Network Nature

Design Brief 2

Biodiversity-positive Design in Urban Areas with NBS:

Wildlife-friendly Areas, Conservation Sites, the Public Realm

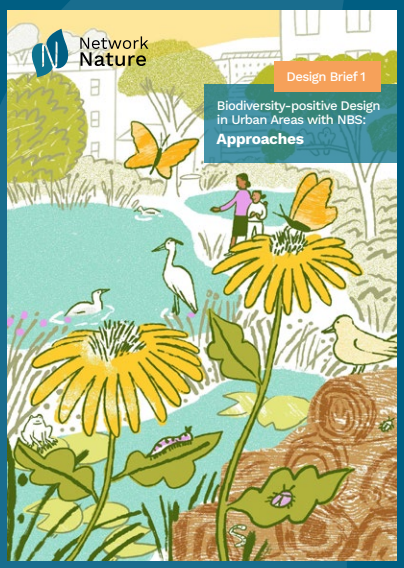
A Series of Design Briefs

This NetworkNature design brief series, the first of its kind, comprises three design briefs on biodiversity-positive design recommendations for urban and peri-urban areas with nature-based solutions. The series, developed with support of IFLA Europe, presents simple design suggestions for renaturing in built environments to restore or provide habitat for nature.

It is not meant to replace professional ecological or landscape guidance, but rather to encourage designers to intentionally consider how they can adopt an interdisciplinary approach to make projects more biodiverse. Specifically, it encourages professionals to adapt to and achieve biodiversity positive design in urban areas via nature-based solutions (NBS).

Design Brief 1

Learn more about Renaturing and biodiversity-positive approaches

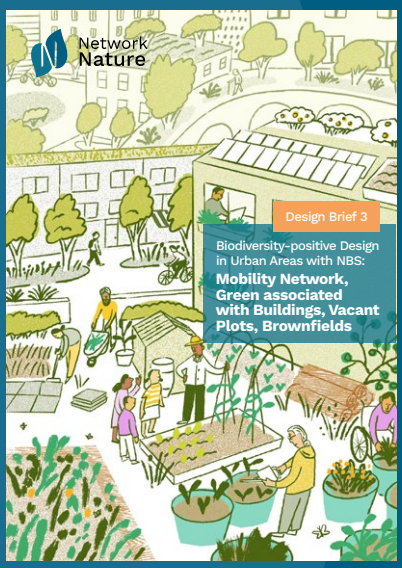


Design Brief 2

Learn more about Biodiversity-Positive Design Recommendations for Wildlife-friendly Areas, Conservation Sites and the Public Realm

Design Brief 3

Learn more about Biodiversity-Positive Design Recommendations for the Mobility Network, Green associated with Buildings, Vacant Plots and Brownfields



Why this Design Brief Series? Why now?

The European Green Deal, which strives to achieve carbon neutrality in Europe by 2050, seeks to protect and restore ecosystems and biodiversity, and to promote the widespread adoption of nature-based solutions (NBS) in policy and implementation. The EU Biodiversity Strategy for 2030 highlights a pressing need to incorporate biodiversity considerations into all policy areas considering the numerous human activities that are threatening it. More specifically, the EU Nature Restoration Law, which was recently proposed and is under review, marks the first legal requirement to mandate large-scale nature restoration to prevent further deterioration of protected habitats and species. This law aims to implement restoration measures in at least 20% of the EU's land and sea area by 2030, with the goal of restoring all ecosystems in need by 2050. Furthermore, this document can be seen as a complementary contribution to the Urban Greening Platform of the European Commission alongside the Urban Greening Plan Guidance Draft and the pending

At a global level, the United Nations has declared the decade from 2021 to 2030 as the Decade on Ecosystem Restoration, which sets a course to repair and restore ecosystems around the world. In addition, the Kunming-Montréal Global Biodiversity Framework (GBF), a key outcome of COP15 from December 2022, builds a strong foundation for global action on biodiversity. It complements the Paris Agreement on climate change by outlining a roadmap for protecting and restoring nature and using it sustainably for current and future generations. The agreement includes specific targets for protecting 30% of global terrestrial and marine areas and restoring 30% of degraded ecosystems, as well as a mechanism for financing these efforts through the Global Biodiversity Fund. It also includes a financial package of international solidarity, particularly for the most vulnerable countries and those with the most biodiversity. There is a growing recognition of the need to prioritise nature protection globally, and those delegates that have painstakingly negotiated the Kunming-Montréal's text, should be applauded. However, the ultimate impact of this agreement will depend on how governments and practitioners implement nature protection policies and design interventions at the local level.

