

Developing Biodiversity in Business Areas

LIFE BooGI-BOP 2020



Funded by the EU LIFE programme
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Office of the State Government of Vorarlberg

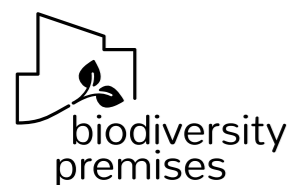
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ARGE natur vielfalt bauen

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In the project LIFE BooGI-BOP seven European partners from Austria, Germany, Slovakia and Spain have teamed up to promote biodiversity-oriented design of business premises in Europe.



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naturvielfalt
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unter Land

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Introduction

This brochure serves as a basis for dialogue with stakeholders from the fields of politics, government, teaching, research, planning, professional associations and, last but not least, companies. It is aimed at a key construction sector, namely industry and business. It is also a sector with enormous potential for improvement in terms of climate change mitigation and biodiversity, one that must be approached and won over to the cause of biodiversity as an integral part of economical and climate-friendly urban development.

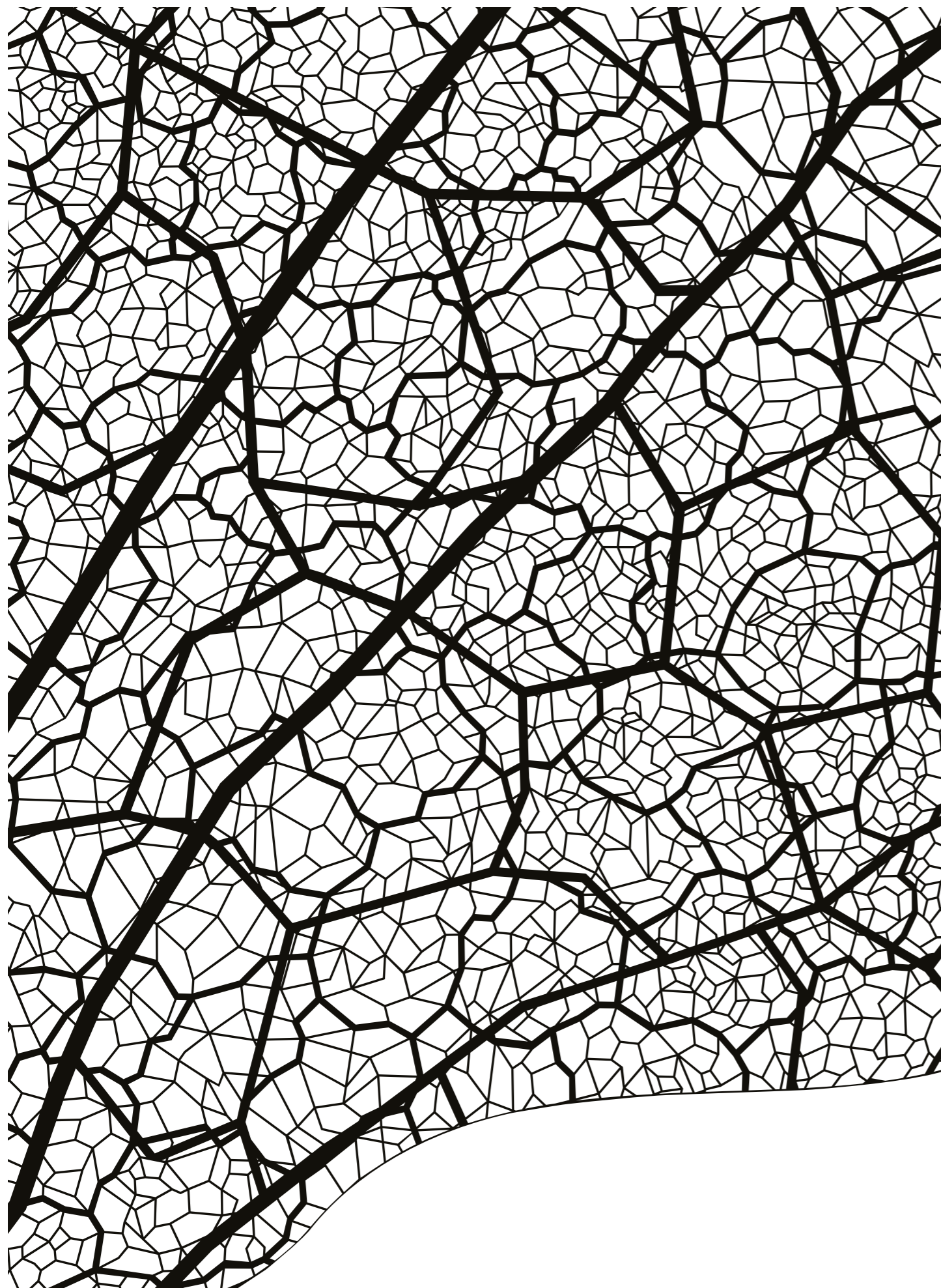


Far-sighted urban development is now more important than ever before, taking account of local conditions, exploiting the economic and ecological advantages offered by the soil and the flora and fauna, and improving the quality of life in the urban area. Companies that are guided in their planning and activities by both energy-efficiency and the inclusion of nature may benefit in terms of employee satisfaction and social standing. By creating space for plants and water, their premises also become attractive as a living space for people and animals. At the same time, they prepare themselves for future extreme weather events and play a role in an overarching climate protection strategy.

Besides good examples, more knowledge and experience regarding the interaction of nature and construction are needed in our building culture. All stakeholders, from the clients and the planners to the contractors, are called upon to work together on forward-looking, nature-inclusive business premise design. Nature-inclusive planning should accordingly be anchored in and promoted by the political and administrative framework.

In 2018, in the context of an Interreg project, the Vorarlberg regional government and numerous partners launched a process of dialogue with planners, the construction industry and politicians, culminating in the international symposium “natur Vielfalt bauen” (Building Nature Diversity). Various aspects of green infrastructure and biodiversity were brought together with the help of spatial planners, architects and landscape architects, representatives of trade and industry, building construction experts, nature conservationists, doctors and a linguist.

With a focus on business parks and premises, the ARGE “natur Vielfalt bauen” (Working Group for Building Nature Diversity) deals in this document with the aspects and possible solutions discussed in the process and, together with the BooGI-BOP team, formulates proposals for action for local authorities, planners and businesses. The aim is to promote a better understanding of measures relevant for the climate and urban areas and to provide a basis for further discussion with stakeholders from the fields of politics, government, teaching, research, planning, professional associations and business.



Point of departure

Climate change and its consequences are one of the greatest challenges for society and nature. Rising average temperatures can be expected to result in more frequent heat waves, forest fires and droughts in central and southern Europe. Central and northern Europe are also seeing an increase in heavy rainfall and extreme weather events including flooding and mudslides. Populated areas close to the coast, such as in the Netherlands, must prepare for the threat of rising sea levels. Urban areas, where four out of five Europeans now live, are particularly vulnerable to the consequences of global warming¹. In Berlin 490 people died from the effects of heat in 2018² and even in Vienna 760³. The physical and psychological burdens of climate change are having a major impact on our everyday and working lives⁴.

In addition to climate change and its effects, the loss of biodiversity is another global threat to humanity. The gradual destruction of the food chain and the disappearance of many species is alarming. On 6 May 2019, the IPBES (Intergovernmental Platform on Biodiversity and Ecosystem Services – Council of Science and Humanities of the UN States on Biodiversity Issues) published its “Global Assessment Report”: One million animal and plant species are in danger of disappearing in the next few years (1/8 of the recorded total) unless a higher priority in political strategies is given to species protection. Of particular concern is the rate at which species have become extinct or have declined in numbers in recent decades.

