

TITLE**Biodiverse Business Sites - Contradictio in Terminis?****Author Information**

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Abstract

In the Netherlands, an important part of city development consists of business site developments. These developments are often situated in peri-urban locations that have great value for other land uses, especially landscape development for ecology. For instance, about 20% of all Dutch business sites are located adjacent to the national Ecological Main Structure (EMS) and many more create bottleneck situations or form barriers for the continuation of this EMS-structure. On the other hand, areas reserved for ecological aims may occupy land that is valuable for development as a business site. We assumed that this undesirable situation can be counteracted by implementing what has always been considered a “contradictio in terminis”: biodiverse business sites. In biodiverse business sites the aims of biodiversity conservation are in synergy with the aims of business sites. We looked for the synergy effects of spatial and functional configurations for both, business sites and biodiverse habitat areas. First, we distinguished different typologies of business sites and typical spatial layouts. Secondly, we identified a large range of habitats known from peri-urban areas in the Netherlands. In a next

step, we linked spatial requirements of business sites with those of ecological networks and habitats. We found that various habitats could be fit within the spatial and functional lay-out of different types of business sites. So we composed a “toolbox” that can support urban planners and designers in creating biodiverse business sites.

Finally, we tested the toolbox in a hypothetical design process in the redesign of an outdated business site. As a result of using the toolbox in this hypothetical planning and design case, we concluded that application of the toolbox is possible. We are convinced that if landscape architects and urban planners would try to achieve biodiverse business sites we could overcome this “*contradictio in terminis*”.

Paper:

Biodiverse Business Sites - Contradictio in Terminis?

Introduction

In the Netherlands, the traditional cultural landscapes are changing. Different land claims reshape the typical Dutch landscape, especially in metropolitan regions. An important part of the ongoing city development consists of business sites- sites where businesses and companies are located collectively. Also land claims originating from nature conservation policy change the metropolitan landscape. Regarding the latter, the aimed establishment of the Dutch Ecological Main Structure (EMS) – a nation-wide network of nature areas – seems to be the main driving force. Business site development and nature conservation are considered as functions that cannot coexist at the same location. However, about 20% of all Dutch business sites (n = 3600) are located adjacent to the EMS and many more create bottleneck situations or form barriers for the continuation of this EMS-structure (fig.1). The environments that business sites represent are often dissociated from the natural system and have very low ecological value. For instance, they are detached from the natural soils because they were built on a thick layer of sand and from the natural water systems due to the drainage systems. Furthermore they have a large amount of paved surfaces (roofs and pavement) which leave less space for plants and water retention. (van der Gaag, 2004)

On the other hand, peri-urban areas are often reserved for ecological aims and may occupy land that is valuable for development as a business site. This can often generate economical and political conflicts for the local authorities who want to invite businesses to contribute to the local economy.

We assumed that this undesirable conflict can be counteracted by implementing a new model that has always been considered a “contradictio in terminis”: biodiverse business sites. In biodiverse business sites the aims of biodiversity conservation and nature experience are in synergy with the aims of business sites such as economic functionality and efficiency. Therefore, in our research, our hypothesis is that we can generate design tools that bring synergy between biodiversity and business aims in business sites.

In order to evaluate if this model of biodiverse business sites has potential for planning and urban design, we initiated a research in which we tried to answer the following major questions:

1. what are the spatial and functional characteristics of mixed use business areas?
2. what ecotopes are suitable at mixed use areas and where?
3. how can a business site be redesigned using the biodiverse business site toolbox?

Methods

Method and results for question 1: what are the spatial and functional characteristics of mixed use business areas?

To extract these characteristics of business plots we conducted a design research. We focused this research on the most common type of commercial areas: mixed business sites where offices, services, trade and production are combined. (Louw, 2004; van der Gaag, 2004) This encompassed the analysis of existing business sites, identifying spatial layout and elements of business site plots. Apart from that on-site research we also conducted literature research on business sites in Dutch context. (Etin-adviseurs, 2006; van der Gaag, 2004; Louw, 2004; Louw & Bontekoning, 2007; Louw & Bruinsma, 2006; Pen, 2002; Rigo & van Beek 1998)

From the two inquires, a range of business plot typologies could be derived that have specific spatial configurations and elements. The main characteristics were the building itself, the borders (open or closed by fences, walls, etc.), the amount and situation of parking space, outside storage, on-site green and on-site roads and footpaths. For instance, an office plot consists of different characteristics than a production company plot. While the office needs more parking space and representative and recreation areas, the production company needs space for storage, is often fenced and the building (which itself is also very different from the office building) takes up more space on the plot. Many more differences exist, but it was possible to group different kinds of businesses according to these characteristics into types. The types we could differentiate, based on the characteristics described above were office, office with a shed, retail/service showroom, retail/service small, retail/service big, retail/service outside, storage/production inside and storage/production outside and storage/production inside/outside. For these types, different urban/site design potentials for the functional and economic value of the business site were described. These were the visual/decorative image of the front, side and back of the

business buildings, the quality of the borders to prevent trespassing or burglary, the possibilities for rainwater storage, lowering energy costs for the building and recreational value.

To connect these potentials to the issue of ecotopes we looked for the possible potentials of biodiversity in business areas, e.g. making use of green roofs and facades, lining streets with trees, ecosystems that are related to the predominant sandy soils in the business areas, rain water infiltration, the replacement of the typical exotic vegetation with more autochthonous plant species and less intensive maintenance and concentration of the green plot areas in clusters.

Method and results for question 2: what ecotopes are suitable at mixed use areas and where?