Earth's ecosystems are in decline globally at rates unprecedented in human history – similarly, the rate of species extinction is accelerating, anticipated to have massive adverse impacts for people and nature around the world. The crisis, which has resulted in one million species being at risk of extinction, is a particularly significant topic for designers working in areas planned for urban and peri-urban development and particularly greenfield development. How can new developments incorporate biodiversity into their design? What design strategies can help create healthy and resilient spaces for both people and nature?

Who should read this?

The series is intended for anyone working with nature-based solutions (NBS), for example:

- practitioners directly involved in the design, development and implementation of NBS and across urban ecosystems,
- policymakers, and
- landscape managers,

who are active at the local and regional levels, tasked with implementing legislation issued by the European Commission or by national authorities themselves.

The United Nations Fifth Environment Assembly in March 2022 defined NBS as "**actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits.**"

Introduction

Biodiversity matters

The term "biodiversity" refers to the diverse range of life on Earth, including the variation among species and all forms of life, including rare, threatened, endangered, and even poorly understood species such as microbes, fungi, and invertebrates. According to the online glossary of the European Environment Agency (EEA), it is "*an umbrella term to describe collectively the variety and variability of nature. It encompasses three basic levels of organisation in living systems: the genetic, species, and ecosystem levels.*" Plant and animal species are the most recognised units of biological diversity, thus public concern has been mainly devoted to conserving species diversity. Biodiversity has value in many aspects of our lives, both for the benefits it provides to humans and for its own inherent worth. Utilitarian values of biodiversity include meeting the basic human needs such as food, energy, shelter, and medicine. Ecosystems also provide important services like pollination, seed dispersal, climate regulation, water purification, soil purification, nutrient cycling, and pest control. In addition to these practical values, biodiversity also has a cultural value by offering opportunities for recreation, relaxation, and inspiration. However, the intrinsic value of biodiversity refers to its inherent right to exist, independent of its value to humans or anything else. Finally, biodiversity can also be valued for the relationships it helps us form and maintain with each other and the environment. These relational values contribute to our sense of well-being, responsibility, and connection with nature. Understanding the different values of biodiversity is important to inform urban and peri-urban planning choices practitioners make every day. Biodiversity-positive design is about taking design decisions that reinforce the positive impacts on biodiversity and ecosystems and reduce the negative ones.

However, in the past century human actions have caused rapid ecosystem changes and significant loss of biodiversity worldwide, leading some to call our current era the "Anthropocene." While the Earth has always experienced changes and extinctions, they are now occurring at an alarming rate. Major threats to biodiversity include habitat loss and fragmentation, unsustainable use of natural resources, invasive species, pollution, and climate change. The root causes of biodiversity loss, such as environmental degradation, inequalities and overconsumption, are often complex and interconnected.

The Kunming-Montréal Global Biodiversity Framework

The Fifteenth meeting of the Conference of the Parties (COP 15) has been a significant moment for the planet, when the Kunming-Montréal Global Biodiversity Framework (GBF) was published to establish a shared commitment to protecting 30% of land and seas by 2030. This has been unanimously welcomed as the 'Paris moment' for biodiversity. Governments must follow through with their commitments on policies, action plans, and financial resources. This includes prioritising critical biodiversity hotspots, investing in urban green infrastructure, addressing over extraction, and transitioning towards a nature-positive economic model.

NBS and Biodiversity-Positive Design

Fortunately, humans have the opportunity and means to change actions and protect species and ecological systems. By understanding the threats to biodiversity and how they operate in specific contexts, designers can better prepare for conservation challenges. Conservation efforts in the past have made a significant difference in the state of biodiversity. On the one hand, protected areas such as national parks, wildlife refuges, game reserves, and marine protected areas, managed by governments and local communities, can provide habitat for wildlife and help prevent deforestation. On the other hand, when protecting habitat is not enough, other actions such as restoration, reintroduction, restrictions to land use conversion and controlling invasive species, have also had positive impacts. These efforts have been supported by measures to improve environmental policies at all levels. Additionally, individual and community lifestyles can greatly impact biodiversity and the environment.