With its strategy for strengthening the green infrastructure, the European Commission is focusing on the multifunctionality of nature, its regenerative and ecosystem control capacities. It includes Natura 2000 areas, forestry and agricultural areas, as well as urban areas and business premises⁵. The nature-inclusive development of urban areas and business parks is being proposed in the light of the numerous predicted environmental benefits such as the provision of clean water and improvements to soil function and air quality. A wide variety of biotope structures and vegetation cover with many species of wild plants provide wild animals with valuable habitats. For human beings, health, well-being, and quality of life in the residential and working environment are improved. Parks, trees, streams and ponds, plant-covered buildings and extensively and intensively planted roofs can serve at the same time to support specific climate protection and climate change mitigation goals such as flood protection, natural cooling effects, carbon storage and strengthened ecosystem resilience. Moreover, all these measures are expected to bring economic benefits for municipalities and businesses, create jobs and promote social harmony.

1 https://ec.europa.eu/clima/change/consequences_de

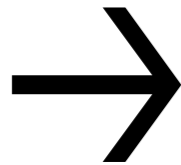
2 https://www.rki.de/DE/Content/Infekt/EpidBull/Archiv/2019/Ausgaben/23_19.pdf?__blob=publicationFile

3 <https://www.ages.at/themen/umwelt/informationen-zu-hitze/hitze-mortalitaets-monitoring/>

4 <https://link.springer.com/article/10.1007/s00103-017-2548-3>

5 https://ec.europa.eu/environment/nature/ecosystems/strategy/index_en.htm

01 Time to act



01.01 ... for our wellbeing

Today's working environments are extremely complex. Increased efficiency is the motto, and digitisation the means to this end. That is all the more reason why we need to strike a balance in our everyday working lives. Nature-inclusive business premises reduce stress, provide space for exercise and encounter, and regenerate our vital spirits.

Stimulating well-being

Intact nature, with clean water, fresh air, sunlight and space for recreation and exercise, is the prerequisite for human well-being. Natural environments with meadows, trees, bushes and water promote recovery from mental fatigue and stress. The simple enjoyment of the view from the window of a park or garden reduces discomfort and headaches in office workers⁶. Studies show that biodiverse vegetation in the residential environment has a positive effect on the residents' concentration⁷. In general, nature can be shown to have positive effects on health and performance. That makes the biodiverse design of business areas attractive from an employer's perspective, too.

⁶ Naturfreunde Internationale (ed.) 2015, p. as cited in Kaplan and Kaplan 1989) Kaplan R. and Kaplan S. (1989): The Experience of Nature: A Psychological Perspective. Cambridge University Press, Cambridge, New York.

⁷ (Kuo 2001 as cited in Abraham et al. 2007, p. 21) Kuo, F. E. 2001: Coping with poverty - Impacts of environment and attention in the inner city. *Environment and Behavior* 33(1): 5-34. Abraham, A. et al. 2007: *Landschaft und Gesundheit. Das Potential einer Verbindung zweier Konzepte*. Bern: Universität, Institut für Sozial- und Präventivmedizin, Abteilung Gesundheitsforschung.



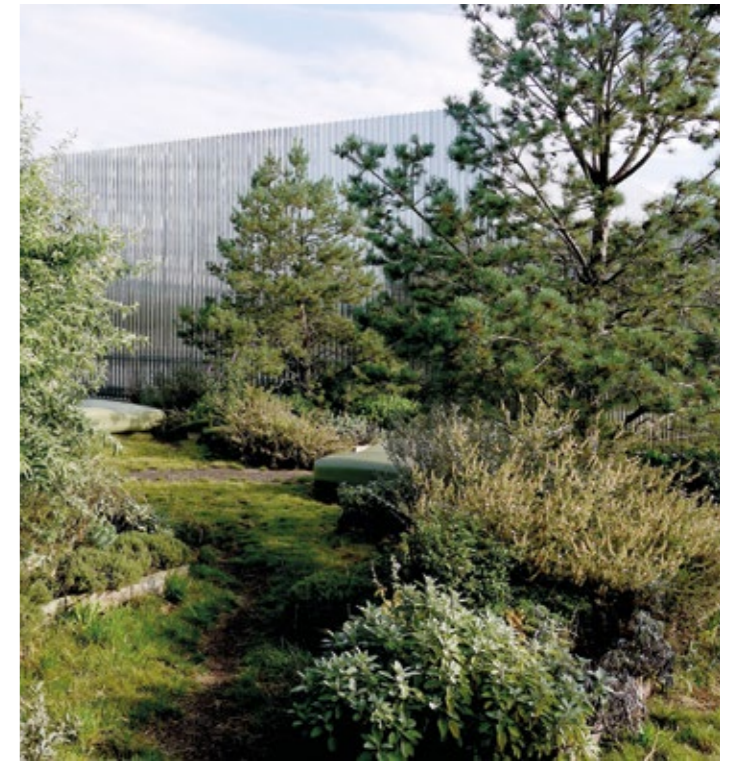
Photo © Roland Bernarth

Bringing nature into the working world

When business premises or parks are planned, the focus is often on specific operational requirements and functions. The process frequently neglects what actually links us all as humans, what our evolutionary similarities are. One of these similarities lies in the emotional bond between the human species and nature and the associated need to experience nature. Water and plants are two of the elements that were essential for our ancestors, elements that ensured their survival. We react to water and plants on a physiological and psychological level just like our ancestors in the savannah. Stress levels are reduced, our sense of well-being is strengthened and the organism can regenerate⁸. What is important is that nature should not just be a leisure experience limited to the weekend walk but also and especially an experience that is available in our stressful everyday and working lives. What form it takes – the view of the tree in the office courtyard, the morning ride on the cycle path by the stream, or the lunch break spent sitting on a bench in the park – is not so important. What is needed is a mixture of accessible natural environments with diverse qualities – from landscaped parks and urban woods to wasteland.

⁸ Oberzaucher E. (2018): Homo urbanus – mit Naturelementen menschengerecht bauen. (presentation, 25.10.2018). Feldkirch: Symposium natur Vielfalt bauen, Montforthaus.

Toni-Areal university campus, Zürich (CH), 2014
Perennial flowers, kitchen herbs and small shrubs were cultivated in crates for two years. The crates were then stacked and arranged so that, as they decay, they form a gentle hilly landscape on the roof of the university campus.
Studio Vulkan Landschaftsarchitektur
Photo © u. r. : Daniela Valentini, I: Roland Bernarth



Encouraging fresh air and exercise

Outdoor exercise promotes physical well-being. Whether people enjoy taking exercise outdoors depends largely on how their surroundings are designed; there is a strong interaction between the physical and aesthetic components⁹. A grassed area with meadow flowers and apple trees, with wild tracks and some seating, will encourage people to walk or spend time in the fresh air more than a uniform green area with concrete paved paths. Since nature is not only a place for exercise but also a space for encounters, it also enhances social well-being in the living and working environment. Various studies confirm that social encounters are significantly promoted by biodiverse nature-inclusive design of open and public spaces¹⁰. If we assume that on weekdays we spend an average of 50% of the day at work, it is clear how important it is to provide employees with attractive and varied nature based spaces at the workplace.

Enhancing the quality of working environments

The attractiveness of the working and living environment plays an increasingly important role for innovative companies and employees alike. Leisure facilities, healthy and enjoyable environments such as parks, woods and also accessible water are now in demand and can play a decisive role in competition between regions. Cities with a marketing focus on natural environments and nature-inclusive urban development are perceived as particularly attractive locations¹¹. The green gentrification effect, i. e. the displacement of lower-income groups of people and workers, must be counteracted, e.g. through the provision of affordable housing as well as participatory, communally designed urban green (e.g. community gardens).

⁹ (cf. Powell 2005 as cited in Abraham et al. 2007, p. 37) Powell, K. E. 2005: Land use, the built environment, and physical activity: A public health mixture; a public health solution. *American Journal of Preventive Medicine* 28(2, Supplement 2): 216–217.
¹⁰ (cf. Abraham et al. 2007, p. 50) Abraham, A. et al. 2007: *Landschaft und Gesundheit. Das Potential einer Verbindung zweier Konzepte*. Bern: Universität, Institut für Sozial- und Präventivmedizin, Abteilung Gesundheitsforschung.
¹¹ Schäffer, I. (2017): *Grüne Infrastruktur als Standortfaktor und als Potential für das Standortmarketing. Städte in Nord-rhein-Westfalen im Vergleich*. Dissertation Rheinische Friedrich-Wilhelms-Universität, Bonn

01.02 ... for climate protection

Many companies are now familiar with ecological construction and energy-efficiency standards. For a holistic approach to protection of the climate and the environment, however, we also need to consider the natural water balance, increase the percolation, retention and evaporation rates, promote cold air sources and as much foliage as possible and, at the same time, make sparing use of land for building.

