

A City – Fair or Bare?

Designing a Biodiverse Urban Environment

This guide has been compiled based on the knowledge gained from two projects. In 2020, the European Capital of Culture Tartu 2024 project “Curated Biodiversity” began piloting an increase in the biodiversity of the parks of Tartu city centre. The trials are now continuing with the urbanLIFEcircles project. Five years of knowledge has been gathered on which approaches work best, which yield poorer results, and what needs to be changed. This guide spreads the knowledge we have gathered over the years so that everyone would have the opportunity to make our surroundings more biodiverse. Big changes are possible with small steps and initiatives.

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Cover image – The second summer of the urban meadow sown in Tartu Uueturu Park in 2020. Photo: Mana Kaasik, 2022.

Title page – An urban grassland in Uueturu Park in Tartu. Photo: Mana Kaasik, summer 2024.

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The second summer of the urban meadow sown in Tartu Uueturu Park in 2020.
Photo: Mana Kaasik, 2022.



The world is urbanising at an ever-increasing pace. A UN report points out that if current trends continue, by 2050 nearly 6.8 billion people will live in cities, which is half more than in 2010. Urbanisation is one of the biggest causes of biodiversity loss, as habitats are either built over or fragmented. Suburbanisation also takes place at the expense of natural and biodiverse areas.

However, urbanisation does not always have to mean a loss of biodiversity. Studies show that a well-designed urban space with a mosaic landscape can support diverse local species-rich communities and contribute to nature conservation more broadly. Urban nature in good condition is key to the mental and physical health of city dwellers, as it helps to reduce air, water and noise pollution and prevent allergies, among other things.

An urban meadow established in 2019 at the Vene Street roundabout near the University of Tartu Delta Centre (designed by Helle Väärsi). Photo: Mana Kaasik, 2025.

How to plan a biodiverse city?

Urbanisation has brought about significant changes in the natural environment, including the loss of natural habitats and the fragmentation of ecosystems. At the same time, it is becoming increasingly clear that biodiversity is not a luxury but a prerequisite for the sustainability of cities and the well-being of their inhabitants. Many cities around the world have adopted various measures aimed at restoring, increasing and preserving biodiversity. This chapter provides an overview of the main approaches and discusses Tartu's approach, which can be transferred to other cities.



Meadow designed by Helle Väärsi at the Vene Street roundabout. Photo: Mana Kaasik, 2025.



Increasing biodiversity in cities requires a comprehensive and multi-level approach. The most successful examples combine nature-based solutions for climate change adaptation, urban greening, engagement of local residents and stakeholders, strategies and policies. Such a holistic approach not only improves the natural environment, but also supports human health, increases the resilience of cities to climate change and creates a more attractive living environment.

Wild strawberries in the urban grove of Vabaduse Puiestik Park.
Photo: Mana Kaasik, 2025.

Ecological approach

Nature-based solutions are strategies that focus on preserving and restoring natural processes in urban design. Many urban green spaces are designed for ornamental, purely decorative purposes that appeal to human aesthetics. However, this approach needs to be revised and the focus shifted on the ecological functioning of green areas, understanding the interrelationships between species and the fact that in nature, everything is interdependent. It is important to create green corridors, blue corridors, and green and blue infrastructure that connect parks, smaller green areas, gardens, and natural areas, ensuring mobility for animals, including birds and pollinators, but also a pleasant environment for people. Natural water systems such as rain gardens, rainwater retention areas and wetlands should also be considered, that reduce the risk of flooding whilst providing habitats for a variety of species.

Diversifying urban greenery

Urban greening can no longer be limited to sowing lawns and planting individual trees. Preference should be given to native species that support the local ecosystem and are more resistant to climate change. Multi-layered greening should also be created, where trees, shrubs and herbaceous plants grow together. Another important measure is the development of street landscaping, which involves adding trees, shrubs and pocket parks to the urban space in order to reduce the heat island effect and provide shade and food for urban birds and insects, as well as a pleasant microclimate for plants.

A mixed planting of native shrubs and perennials in front of the Estonian National Museum, established in 2016. Photo: Mana Kaasik, 2025.



An urban grove at the Vabaduse Puiestik Park in Tartu.
Photo: Mana Kaasik, 2022.

Special habitats in urban environments

Special microhabitats that support species diversity must be created. The creation of small refuges – fallen trees, ditches, ponds, shrubbery – is becoming more widespread, providing habitats for both invertebrates and birds. Green roofs and green facades are also increasingly being created, adding habitats to places where they have been removed or excluded due to construction, whilst at the same time helping to increase the energy efficiency of buildings. When designing parks, it should become common practice to create semi-natural landscapes, such as meadows and undergrowth, in order to increase their ecological value.

Restoration of meadows and natural areas

The creation of meadows and the renaturalisation of areas affected by construction have become one of the most effective ways of increasing biodiversity. Urban meadows, that are mowed only once or twice a year, support pollinator populations and diverse plant communities suited to local conditions. Many cities have also undertaken ecological restoration projects, converting former industrial or commercial areas into natural parks or creating more green spaces by removing pavement.



3D-printed ceramics designed by Lauri Kilusk in the urban grove of Vabaduse Puiestik Park.
Photo: Ragnar Kekkonen, 2024.



Planting the urban grassland in Uueturu Park.
Photo: Tiina Pitk, 2023.

Community involvement and awareness raising

Promoting biodiversity in cities is not possible without the active involvement of residents. Community gardens are one of the most common examples, offering not only increased biodiversity but also social cohesion and promoting a healthy lifestyle. It is also important to carry out educational projects in schools and local organisations to raise awareness of the value of urban nature. Local residents should be involved in decision-making processes and the creation of green spaces so that all plans are based on the best local knowledge and meet the expectations of users.