Many years before the latest NBS definition by UNEA's Resolution, Eggermont (Eggermont et al, 2015) proposed a framework of three types of NBS to address environmental and social challenges:

- Type 1 - Minimal or zero intervention in ecosystems: Aims to maintain or enhance the provision of a variety of ecosystem services both within and beyond preserved ecosystems, with little to no intervention in the natural systems. Examples of this approach include safeguarding mangroves in coastal regions to reduce risks from extreme weather events and provide benefits for local communities, and establishing marine protected areas to conserve biodiversity within these areas while supporting the fishing industry through the export of biomass. This type of NBS is closely linked to the concept of biosphere reserves, which feature protected core areas for nature conservation such as those belonging to the Natura 2000 network, and buffer and transition zones where sustainable human activities take place.

- Type 2 - Sustainable and multifunctional management of ecosystems: Involves adopting sustainable and multifunctional management strategies for ecosystems and landscapes that are either extensively or intensively managed, with the aim of improving the delivery of specific ecosystem services beyond what conventional approaches could achieve. Examples of this approach include innovative planning of sustainable agricultural landscapes to increase their multifunctionality, or the use of approaches to enhance tree species and genetic diversity in forests to improve their resilience to extreme events. This type of NBS is closely associated with concepts such as natural systems agriculture (Jackson 2002), agroecology (Altieri 1989), and evolutionary-oriented forestry (Lefèvre et al. 2014).

- Type 3: Design and management of new ecosystems: Involves managing ecosystems in highly "invasive" ways or even creating entirely new ecosystems. This type can only be considered NBS if it contributes to the preservation of biodiversity and the sustainable management or restoration of ecosystems while delivering a range of ecosystem services. For agro-ecosystems and green spaces in urban areas, for instance, it is important to consider ecological complexity and connections with surrounding ecosystems to provide biodiversity benefits. Under this category there are actions aimed at increasing green space in squares and streets, restoring degraded areas within the city such as slopes or even quarries, provision of sustainable water management, etc.

The past few years of global pandemic have highlighted the importance of having access to natural spaces and nature in our communities. Protecting and enhancing nature is important not only in nature reserves and other protected areas (NBS Type 1), but also across urban and peri-urban landscapes, where one can find NBS Types 1, 2 and 3. New developments should be designed to support nature recovery networks and allow wildlife to thrive and move through the landscape, improving biodiversity. In this sense, local and regional authorities, through the planning and development consent processes, can positively affect the way in which developments are planned from concept to realisation. Landscape architects, designers and planners, along with staff working in local government planning agencies, have a key role for conserving biodiversity in human-modified landscapes or, where possible, enhancing it. Net-gain principles have been carried out in many countries such as the UK, Germany, France, Spain and Australia. Professionals can reconcile the needs of communities and healthy ecosystems to benefit both, connecting people with nature – e.g., creating new opportunities for children and young people to become immersed in nature and learn about the benefits through education. The more people understand and care for nature, the more they will contribute to protect biodiversity.

However, landscape designers and local government planning agencies often lack knowledge of wildlife ecology (e. positive and negative effects of cinegenic species on biodiversity) and biodiversity net gain, and the required skills for planning. Thus, there is an urgent need for recommendations guiding the design, planning, construction and 'stewardship' of urban ecologies. The approach is, by nature, a multidisciplinary one in tandem with the needs and aspirations of the human community inhabiting the urban realm.

Biodiversity-Positive Design Recommendations for Wildlife-friendly Areas, Conservation Sites and the Public Realm

Many authors recognise that green spaces in urban and suburban areas can provide habitat for the preservation of native plants and wildlife (Goddard et al., 2009; Kowarik, 2011), given that such spaces can take various forms: parks, gardens, green roofs, road verges, vacant lots and wastelands, hard surfaces and walls, cemeteries, allotment gardens, etc. (Müller et al, 2013). It is key to be open about the limitations of small-scale green spaces in terms of providing wildlife habitats for fauna, as these might be beneficial for cinegenic wild species, but not for fauna species that require wider life areas ranges or have specific trophic or nesting requirements. However, the potential of urban and peri-urban green spaces to support biodiversity enhancement should be further explored. Designers will find here some recommendations to enhance biodiversity.