Protecting the soil through intelligent construction

Company premises are often located on the fringe of the built-up area. Large continuous areas of land are used for the construction of office buildings and production facilities, truck manoeuvring spaces and car parks, warehousing and retail areas, etc. But land is becoming more and more valuable, and the qualitative and intelligent development of the urban area increasingly necessary. This calls for intelligent models for the efficient development of the potential uses of existing and new areas including building optimisation, additional storeys, vertical function stacking and, in the case of new buildings, more flexible and also shared use. An interesting approach has been adopted in this context by the city of Karlsruhe, with its focus on the further development of existing business parks. Together with the Deutsches Institut für Urbanistik (German Institute of Urban Affairs), it has compiled a collection of such examples, opportunities and measures for companies and local authorities¹².

Taking the landscape perspective

Intensively used areas with high-density, high-rise buildings must be offset with correspondingly high-quality natural and open spaces. Parks and old stands of trees, streams and natural woody structures not only support cultural and recreational activities and nature; they are also sources of cooling and the basis for a functional soil and water balance. Such assets should be identified and evaluated in terms of networking, climate change mitigation and recreational quality. Undeveloped land and property development activities can then be considered together and requirements for buildings and their surroundings defined. For this purpose, the concept of “double internal development”¹³ provides municipalities with a planning tool, which is being increasingly used in the German-speaking world¹⁴.



Copenhagen: Climate change mitigation in the urban area. This climate change mitigation strategy in the urban area incorporates solutions for flood control and the optimisation of water and air quality. At the same time, ecological and social aspects are enhanced through synergy effects.
© Ramboll Studio Dreiseitl

Respecting soil and water balance

Water shapes much of our landscape; it is the source of all life and should be made the basis of planning. In today's urban areas, the natural water cycle is usually disrupted by compacted and sealed soils with little or no storage capacity, underground drains and rapid runoff. In many municipalities a rethink has begun. Water-sensitive locations are being created where rainwater is managed decentrally, and the natural water balance is a focus of urban development.

Companies and site developers should also give priority to water-based nature and the blue infrastructure in their plans and take its many benefits into account. If we make use of water-based nature in residential and business areas, places can be created which absorb the rainwater, allowing some of it to seep away locally and to evaporate with cooling effects, and the rest to run off above ground in rivers and streams with habitat and landscape functions.¹⁵

¹⁵ Gerhard Hauber (2018): presentation symposium “natur vielfalt bauen”

¹² Holbach-Grönig, B. et al (2014): Unternehmensstandorte zukunftsfähig entwickeln, Flächenpotentiale gewinnen, nachhaltig bauen – Synergien nutzen. Publ. Stadt Karlsruhe. 74 pages. http://www.nachbarschaftsverband-karlsruhe.de/b3/fnp_2030/logbuch_fnp/HF_sections/content/1490186301283/ZznZzcqPxxgOTTTC/Praxisbericht_Karlsruhe_web.pdf retrieved 11 November 2019
¹³ Böhm, J. et al (2016): Urbanes Grün in der doppelten Innenentwicklung. BfN.-Skripten 444. 272 p.
¹⁴ <https://www.bfn.de/fileadmin/BfN/service/Dokumente/skripten/Skript444.pdf>, retrieved May 2018
https://www.bfn.de/fileadmin/BfN/planung/siedlung/Dokumente/DOPI_Brosch.pdf



An der Schanze, residential and business quarter, Vienna, 2020

The project has a focus on the quality of life in an urban environment, including green and open spaces such as the children's playground in the urban wilderness, community terraces and a hybrid city base with quality of life. RLP Rüdiger Lainer + Partner © DMAA

Generating cold air reservoirs

Water surfaces, woods, groups of trees and old solitary trees, hedges, meadows, green corridors and wetlands on the fringe of the built-up area serve as reservoirs of cold air for cities and residential areas. Streams and rivers, as well as avenues, parks and gardens, carry cold air from the open countryside into the residential and business areas and improve the living and working conditions there during hot periods in summer. Many cities create and maintain such cold air corridors and develop their open and green space concepts accordingly, as in the case of Lindau¹⁶. There, for optimum ventilation of the city, the suburban belt is not permitted to grow together and corridors are maintained between Lake Constance and the city's surroundings in the form of "landscape fingers". That benefits the residential and working quarters in those locations. Similarly, the city of Singen has developed planning reference maps from a city-wide analysis of the current urban climate taking account of the cold air balance. Due to the high degree of sealing, the industrial parks there create predominantly adverse bioclimatic conditions. The authorities are accordingly recommending that more green structures with positive effects on the urban climate be required for business premises, especially in the vicinity of the city centre and residential areas¹⁷.

16 Stadt Lindau (2016): Gesamtstädtisches Freiraumkonzept der Stadt Lindau 2030, <https://www.stadtlindau.de/B%C3%B6rger-Politik-Verwaltung/Planen-Bauen/Integriertes-Stadtentwicklungskonzept-ISEK-17>
 17 LUBW Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (publ, 2018): Zielkonflikt Klimakomfort – Nachverdichtung: Entwicklung von Lösungsstrategien zur klimawandelangepassten Siedlungsentwicklung der Stadt Singen. Reihe Klimopass-Berichte, https://inciti.net/data/departement/2/2uws_klimopass_abschluss_02.pdf

Leave it to the leaves

850 m² of facade greening on an uninsulated building has the same cooling effect as seventy-five 3000 W air conditioners operated for 8 hours on a hot summer day. Four one-hundred-year-old beech trees have an effect on their surroundings of the same magnitude, according to a study conducted in Vienna¹⁸. Researchers at the Technical University of Dresden have measured up to 15°C higher surface temperatures on asphalt surfaces exposed to the sun than under trees¹⁹. Plants and their leaves are masterpieces of multifunctionality. They provide us with shade and evaporative cooling; they cool the environment, filter out particulate matter and produce oxygen. Greenery on buildings also pays off in other ways for the owner: Roof and facade greening reduces heat transfer by up to 20%²⁰; interiors are cooled in summer and heat losses reduced in winter.²¹ The outer skin of the buildings also has a much longer life as it is protected from heavy rain, wind and pronounced fluctuations in temperature. Roofs covered with plants are expected to have double the service life of conventional roofs. The positive effects are well known; the technology is there, and yet such natural-based solutions have so far gained little acceptance. Competence networking and best practice collections, such as the one currently offered by the Grünstattgrau platform (Greennotgrey) in Austria, are one way of promoting sustainable developments.

18 Enzi, V. & B. Scharf (2012): Das Haus im "Grünen Pelz". Bürogebäude der MA 48. In Wettbewerbe, JG 36
 19 <https://www.bi-medien.de/artikel-5342-gb-stadtbäume-mildern-hitzewellen.bi>
 20 Scharf, B. et al (2012): ... in Pfoser
 21 Pfoser (2013)

01.03 ... for biodiversity

Cities and urban areas offer niche habitats for many species of flora and fauna, sometimes more so than the surrounding countryside – an asset that can be exploited in the context of urban, regional and business development. Gravelled roof areas on industrial buildings, for example, can be reanimated with the help of plants, thus creating habitats for animals and the strong appeal of an intelligent aesthetic.

