the walker to nature and ensuring that the nature provision is well used.

Pet-keeping can create a number of local inter-neighbour problems. These usually centre around noise, hygiene, and perceived danger. To some extent these are design issues, some of which such as noise, already being covered by codes of practice. Some are generated by anti-social and thoughtless behaviour, and cannot be "designed out".

Though these seem highly specific issues, outside the normal architectural design sphere, bearing in mind the prevalence of pet-keeping, and its benefits to health and well-being, it seems appropriate to bring some design effort to bear to this neglected area.

Conclusions

The literature provides convincing evidence that access to nature has a significant impact on health and wellbeing; only a tiny fraction has been quoted here. It follows that it should be an essential part of the design and planning of residential buildings. This paper suggests a framework for how a design proposal could be assessed. No quantitative calibration, has been offered yet. But by means of social survey and Post Occupancy Evaluation, a quantitative model could evolve. The VELUX Building with Light and Air Project has the design of healthy residential buildings as a prime objective; access to nature is clearly an important part of the design challenge.

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