This design brief is part of a series, and it provides NBS design recommendations considering the following typologies of space in urban and peri-urban areas:

- Wildlife-friendly Areas
- Conservation Sites
- Public Spaces (Urban Green Areas, Parks and Gardens)

A solution classified in one type of space does not mean it cannot be implemented in another if it is considered appropriate. In addition, there are several solutions that are transversal to all spaces.

The design recommendations presented here derive largely from two urban manuals: Madrid's "Handbook on Nature-based Solutions: Promoting Biodiversity in the City of Madrid" and London's "Urban Greening for Biodiversity Net Gain: A Design Guide".

The next design brief of this series will provide NBS design recommendations considering the following typologies of space in urban and peri-urban areas:

- Urban and Suburban Mobility Network (Roads, Streets and Axes)
- Green associated with Buildings (Green Roofs and Facades)
- Vacant Plots and Building Sites

Wildlife-Friendly Areas

Urban and peri-urban areas might offer valuable opportunities for wilderness. Some overall principles to consider when designing wildlife-friendly areas:

- Take stock on natural habitats such as riparian vegetation and microbial rich soils to prioritise their restoration.
- Identify a diverse and interconnected network of habitats during the master planning process. A design decision might be not to design at all and take a rather passive approach by halting human interference and letting spontaneous rewilding to take place. This process is especially useful when ecological connectivity is present to allow animal and plant species to spontaneously recolonise the site.
- Take into account local conditions such as wind, ground water, aspect, light, soil type and depth. Keep in mind that tall buildings and high-density development can create harsh microclimates for people, plants and wildlife.
- Choose and locate native species based on their optimal traits, such as drought tolerance or ability to thrive in low-nutrient soils, to reduce the need for irrigation, energy input, and intensive management.
- Use natural systems as a reference for form and pattern in planting designs, choosing compatible, adaptable species that interact with each other and the site. Plants should be seen as forming part of a habitat rather than just being ornamental features.

- Incorporate green infrastructure into the design process as early as possible. Making space for nature can help achieve various policy objectives rather than being a design constraint.
- Use native plant material of wild and local provenance in NBS projects to allow for shifting the focus away from a purely ornamental perspective and towards native and biophysical perspectives. Native plant material can contribute to the conservation of local natural heritage and bring a different perspective on aesthetics.
- Support pollinator populations through the creation and management of dedicated urban areas with food for pollinators such as seeded grasslands. Multi-purpose grasslands can improve biodiversity, enhance the aesthetic value of urban development, increase the water holding capacity of the land, increase the sequestration of carbon and build greater resilience. The use of native plant material in the creation of urban flower meadows has been implemented as a means of increasing biodiversity in urban spaces and meeting the European Green Deal's target of increasing biodiversity in urban areas.
- To protect biodiversity in the design process, prioritise avoiding and minimising impacts on biodiversity hotspot areas and implementing mitigation measures. Plan for compensation as early as possible and document the creation of new habitats before impacts occur. If avoidance and minimization are not possible, seek external guidance and consider compensation as a last resort. Offset any biodiversity losses by creating gains in other areas if compensation is not feasible or does not provide the most conservation benefits. Avoid losing biodiversity that cannot be offset by gains in other areas.
- Understand macro fauna habitat requirements and movements to design adequate Wildlife Movement Solutions (WMS).

Conservation Sites

Conservation sites are vital habitats for wildlife, playing a fundamental role in biodiversity conservation. Moreover, conservation sites within urban and suburban areas help to forge a sense of belonging and identity. Designers need to make sure to identify those ecological and cultural aspects and try to add to their protection through their projects.

Development near conservation sites must consider their ecological character and valuable features. Creating ecologically diverse development that adds additional life and diversity helps to connect, strengthen, and expand this network to support nature's recovery. The design approach could be also: "do not design", in the sense to let ecological processes to re-establish spontaneously. Urban renaturing that is inspired by ecology can include designs that complement the distinctive habitats and species that are present in conservation sites, extending and connecting wildlife habitat into new developments. New habitats/ecosystems need to be evaluated in terms of their long-term feasibility and maintenance requirements, as well as in terms of the concrete gain they bring to ecological connectivity.