Boosting urban, nature based business

Towns and cities have become vital habitats for numerous wild animals. They have adapted to the human environment²² and occupy niches in built-up areas and green structures as their habitats. Cities with structural variety often enjoy much greater biodiversity today than land subject to the pressures of agriculture²³. Yet the urban potential for biodiversity is often ignored in the fields of urban planning, nature conservation and protection. With the call for intensive inner development as a response to population growth, land consumption and climate protection, urban biodiversity, which has received little attention in the past, is now coming under additional pressure. What is required is nature-inclusive planning that takes account of the value of urban nature²⁴. With its strategy for strengthening the Urban Green Infrastructure (UGI)²⁵, the European Commission has created a political basis for this, which is also being applied in trade and industry.

Awareness building

An advantage in this context is the fact that human demands of public and corporate recreational areas and landscapes correspond to the habitat requirements of a large number of animals and plants²⁶. For many people, urban wildlife and everyday landscapes are the only way to enjoy nature. Germany's 7th "Jugendreport Natur" (Youth Report Nature)²⁷ confirms increasing alienation from nature among children and young people, especially in the cities. Nature-inclusive planning responds to these challenges, integrates the diverse needs of humans and animals and creates a new picture of urban nature. This is important because knowing and experiencing nature is a prerequisite for awareness and for action to promote biodiversity.

High-Tech Campus Omicron, Klaus, Vorarlberg

The world market leading company in safety technology came up with a neighbourly gesture – the water bodies, lined with poplar trees, are more than habitat for plants and animals, they are a connecting lifeline within the business area.

Landscape architecture: Kienast Vogt and Partner, Zürich; garden design and landscaping: Lothar Schmidt, Koblach
Photo © Lukas Hämmerle, Lustenau



Nature-inspired design

Whether the product of spontaneous growth or systematic design, with or without cultural relics or ethnic references, the built environment, with its diverse niches, offers habitats for numerous animals. The aesthetic appreciation of urban nature is often based on phenology, subjective experiences and the ability to understand the interrelationships²⁸. Meadows, wastelands and ruderal areas with a wealth of species, for example, are appreciated by some as spaces for experimentation and discovery but rejected by others. Uncultivated, "overgrown" open spaces are an irritation for some citizens, and that must not be ignored²⁹. Nature-inclusive design can be used to create functional and biodiverse habitats and have an aesthetic and emotional appeal at the same time³⁰.

22 Reinberger S. (2012): Vögel, die auf Städte fliegen, MaxPlanckForschung 4/12

23 Werner, P, Zahner R (2009): Biologische Vielfalt und Städte. Bundesamt für Naturschutz Skript 245

24 Hauck, Th, Weisser, W. (2018): Biodiversität der Städte. Bundeszentrale für politische Bildung Dossier

<http://www.bpb.de/politik/innenpolitik/stadt-und-gesellschaft/biodiversitaet-und-stadtplanung> 10 October 2019

25 https://ec.europa.eu/environment/nature/ecosystems/strategy/index_en.htm

26 Obrist, K. et al, 2012: Biodiversität in der Stadt für Mensch und Natur, Merkblatt für die Praxis, WSL, Birmensdorf, 12 p.

27 Brämer, R. et al (2016): Ergebnisse 7. Jugendreport Natur - Natur Nebensache? Institut für Biologiedidaktik der Universität zu Köln und Natursoziologie.de, 15 p.

28 Gandy, Matthew (2019): Ästhetik, Ökologie und Brachland. in Gesing, K. et al: Naturen-Kulturen. Denkräume und Werkzeuge für neue politische Ökologien. Transcript Verlag, Bielefeld. pp. 139 - 174

29 Lilli Licka im Interview mit Maik Novotny, Standard 15 June 2018

30 Rainer, T., West, C. (2015): Planting in a Post-Wild World: Designing Plant Communities for Resilient Landscapes



**Primary School for Sciences and Biodiversity
Boulogne Billancourt, Paris**
The building plays host to various species (plants, insects, small animals) and acts as the foundation for low prairie-type vegetation leading up to a shrub-land fringe around a central grove of standard trees. Design elements for hosting plant and animal species need to be seen as part of the body of the building. ChartierDalix architectes, Paris
Photos © Takuji Shimmura (top and bottom right)
Photo © Myr Muratet (bottom left)



Animals as teachers

A look at the life cycles and habitats of animals can enable human beings to benefit from the structures revealed³¹. A hedgehog, for example, needs species-rich margins and extensively maintained meadows to find food and woody materials for raising its young. A house sparrow also needs sandy soil, for example at the edge of paths and spaces near water, woody host plants such as berry bushes, and hedges for cover and food in winter. Creative nesting sites on buildings are also relevant and enable us humans to participate in the animal side of urban life. A study conducted by the University of Kassel with various German residential property developers has shown, with reference to more than ten examples, that there is great potential, and also great willingness, to promote biodiversity and wildlife³². Acceptance is particularly high when there are synergies with other aspects of planning, such as the creation of footpaths, improvements to the microclimate, reduced maintenance requirements, the visual enhancement of what is known as setback green or the use of edible plants.

Rooftop protection of the species

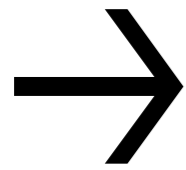
In built-up areas, roofs can be a habitat for rare and sensitive plants, insects and other small creatures and thus provide compensation for built-on land. This has been demonstrated by studies conducted in Switzerland. For the skylark, a ground-nesting bird, for example, green roofs offer the undisturbed nesting space that is now lacking in the open countryside. Similarly, on the roof of the lake water treatment plant in Wollishofen near Zurich, which was built in 1914, an orchid meadow has become established, which includes species no longer found in the Zurich area³³. These roof areas, which are of outstanding importance for nature conservation in the canton, now serve as a source of seeds for (re)propagation on numerous new buildings. On commercial and industrial buildings in particular, there is a large potential for green roofs (also in combination with photovoltaic arrays) as habitats for species that are now rare.

31 Hauck, Th., Weisser W. (2014): AAD Animal Aided Design, ISBN 978-3-00-047519-1

32 Apfelbeck, B., Hauck, Th., Jackoby, Ch., Piecher, J., Rogers, R., Schröder, A., Weisser, W. (2019): Animal Aided Design im Wohnumfeld. Brochure 60 pages

33 Landolt, E. (2001): Orchideenwiesen in Wollishofen (Zürich) - ein erstaunliches Relikt aus dem Anfang des 20. Jahrhunderts. Vierteljahresschrift der Naturforschenden Gesellschaft in Zürich 146/2-3, pp. 41-51.

02 Proposals for action



The effect of biodiversity-friendly spaces and buildings on people, flora and fauna, as well as their benefits for companies and regional development have received adequate attention. However, how such measures will be promoted and adapted to the needs of specific regional locations still requires a common effort. In the following, a number of proposals are presented to show where action can be taken and the range of possible solutions available. The proposals made with reference to various fields offer a basis for discussion with politicians and authorities, planners and educators, and business and society. They show where and how action can be taken NOW.

Schauspiel ohne Grund a theatrical intervention taking place at the business campus Millenniumpark, Lustenau, June 2020, a Caravan and walkanztheater.com, Maria Firlir reziziert Shakespeare, Photo © Marina Hämmerle





Naturmuseum St.Gallen - Studio Vulkan Landschaftsarchitektur - Photo © Das Bild/Judith Stadler

02.01

→ for politicians and authorities

A. Analysing beyond the site

Ecological and social functions must be maintained and improved in a wide-area context.

It is necessary to think beyond the boundaries of the business areas and to consider and analyse the overall environment. Appropriate criteria need to be identified and incorporated to ensure that these areas can assume recreational and health-related functions, regulate climate change impacts and network wildlife habitats.

- a Area-wide survey of natural spaces and elements in the urban area such as near-natural parks, standing and flowing waters, wetlands, unsealed brownfields, trees and hedges, etc. as well as potential elements in the built-up infrastructure (roofs, facades, parking lots, utility networks, etc) in order to identify:
 - recreational and nature experience areas
 - biotope networks
 - fresh air corridors and habitats with natural climate regulation functions
- b Linking the business area or premises with the network system to maintain and promote social, ecological and microclimatic functions (biotope networking, fresh air sources, water body network, recreation).
- c Linking biodiverse infrastructures and biotopes with the regional foot and cycle path network.