We identified the possible ecotopes that can be situated in business sites. We did this based on the existing literature for ecotopes and environmental factors such as soil type, water supply and nutrient availability. The literature we used was focused on the Dutch situation (Bal et al., 2001; Boer et al., 2001; van Dorp et al, 1999; Forman, 1996; Klijn et al., 1994; Opdam et al., 2002; Opdam et al., 2006; Snep, 2009; van Zoest, Melchers, 2006;)

We focused the search on ecotopes that can develop on sandy soils (that are predominant in business sites) and that have a shorter development time so that ecotopes can be in their succession stage after a few years. This is important because business sites underlie economic dynamics which do not cover the hundreds of years, that for instance forest ecotopes need to develop. The suitable ecotopes we could find were fast growing dense and open woodlands, low and high brushwood, open water, high and low marshlands, grass- and herb land, heath land and pioneer vegetation.

Having identified these, we were now able to connect the positive potentials of ecotopes for the business areas. These were different possibilities for designing the plot borders (open, transparent, closed), both according to aesthetic and safety (trespassing and burglary prevention) wishes of the business owners. Other services that the ecotopes could provide businesses are lowering energy costs (insulation of buildings and water cleaning/retention), enhancing the recreational and decorative value and providing businesses with a more ecological aware image. (Bolund & Hunhammar, 1999; Acks, 2006; Akbari et al., 2001; Huang et al., 1987; Mentens, 2002; Papadakis, 2001; Frej, 2005)

Combining these business needs and the ecotopes with their spatial functional characteristics showed that many potential synergies do exist with the functional and other requirements of business plots. We then tried to specify these synergies for the different types of businesses with their typical parcel elements. By differentiating basic spatial parameters such as the abiotic situation, the spatial structure, possible ecotopes and relating them to the different parcel elements for the business types, we were able to generate a 'toolbox' (fig. 2). This 'toolbox' consists of a synergy matrix where the mutual benefits are specified for biodiversity and business economy and functionality (fig. 3). It is specified with a detailed description per business type showing the possibilities to implement suitable types of ecotopes on the sites. It also indicates that combinations of different ecotopes are possible on one site. This offers more possibilities for habitats for all kinds of different species (see an example in fig. 4).

Method and results for question 3: how can a business site be redesigned using the biodiverse business site toolbox?

In order to assess if this toolbox is applicable in a design process, we incorporated it in a hypothetical design process that we conducted for the refurbishment of the business site 'de Herven' in the Dutch city of s' Hertogenbosch. This site 'de Herven' is situated at the eastern border of the city, adjacent to the 'de Heinis' area which is part of the Dutch EMS system. Based on the needs for the key species- amphibians and butterflies- in that EMS area and other surroundings, we designed the larger scaled habitat framework in which we were able to use our 'toolbox' on the plot level (fig. 5).

We applied the toolbox in different ways- depending on the plans of the municipality. The part of the business site that had to be kept in the existing structure was equipped with the examples shown in the toolbox that provided the suitable habitats for amphibians and butterflies. This encompassed, for instance, that around the retail/showroom strip, water structures and herb lands were situated in front of the buildings to provide a decorative view, but also through the water, a boundary. The roofs were retrofitted with pioneer vegetation, the facades with climbers and the plot boundaries were planted with flowering brushwoods (fig. 6). For the part that is to be restructured, the application of the toolbox could

be more radical. We suggested new office, retail and storage buildings that are part of a continuous landscape (fig. 7).

A recapitulation of the proposed interventions for 'de Herven' showed that it is possible to provide sufficient extra habitat space. This way key populations can develop in the combined area 'de Heinis' and 'de Herven', both for amphibians and for butterflies. It also shows that the mutual benefits that were expected to be the effect of the combinations in the 'toolbox' were not diminished by the implementation into a real plan. The principles underlying the 'toolbox' have even enriched our design repertoire and provided us with visionary ideas for new environments that provide unexpected, exciting experiences in business sites.

Conclusions

Through our research we were able to make our hypothesis - that we can generate design tools that bring synergy between biodiversity and business aims in business sites- more verifiable. We have shown that it is possible to combine the needs for biodiversity and businesses and that there are many mutual benefits and even synergies. So there is certainly not a 'contradictio in terminis' when we speak about 'biodiverse business sites'. After having tested the 'toolbox' for biodiverse business sites on a case, we can conclude that the 'toolbox' is an applicable instrument that can be used both for retrofitting existing as well as designing new business sites. Thus we consider this 'toolbox' a useful instrument that can help to make many Dutch business sites part of the EMS or at least can form important corridors or stepping stones in the system.

Of course, this research also has some limitations. The results are only valid for the Dutch situation. Firstly, the 'toolbox' is tailor-made for the Dutch ecotopes. In other regions the ecotopes will be different and as a consequence, the possible combination with spatial setup and functions on business sites. Also the layout of Dutch business sites may be different from other countries due to other building regulations and other business types. Apart from that, also the habitats for key species for animals that have a wider range for foraging and migration like the deer, the otter or others that require more space, cannot be implemented in the business sites.

Our research up to now has given first insights into the possibility of combining biodiversity and business needs. The next step in a research on such 'biodiverse' business sites would be to implement the model in a real retrofitting/planning process for a business site and execute the plans. It would be very interesting to conduct such a pilot study so that we can learn more about the feasibility: the opinions of business owners, local workforce and visitors, the financial consequences and the ecological effects.

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List of Attachments

Fig. 1

Locations of business sites and EMS structures in the Netherlands

Fig. 2

Combinations of parameters that form the 'toolbox'

Fig. 3

An overview of the 'toolbox'

Fig. 4

Specified description of the 'toolbox' for the business type 'office'

Fig. 5

Combined habitat framework for amphibians and butterflies for 'de Herven' area

Fig.6

Principle-cross-section and impression of the retrofitted strip of showrooms

Fig.7

Impression of the newly designed 'continuous landscape'