The Public Realm (Urban Green Areas, Parks, Gardens)

There is a wide range of biodiversity in urban areas, with some green spaces being more naturalised, and others that, while appearing more urbanised, still have high levels of species richness. To promote biodiversity in these spaces, it is important to improve the habitats that they offer to local wildlife through NBS. Find below some design recommendations for the public realm in terms of improvement of connectivity, vegetation selection (tree, shrub and groundcover), introduction of educational measures and public awareness, installation of nesting and feeding stations, provision of shelter for various forms of wildlife, application of pollinator-friendly practices, water-sensitive design, etc. It is also important to carry out sustainable maintenance that respects the natural cycles of the urban wildlife to avoid interfering with their feeding, resting, or sheltering habits. By using innovative design strategies, it is possible to integrate even the most formal parts of public areas into the larger ecological system of the city.

In terms of improving ecological connectivity every City should have a Landscape Master Plan to direct development and sustainable management:

- To create an ecological connection in the public realm, map existing priority habitats and protected areas. Consider establishing physical connections with these areas by incorporating features such as trees for shade or species-rich hedgerows.
- To create a connected and diverse green space map in your public realm existing green infrastructure elements such as street planting, podium gardens, and green roofs, and plan for new ones connecting green corridors.

- Consider using green walls and varied management techniques to create smooth transitions.
- If there is no sufficient space for shrubs, connect tree pits using cell systems with shrubs under the tree canopy to provide structure.
- Choose plants that are rooted at different depths to prevent competition between species.
- Limit the use of sealed surfaces. Avoid designing large, sealed areas.
- Consider “depaving” actions in strategic sealed areas that can be potentially renaturalised to allow for ecological connectivity by connecting isolated habitat patches to larger biodiversity reserves, expanding the size of small reserves or areas of ecological importance, and creating new habitat or ecological niches for vulnerable species in urban areas.
- Avoid using plants that require frequent irrigation with mains water by using native and locally adapted species.
- Limit introducing large quantities of nutrient-rich topsoil to avoid rapid colonisation of invasive species.
- Create or complement green corridors, as they serve important functions by providing habitat connections, recreational routes, and links between larger green spaces. They can also enhance the aesthetic appeal of an area and encourage active lifestyles. Additionally, green corridors can connect sites of biodiversity.

In terms of diversifying vegetation and ensuring biodiversity-friendly maintenance:

- To promote greater interaction with local wildlife, choose native plant species and plant trees with attractive flowers that have high levels of nectar or pollen.
- Properly developed tree canopies provide nesting sites for birds. Therefore, try to ensure the conservation of mature trees, given that their cavities and unique disturbances support the presence of certain species.
- Encourage the closure of tree canopies while maintaining clearings for the benefit of the ecosystem.
- Choose dense and complex plant structures to provide new habitats and provide a combination of deciduous and evergreen species to increase structural complexity, which can also be enhanced by the choice of uneven aged species.
- Prioritise species that produce fruit to provide a food source for small mammals and use fruit-producing species in the fall and winter to provide food for migratory and wintering birds.
- Avoid using resin-producing species to prevent soil acidification.
- Plant perennial climbing plants with nectar-rich flowers to cover dry hedges and diversify the plant structure.
- Use groundcover plants to cover the ground beneath trees or shrubs and consider using vines that attach to lightweight structures.
- Create micro-meadows within a semi-naturalised lawn and allocate social lawn areas within meadows to allow for the coexistence of public use by humans and fauna.
- Supplement meadows with groundcover, shrub groups, or individual fruit trees, and plant ornamental meadows made up of seeds of perennials and annuals.
- Use low hedges and furniture to protect small meadows from trampling
- Create islands of vegetation and living hedges as well as agroecological plots and crop diversification.
- Planting isolated fruit trees can also diversify the food source available.
- Create rock piles or stone walls to provide shelter for wildlife. Wood piles can also offer effective habitats.
- Engage in anticipatory land-use planning to create maps of pollinator habitats and form pollinator-ways.

- Introduce pollinator-friendly practices and disseminate information about pollinators to promote public awareness.
- Give guidance for public green space and land managers to protect pollinator-friendly species and use Integrated Pest Management.
- Introduce nesting boxes or perches to promote biological pest control and seed dispersal.
- Create micro-ponds to create suitable habitats for amphibians.
- Adapt tool sheds to provide shelter for species that need large spaces and choose locally adapted varieties.
- Use composting to improve soil health, and to create habitats for different species. Encourage maintaining leaves on the soil. Composting can be a sustainable method of waste management as well.
- Avoid illuminating vegetation or water, which can decrease the value to bats and insects.
- 'Tiny Forests' can also be an alternative to enhance biodiversity within the public realm. The growth of micro forests in urban areas can contribute to various vegetation species densely planted, low-maintenance and able to reverse sealed soil. However, the benefits in terms of biodiversity and cooling are not scientifically substantiated, and claims of their growth being 10, 20, or 30 times faster, denser, or hosting more biodiversity are not backed up by evidence. While urban micro-forestry projects in urban areas can be attractive, it is recommended that they be evaluated prior to application in terms of sustainability, resource requirements, and waste production.