B. Building with nature in business parks

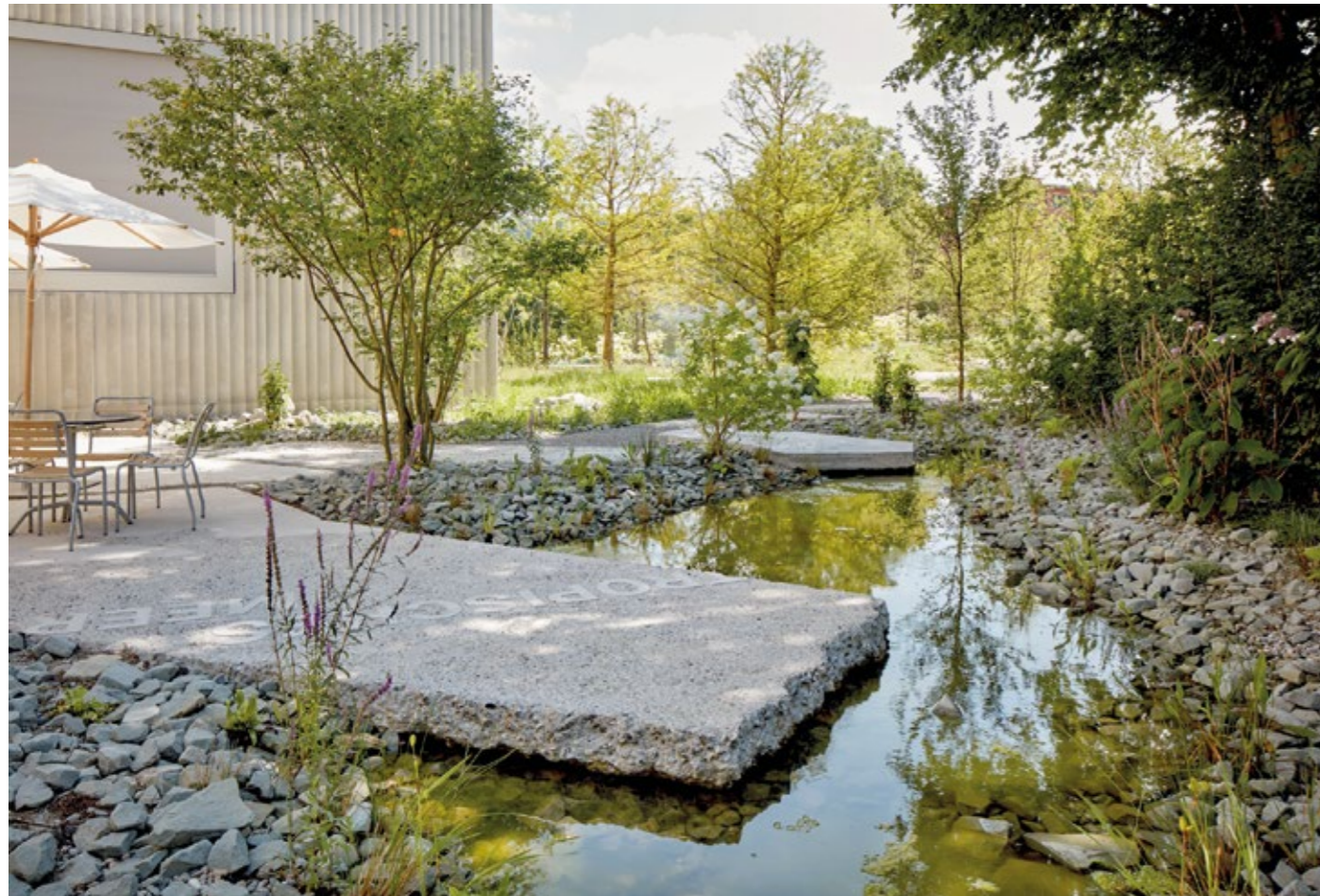
In business parks, nature and construction must be given equal status with regard to health, climate regulation and the promotion of biodiversity.

A shift in building priorities is needed to achieve optimum interaction between the targeted qualities: Equal importance and equal treatment are to be given to natural and built spaces in urban and business area development. Open spaces and built spaces are to be geared to the basic needs of nature and implicitly to those of human beings.

- a Definition of the planning objectives with regard to the natural location factors, such as the local water balance, the habitat network and the microclimatic conditions, and linkage to the requirements of business processes and conditions.
- b Upgrading of existing building stock at strategic locations, for example through improvements to buildings, vertical additions, synergies of use, etc. The basic concepts for business parks and buildings must take account of changing work and life patterns, and their design must be as neutral as possible in terms of use.
- c Collaboration among actors in the fields of urban development, architecture and ecology to promote a combination of technical and nature-inclusive construction methods. That will lead to improvements in social, ecological and microclimatic functions, the wellbeing of all living creatures, and health and recreation functions.
- d Creation of synergies between business-related uses, recreational space requirements and habitat functions for flora and fauna.



Peter Zumthor - Serpentine Gallery Pavilion, 2011 - Photo © Urszula Maj · Courtesy of Atelier Peter Zumthor and Partner



Naturmuseum St.Gallen - Studio Vulkan Landschaftsarchitektur - Photo © Das Bild/Judith Stadler

C. Facilitating nature-inclusive planning processes

Nature-inclusive planning for industrial estates and business parks calls for more expertise and communication.

Nature-inclusive planning presupposes interdisciplinary and multidisciplinary cooperation at the level of development and implementation. Expert opinions on wellbeing, health and recreation, climate change impacts and biodiversity must be explicitly included in the development concepts and steering instruments.

- a Perception and dialogue processes supported by facilitation and mediation specialists as tools for nature-inclusive project developments and competition processes.
- b Competition processes and calls for tenders based on such expertise and a nature-inclusive, transdisciplinary planning process.
- c Provision of funds to cover the additional costs of new and as yet hardly standardised nature-inclusive project development and implementation methods.

D. Promoting climate change mitigation and biodiversity in building culture

Nature-inclusive planning for business parks and premises calls for political advocacy and the corresponding funding.

Suitable funding structures must be developed to promote climate- and biodiversity-friendly architecture based on nature-integrating building envelopes, corresponding spatial configurations and biodiversity-friendly open spaces.

- a Strategy to promote the analysis of building stock and potentials with regard to biodiversity and microclimatic adaptation functions (local water balance, fresh air reservoirs, etc.) and to record health-related aspects as a planning basis for business areas and company premises.
- b Strategy to promote measures for the improvement of the local natural water balance and the creation of biotopes. Significant increase in evaporation capacity through biodiversity roofs, facade greening and surface water bodies, and an increase in the percolation share.
- c Biodiversity-friendly measures and nature-based climate change mitigation measures to be rated higher in building certificates and climate protection labels.
- d Strategy to promote resilient plants adapted to the location and autochthonous seeds.
- e Strategy to promote stakeholder networks of relevance to biodiversity.

02.02

→ for planners and educators

E. Reversing the planning hierarchies

The landscape with its ecological and health-related functions is the point of departure for business area planning.

The basic principles of the project design with regard to water balance, habitat networking, local recreation and physical exercise are to be defined by landscape architects and other relevant experts.

- a Analysis of the planning area and the higher-level perimeter to be performed with regard to the potentials and deficits of the blue-green infrastructure (water, microclimate and vegetation layers) with the following functions:
 - habitats with natural climate-regulating functions
 - biotopes and biotope networks
 - recreational and nature experience areas
 - vegetation types
- b Preliminary draft of a landscape concept to secure the most natural local water balance possible, the habitat network and local recreation areas. The draft urban design is to be developed from the landscape planning analysis.
- c Integration of natural elements (biodiversity roofs, façade plants and trees for shade, water and woody plants for cooling effects, use of daylight, interlinking of interior and exterior spaces, etc.) in the architectural design to optimise ecological, microclimatic and social functions.
- d In the planning for the urban open space and business premises, landscape architecture and architecture must take account of the needs of animals, plants, citizens and employees. Their requirements are to be incorporated into the design.



Plataforma Central Iberum, Illescas / Toledo · Photo © Marina Hämmerle



Stephan Brenneisen, Swiss pioneer in establishing green roofs, illustrating soil structure and advantages of green roofs. Photo © Marina Hämmerle

F. Communicating nature-inclusive construction

A knowledge of the processes, techniques, practices and tools for nature-inclusive construction must be communicated to the occupational groups involved.

Today's planning and construction processes mainly focus on economic and energetic factors, and less on intrinsic and health-related aspects. In order to ensure that the planning processes also take into account the human need for nature and the needs of nature itself as an integral element of planning, it is essential to develop and impart knowledge and experience.

- a The establishment of a network of biodiversity-relevant actors and stakeholders to be initiated with the aim of sharing experience and knowledge, stimulating innovation and identifying training needs at the various levels.
- b Pilot projects to be used to create learning and innovation spaces for nature-inclusive construction on the basis of interdisciplinary and cross-disciplinary collaboration. Conclusions to be drawn for everyday practice, materials, instruments and tools, and regulations and standards.
- c Architects to acquire a basic knowledge of perception and dialogue competence, urban and animal ecology, plant and soil science as well as water management, multifunctional biodiverse vegetation on buildings, health effects and intrinsic properties – and nature-inclusive construction.

This is to be achieved through

- collaboration and dialogue with the relevant experts
 - further training
 - development of teaching materials (interaction with affected parties, e.g. the social environment)
- d University training of landscape architects to provide in-depth knowledge of vegetation ecology and habitat networks, ecology of urban animals (animal-aided design), aquatic ecology, multifunctional biodiverse vegetation on buildings and health effects. Architects to acquire a basic knowledge.
 - e Resilience management of biodiversity and of socio-ecological aspects and their interactions is something that has to be learned; improvement of business leadership skills (understanding, acting, motivating) in the training of landscape architects.
 - f Training for gardeners and landscape gardeners to include nature-inclusive and biodiversity-friendly methods. An awareness of the ecological inter-relationships to be developed.

G. Implementing nature-inclusive construction

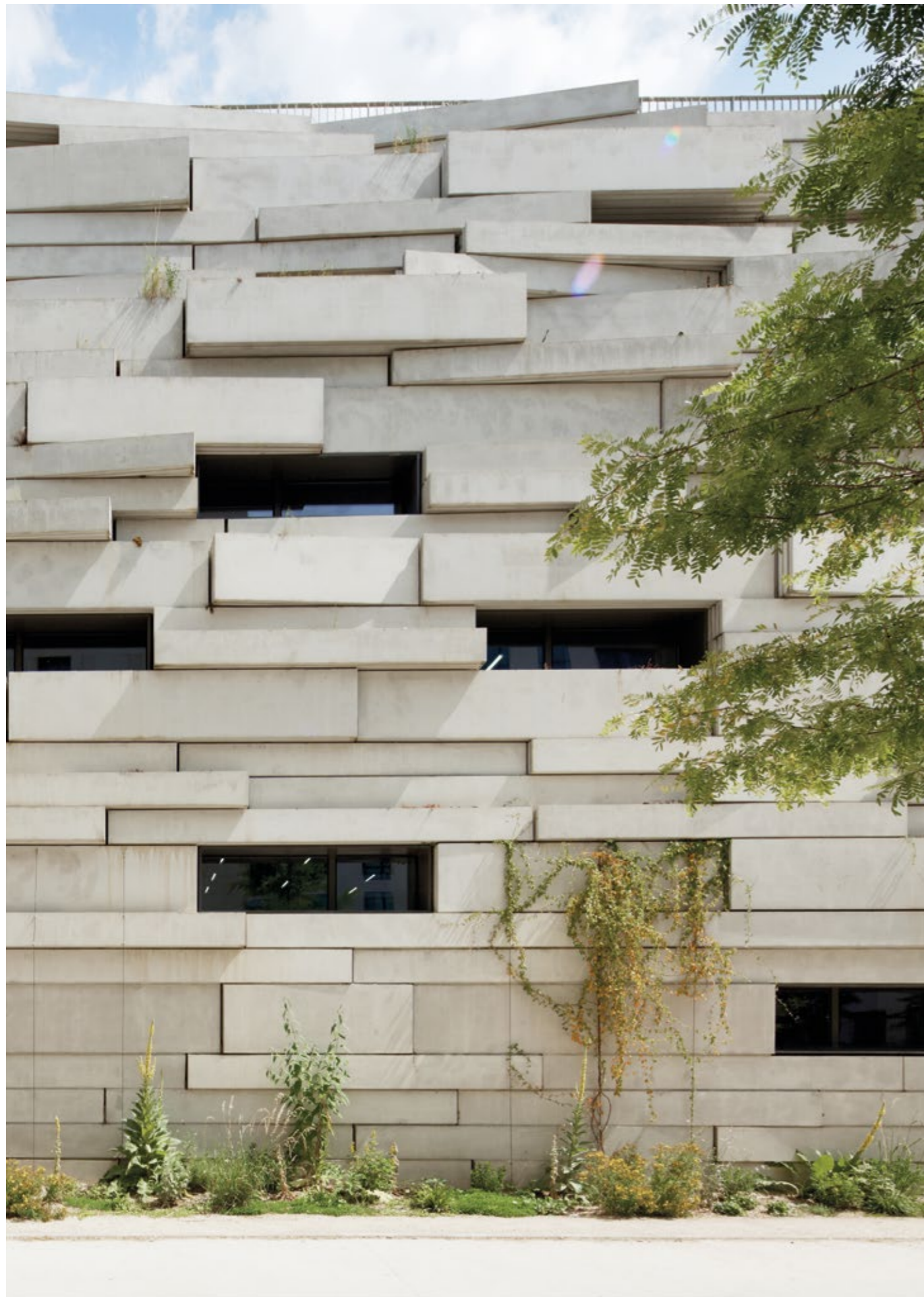
Promotion of regulations, codes and standards for nature-inclusive construction in competition procedures, scales of fees and curricula.

To promote the spread of nature-inclusive, biodiversity-friendly construction, these objectives also need to be anchored at the level of training, competition procedures, project execution and maintenance. This key issue can only be promoted through implementation along the entire construction industry chain.

- a Fee scales, procurement and contract rules and the relevant codes to include requirements for nature-inclusive planning and implementation.
- b Ecological construction supervision targeted at the implementation of nature-inclusive measures to become standard.
- c Horticultural measures to be sustainable in terms of soil and resources. Predominantly regional, native wild plant seeds and wild plants in their original form to be used.
- d The dynamics of nature to be supported at the level of cultivation and maintenance taking not only human needs but also the seasonal requirements of the flora and fauna into account.



ChartierDalix architectes, Paris · Photo© Myr Muratet



ChartierDalix architectes, Paris · Photo © Takuji Shimmura

02.03

→ for business and society

H. Biodiversity competence initiative

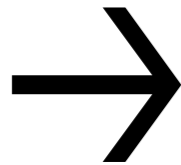
Attracting business and employees to the cause of biodiverse, nature-inclusive design.

In the construction industry, business premises and parks constitute a very large sector – and a correspondingly effective lever for the improved implementation of biodiversity in the urban area. This makes it all the more important to convince entrepreneurs to develop their sites along these lines and to mobilise employee support.

- a Establishment of the “Biodiverse Business” competence initiative – the issue needs allies and mentors.
- b PR initiative on the part of chambers of commerce and business associations – good examples need to be in the spotlight. Both companies and society benefit from biodiverse business. The benefits to be disseminated with the help of prizes, awards and labels.
- c Biodiverse business also implies occupational health and forms part of a company’s corporate identity.

03

Acting on principle



03.01

The picture of the past, ...