In terms of encouraging a water-sensitive design:

- To support biodiversity and ecosystem health, implement environmentally friendly water flow regimes and prevent water contamination.
- Use principles of river and geomorphological restoration and preserve natural islands.
- Protect the biodiversity hotspots with hedges, fences, and signage, while allowing fauna circulation.
- Consider adjusting the sustainable drainage system hierarchy, as needed, to enable the establishment of permanent or temporary wetland habitats.
- Organise the sustainable drainage system to make use of the surrounding landscape as much as possible before discharging off-site.
- In the design, include a variety of substrate types such as dead wood, gravel, and rough, vegetated banks.
- Establish areas with minimal disturbance, like vegetative screens and observatories, and use specific signage to inform the public. Utilise tall vegetation, swales, buffer strips, and ditches as natural barriers to restrict access and mark walking routes.
- Incorporate beaches with vegetation and gravel along the shores, in a sinuous manner, and use horse-shaped islands to increase edge surface and create shallow water spaces.
- Include marsh vegetation to provide suitable nesting places, and design island access to facilitate entry and exit from the water. Incorporate shallow sides on swales, ditches, and ponds to allow for plants and easy access for wildlife such as newts and frogs. Ensure that inclines have a grade of no more than 1:5 (12%) and preferably less than 1:20 (3%).
- Whilst choosing marsh vegetation, try to mimic locally significant priority habitats instead of relying on garden plants.
- Use closed networks or submerged log piles as refuge for aquatic life as substrate for planted emergent species.
- In shallow zones, between 5 cm and 1.5 m deep, various submerged substrates like sand, gravel, stones, deadwood should be considered. Design with shrubs and tussock grasses.
- Design ponds with variable depth and diverse slopes on their banks and increase the surface area of the edges.
- If necessary and depending on pollutants, use pre-treatment manholes to capture specific contaminants and set up filtering ponds with distinct areas and floating and edge hydrophyte plants. Depending on the water quality of the

ponds, some of them can be considered to serve as recreational pools by people.

- Form retention ponds with hydrophyte vegetation to retain and filter the water. Add stones and gravel to the water inlet stream to filter the water and provide habitat for bird and fish species.
- If erosion problems cannot be solved at the source, position pollution and sediment traps to catch water before it reaches play areas or ponds.
- Refrain from using fountains or decorative ponds that rely on chlorinated, potable water or UV filtration, as they can limit wildlife use.
- Instead of having one large sustainable drainage system feature in a corner, consider several smaller features located throughout the public realm.
- Avoid using mulches and timber features that may float when the sustainable drainage system feature becomes filled with water.

In terms of creating feeding and shelter options:

- To provide shelter and feeding options in green spaces, it is important to manage dead wood, such as collecting logs and branches of different sizes, and preserving old trees.
- Fencing can be used to protect these areas, and informative signage can educate the public about their importance.
- Leaf litter can be collected for composting or left to accumulate.
- Fruit-producing plants can provide food for birds and small mammals.
- Dry stone walls can offer shelter for wildlife, and soffits with overhangs and a variety of substrates can attract insects.
- Water sources, nest boxes, and feeders can also support wildlife, but should be placed carefully to avoid disruptions and predators.
- Simply supported tile roofs and nest tiles can provide shelter for a wide range of species. Eaves and the space under roofs can also support different species.
- To encourage the use of these resources, it is important to maintain them and engage in environmental education.
- To maintain a calm atmosphere, it is recommended to minimise artificial lighting.
- Some species, such as bats, may require spacious areas for nesting.
- Designers are encouraged to analyse the existing biodiversity in the areas before decision-making about intervention measures.