Pressures on outer development

If we consider regions like Vorarlberg, which are highly industrialised and rural in equal measure, the following picture emerges with regard to spatial planning: Good-quality inner development of the urban area can only be achieved if the thoughtless “outer development” of the surrounding natural and cultural landscape is made a “no-go”. At present this is not always the case; inner and outer development, these two communicating vessels of urban planning, are still not sufficiently interrelated and mutually conditional.

Culture loss and loss of nature go hand in hand

Our cities, towns and villages have been undergoing a total restructuring process for decades. In many cases, this is accompanied by a considerable culture loss in all respects: urban planning, landscape architecture, architecture and construction technology including materialisation. Historical urban centres that have grown over the centuries are losing their vitality and in many cases are being undermined by uncoordinated developments. At the same time, the outskirts of towns and cities are fraying out and becoming non-places dominated by shopping malls, industrial estates, roads and carparks trimmed with setback green.

Closures with more to come

The migration of significant commercial operations to the periphery is bringing pressure to bear on many village and urban centres. Empty properties perforate the core zones, leaving holes in the urban fabric. And the reaction is to construct new buildings with increasing height and density, thus upsetting the social and structural balance.

Copy and paste wherever you go

In many cases, new residential and business areas are developed without reference to either the topography or the existing qualities of the location. Lines of sight into the surrounding countryside are blocked, and existing water bodies are not integrated. The failure to read and analyse a location is usually accompanied by ignorance of ecological interrelationships. As a result the fundamentals of location-based planning are missing.

Seemingly economical

In addition to extensive areas with sealed surfaces, uniform greenery with robot lawn mowers, deserts of gravel and coniferous hedges are typical of the public areas of company premises. Biodiversity is left out. This underestimates the potential of foliage and its compensatory effects in terms of reduced temperatures, water runoff and air quality. In the case of overheating in buildings, the focus so far has been on technical solutions that incur high operating costs, waste additional energy and compromise rather than improve the microclimate in the surrounding area.

Concrete planning hierarchies

For company premises and business areas, planners still give priority to logistical considerations and process efficiency. The qualitative requirements of these spaces are marginalised and, where they have any relevance at all, are placed at the very bottom of the planning hierarchy. As a result, there are hardly any areas and spaces left that relate in any way to the needs of people and other living creatures. This situation is the product of a planning culture with a clear hierarchy: Build first and then see what can be done with the spaces in between!



03.02

... a vision for tomorrow in the case of business premises

Business premises are located within existing settlement boundaries. On the periphery they act as a link between the natural rural landscape and the built-up area, offering passage for people and animals. Compact multi-storey commercial buildings designed for flexibility of use reference the surrounding countryside. Thanks to the unsealed soils, terrain modelling and greenery on and around the buildings, rainwater can seep away, evaporate or remain standing as surface water. It supplies the meadows and flowers and the shady trees, gardens and fruit hedges, which offer employees a healthy and relaxing place to take a break. Nature-inclusive business areas provide space for people and animals and are better equipped to cope with the effects of climate change.

Humans

In general, nature can be shown to have positive effects on health and performance. That makes the biodiverse design of business areas attractive from an employer's perspective, too. Intact, biodiversity-friendly open-space design, creating space for recreation and exercise, is a prerequisite for human well-being and the necessary balance in our everyday working lives. Natural spaces with meadows, trees, bushes and water promote stress reduction and regeneration.

Animal habitats

The objective of animal-aided design (AAD) is to settle wild animals permanently in urban open spaces and around buildings. For this purpose, a design methodology has been developed that takes account of the habitat requirements of wildlife species over the entire life cycle and embeds them in the planning process. Animal-friendly planning creates valuable niches in the urban space as habitats for insects, birds, reptiles and mammals and at the same time improves the quality of human life through new forms and enhances the experience of nature in the surrounding area.

Water balance

Water is a defining element for the landscape and the planning process. In the face of climate change and related extreme weather situations, this "blue layer" plays a key role in maintaining cycles and mitigating extremes. It is incorporated from the outset so as to avoid damage and costs – whether caused by heavy rainfall or drought. The network of streams and percolation surfaces determines the configuration of the buildings, circulation areas and open spaces. The flora and fauna are taken into consideration from the very beginning.

Landscape

The landscape is treated as a point of departure for planning and placed on an equal footing with the buildings. The quality of the open space to be planned is just as important as the buildings themselves; a paradigm shift has begun, with the sustainable use of the soil and materials as a basic principle. Intensive cooperation between all disciplines guarantees a holistic planning approach. An active design process delivers maximum diversity in terms of both vegetation and structures. Vegetation successions and rural locations are relevant for the planning process.

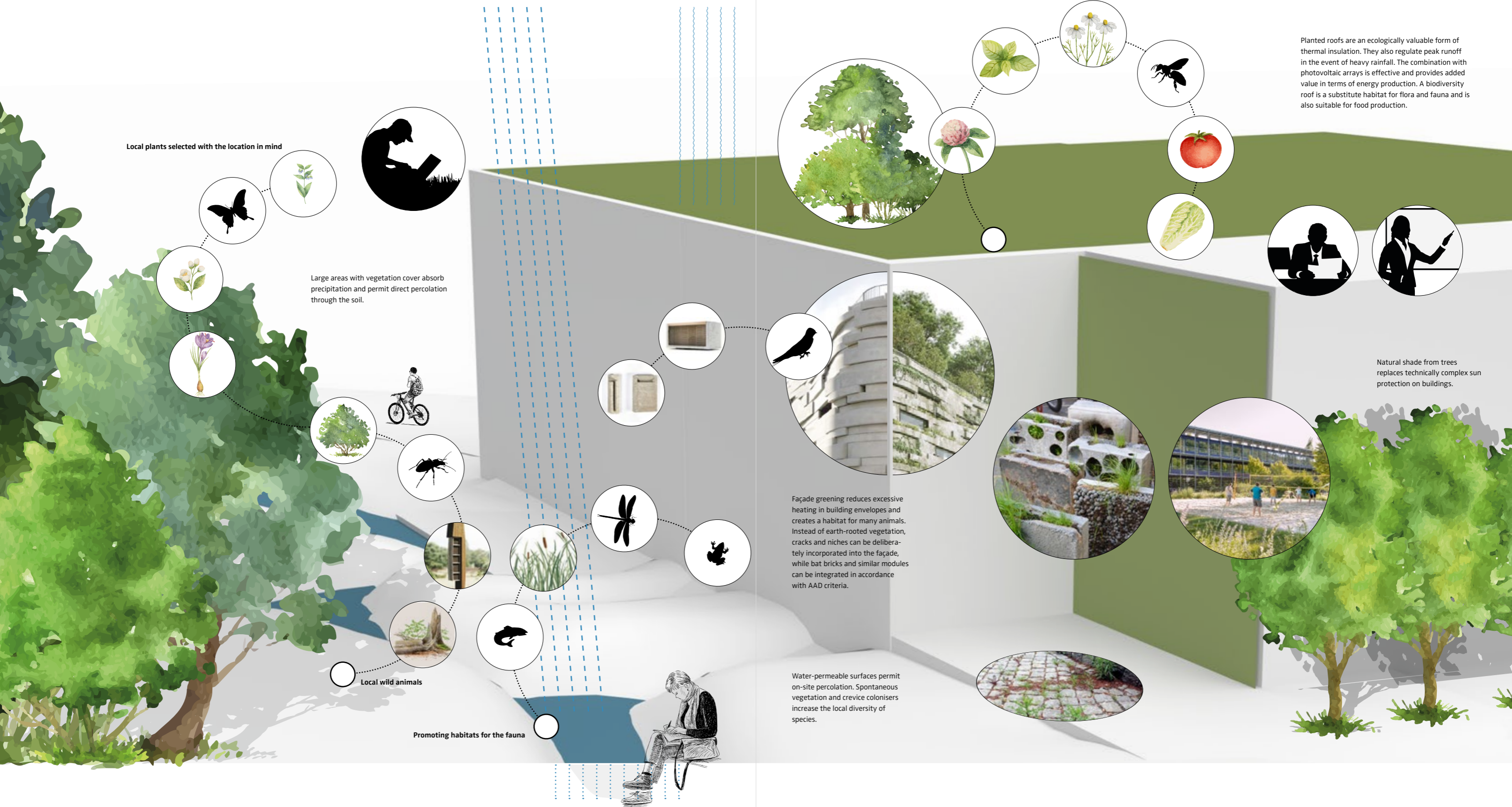
Vegetation

In the planning process, plants fulfill a variety of functions in terms of ecology, aesthetics and curative effects on humans. They also play a technical/functional role. With their foliage, trees and shrubs have regulating effects with regard to temperature, water runoff and air quality. The advantages of building or roof greening, which protects the materials from overheating, are also relevant. The nature-inclusive business park makes use of nature to create a healthy working environment, exploits the regulating and aesthetic functions of plants in relation to other environmental factors and promotes the fauna.

Networks

In analogy to internal development, the areas outside the current settlement boundaries are earmarked for integrated nature and species conservation, local recreation, ecological food production and future decision-making areas. Business premises can provide a qualitative link between open countryside and the urban area. They are part of a building culture that promotes a sense of identity and networking.

Planted roofs are an ecologically valuable form of thermal insulation. They also regulate peak runoff in the event of heavy rainfall. The combination with photovoltaic arrays is effective and provides added value in terms of energy production. A biodiversity roof is a substitute habitat for flora and fauna and is also suitable for food production.



Local plants selected with the location in mind

Large areas with vegetation cover absorb precipitation and permit direct percolation through the soil.

Local wild animals

Promoting habitats for the fauna

Façade greening reduces excessive heating in building envelopes and creates a habitat for many animals. Instead of earth-rooted vegetation, cracks and niches can be deliberately incorporated into the façade, while bat bricks and similar modules can be integrated in accordance with AAD criteria.

Water-permeable surfaces permit on-site percolation. Spontaneous vegetation and crevice colonisers increase the local diversity of species.

Natural shade from trees replaces technically complex sun protection on buildings.

03.03

... and language has a say

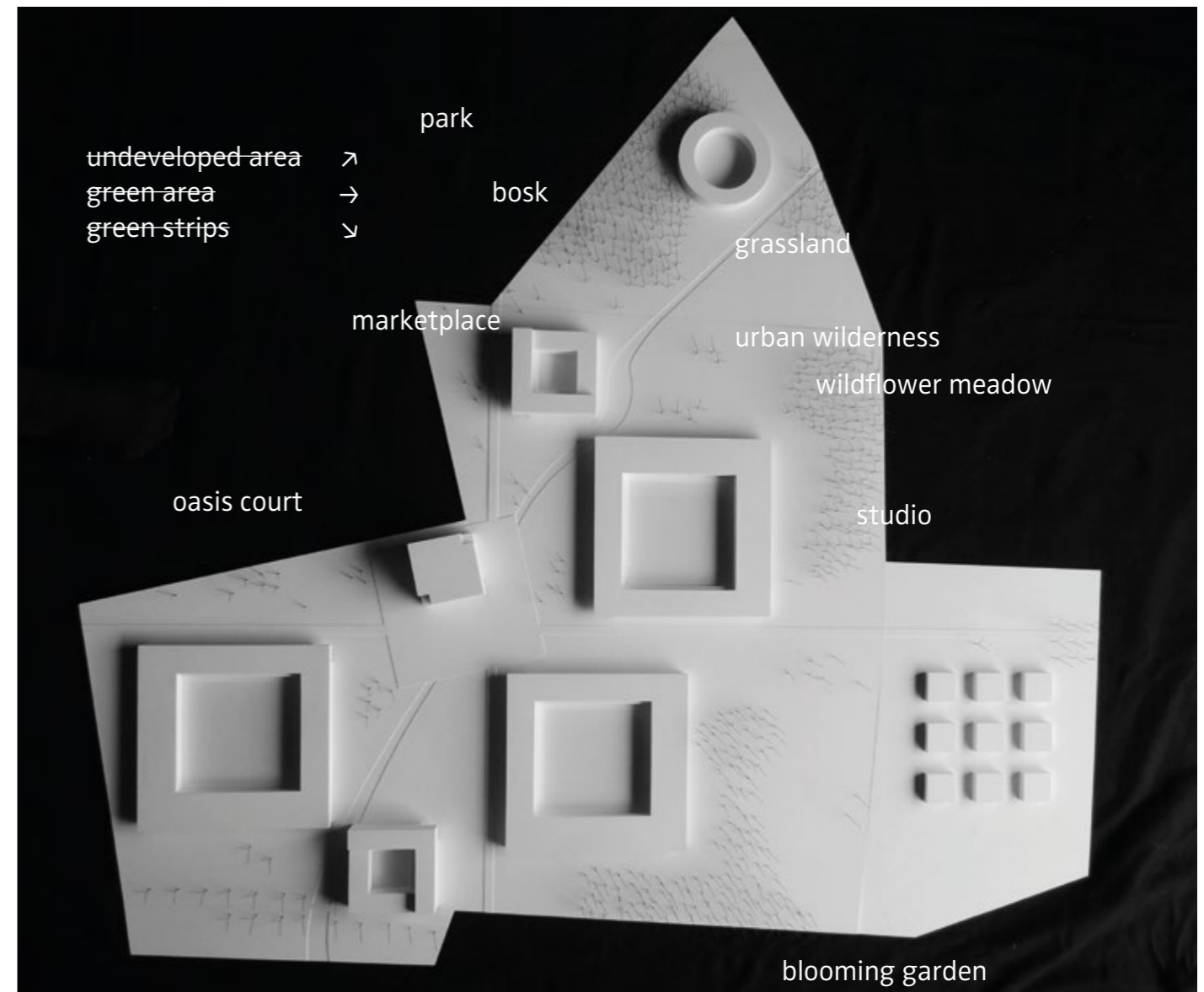
Turning green spaces into gardens again. The use of language draws our attention to the fact that it is high time that the habitat needs of humans, plants and animals are given equal consideration in the field of urban development. What used to be densification is now environmental development³⁴.

Coming under pressure

Physical concepts like densification, the current buzzword and central concept in urban development, illustrate our alienation from nature in the context of building culture. Clients, planners and developers are largely lacking in awareness of biodiversity and its importance for the perception of and feeling for nature. The current usage of language turns living things into passive matter; habitats become components, surfaces and volumes. It reveals what is suppressed when thinking in terms of densification: the living needs of humans, animals and plants – because DENSIFICATION IS BLIND TO QUALITY. Rivers, trees, gardens as well as birds, insects, bats, hedgehogs, etc. are concomitants.

Language is always an expression of interests; the terms that achieve general currency automatically manifest a power structure and related viewpoints and resulting perspectives. To that extent “high-density building” indicates a political and technical view of spatial planning and urban development through the use of a physical term. It denotes the displacement of volume among components, resulting in pressure – in the context of building culture, urban development pressure. Technocratic language often generates resistance when planning issues are communicated.

34 Caviola, H., Weiss, H., Kläy, A., Haupt Verlag, “Sprachkompass Landschaft und Umwelt: Wie Sprache unseren Umgang mit der Natur prägt”, ISBN 978-3-258-08068-0



Maintaining principles through language

In order for other, positive images to emerge, the concepts used must also change; we must think and speak with reference to human beings and living creatures in general and their needs. If, for example, we want to convince the public or the business community of the ecological and economic merits of using less land for buildings, we need a shift in perspective from less emotional distance to more empathy for living creatures. Leaving this meta-level means that decision-makers will in future draw up their plans from the perspective of humans, animals and plants, and that their needs will be given priority. This shift in our scale of values will bring nature back into our projects and actions.

EU LIFE Project BooGI-BOP

The project of seven European partners promotes biodiversity-oriented design of premises (BOP) as a part of green infrastructures and potential stepping-stones for biotope corridors. At the same time, the higher quality of stay due to the variety of elements also improves the well-being of the employees and thus of society.

www.biodiversity-premises.eu