In terms of naturalising recreational and contemplative areas in the public realm:

- The design of landscape infrastructure that meets recreation and contemplative needs of both young and old communities is essential for reconnecting people with nature. Meeting the experiential learning needs of young people is particularly important for the preservation of wildlife in the future, and establishing a strong connection between people and wildlife can have a positive impact on health and well-being.
- Planting ground cover, climbing, and vine plants in recreational areas and squares can create shady spots that decrease urban heat islands, create pleasant paths under green pergolas, whilst enhancing biodiversity. Climbing plants can easily cling to objects such as walls and pergola structures, increasing structural complexity, providing shade and home for numerous species. During hot times, if there are no issues with water scarcity, micro-diffusers might be used to cool the environment and to expand the range of species.
- Habitats can also be created with structures such as cabins or labyrinths made of plants.
- Trees provide shade and comfortable areas for physical activity.
- Water and mud play areas can provide materials for building mud nests and a source of water for wildlife.
- Some plant species can be used for play and learning activities.

- Using dry wood for play structures is a sustainable way to dispose of it.
- Piles of stones, gravel, sand, branches, and logs can provide habitats and play elements for a variety of species.
- Trees can offer opportunities for play and shade, improving the thermal comfort of play areas.
- Terracotta and sandy ground surfaces can lower the temperature of play areas and create temporary puddles.
- Dry leaves and fallen flowers can be used as temporary play elements.
- Gravel and terracotta surfaces can improve thermal comfort and reduce heat islands.
- Dry logs can be repurposed as sports equipment.
- Stones of various sizes can be incorporated into play areas.
- Dead trees and shrub borders can be used as sports areas and provide habitats for wildlife.

In terms of adding vegetation to urban furniture and elements:

- Urban furniture vegetated pieces can be added to the public realm. Some enterprises offer modules that can be easily transportable on wheels, providing plazas with “urban living rooms”. It is key, however, to consider realistically the biodiversity net-gain and the cost-benefit factor of such solutions, as many are too expensive for what they provide in terms of biodiversity.
- Revegetating urban furniture means making small changes to encourage vegetation to grow on elements found in the road, such as benches, bus stops, streetlights, and so on. When rightly integrated in the landscape to promote connectivity, this approach can enhance the ability of some elements to foster biodiversity.

Many of the recommendations for the public realm listed in this section can also be applied to private gardens. Private gardens in cities can play an important role in protecting biodiversity. Although they may be small in size, collectively they can provide significant habitat and food resources for a variety of plants and animals. In urban areas where natural habitat is often scarce, private gardens can act as refuges and stepping stones for wildlife to move through the landscape.

Final Considerations

There are several ways for designers to promote biodiversity conservation, including designing biophilic and climate-resilient spaces, applying NBS, creating nature-sensitive road networks, and incorporating green infrastructure into urban planning. By being mindful of the recommendations presented here, designers can play a key role in preserving and protecting biodiversity.

The design recommendations set out in this document are not meant to be comprehensive. This document also refrains from providing recommended lists of plant species and to highlight single landscape master plans, given that Europe has very diversified climatic zones and biophysical regions. Designers of urban and periurban green spaces, public housing, buildings, street networks and amenities can benefit from the presented recommendations to contribute with more functional, attractive, and biodiversity-friendly networks. However, design details will obviously depend on the biophysical specificities and the Genius Loci of the areas they are being proposed for. Certain spatial typologies that can be found in urban and suburban areas were chosen for the compilation of this set of recommendations. The aim is for this document to serve as a reference for designers to integrate biodiversity-driven principles in their daily work.

To achieve biological health in urban environments, public support is crucial. Many cities have focused on keeping wildlife out, but it is important for public administrations to demonstrate that biodiverse environments are beneficial for both wildlife and humans. This entails providing the necessary resources and conditions for the survival and reproduction of different species ensuring access to food, water, and shelter, as well as suitable environmental conditions such as healthy soils, clean water, clean air, reduced light and sound pollution, reduced waste, and resilience to drought and floods. Biodiversity master plans should be developed for all settlements, rooted in a landscape management approach that integrates wildlife at all levels, harvesting multifunctional benefits and creating more liveable cities for both people and nature.

Finally, it is recommended that practitioners and planners, in order to complement their design decisions, consult indexes such as the City Biodiversity Index and the IUCN Urban Nature Index, which can help them to assess and track the success of their efforts to protect biodiversity. The indexes can measure various aspects of biodiversity, including native species, ecosystem services, and the management and governance of biodiversity. Cities that have used the Singapore Index have found it helpful in improving their biodiversity conservation abilities, determining which conservation efforts are most important, and allocating funding for these efforts.

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