Strategic policies and regulations

Political and legal measures are needed to increase biodiversity. For example, in many parts of Europe, there is an obligation to install green roofs or green facades on new buildings (in Basel, Switzerland), guidelines have been compiled for creating green street spaces that everyone can enjoy (e.g. Tallinn and Vilnius). Urban planning uses biodiversity indicators to assess how planned development projects will affect the natural environment. Biodiversity projects are also supported through funding programs such as the European Union's LIFE programme, that has enabled the implementation of several initiatives that enrich the urban environment.



Planting the urban meadow in Uueturu Park.
Photo: Luisa Greta Vilo, 2024.

Practical measures to increase biodiversity

This chapter discusses practical measures that have been taken in Tartu to increase biodiversity. It provides guidelines and highlights lessons learned so far. Frequently asked questions and answers are included.



Changing the mowing frequency in Tartu Keskpark. Tall grass provides a habitat for many urban species. Photo: Evelin Lumi, 2020.

Reducing mowing

The first and simplest measure to promote biodiversity is to reduce the frequency of mowing. This does not mean stopping mowing altogether, but rather mowing two or three times per season. It is best to choose areas that are not used so actively, e.g. more remote edges of parks or gardens, that people use less often anyway.

Reducing mowing intensity is a good opportunity to determine the potential of the area, what grows there and what does not. After mowing the area less intensively for a couple of years, you can decide on further interventions. For example, whether to mow more intensively in patches to control some of the more vigorous species (e.g. nettle, Ground elder – *Aegopodium podagraria*), add new species by planting or sowing donor patches.

The experiment with less mowing began in Tartu in the summer of 2020. The first test plots were selected in Keskpark. This approach has since been tried in several other parks and green areas in Tartu.



Urban nature test area in Maarjavälja. The grass is mown once a year in autumn.
Photo: Mana Kaasik, 2024.



Practical observations

The less mowing experiment has shown that this method is not suitable for all locations and that action must be taken according to the situation. For example, Keskpark was built on the ruins of World War II and is a fairly new park that has been intensively maintained in the same way for decades. In the first year, *Achillea* and grasses flourished, but in subsequent years, sedges became too dominant and by mid-summer, the grass started to wilt and recline and was no longer aesthetically pleasing. Less mowing is also not suitable for recently established lawns, where grasses grow densely and form a thick mat that is very difficult to mow.

At the same time, less mowing yielded better results at Sadamaraudtee (Port Railway Linear Park), Ülejõe Park and Tähtvere Park. Mathiesen Park, that has had a lower mowing load for years, has orchids growing there and the overall picture of the flora is good.

Therefore, the application of this method depends largely on the soil seed bank. Where the seed bank is richer, the results are better, i.e. the environment is more species-rich.

It should also be taken into account that fast-growing tree species tend to reproduce very vigorously with shoots and suckers and dominate other vegetation. Therefore, when changing the mowing regime, it must be taken into account that horse chestnut, butternut, maple and silver poplar, for example, spread very quickly and must be controlled by mowing.

Orchids in Mathiesen park with reduced mowing intensity.
Photo: Mana Kaasik, 2025.



Urban meadow established in Uueturu Park.
Photo: Mana Kaasik, 2025.



Establishing urban meadows

Meadows are among the most species-rich plant communities in Estonia. Meadow vegetation consists of many plants that bloom at different times and is home to half of Estonia's plant species and a large proportion of bumblebees, bees, butterflies and soil organisms. Estonian wooded meadows are world record holders in terms of species richness; nowhere else in the world are there so many plant species together in such a small area as in meadows.

In Tartu, urban meadows have been created in Keskpark, Uueturu Park, on the banks of the Jaamamõisa stream and in Maarjavälja. Existing vegetation has been cleared and replaced with seeds of native meadow plants. Clearing and removing existing vegetation serves two purposes. Firstly, it helps to decrease the fertility of the local soil. Secondly, it creates a clean soil surface on which the newly sown seeds can more easily take root and begin to germinate. A flower-filled meadow in the city is an oasis of biodiversity – a habitat and feeding ground for pollinators, birds and small animals. Meadow plants purify the air, bind rainwater and help keep the urban environment cooler, whilst diverse greenery also supports human well-being. Creating natural meadows and reducing mowing creates habitats for species that cannot survive in intensively maintained lawns.

There are not enough green areas maintained as meadows in the city, so the creation of meadows must be undertaken.

The urban meadow in Uueturu Park was established with the help of volunteers in autumn 2020. Photo: Mana Kaasik.

There are several ways to establish a meadow:

- Removing the turf, clearing it away and sowing grass seeds on the exposed soil surface. If possible, additional soil could be brought to the meadow area from an existing species-rich grassland with healthy mycorrhiza and a rich seed bank.

- Establishing donor patches in the lawn. The turf is removed from an area of approximately one square metre and a mixture of meadow seeds is sown there. The surrounding grassland can then be maintained as a meadow, mowing it once or twice a year. The donor patches will gradually spread seeds to the rest of the green area. The donor patches should cover about 30% of the area. Consider that the seeds will spread about two metres, but some sources claim that they can spread up to five metres from the patch.

- Mown grass from an existing meadow can also be scattered over the desired area. This will allow the seeds to fall and germinate in the new location. One square metre of mown grass is sufficient to cover two to five square metres of the planned meadow.

NB! When purchasing seeds, it is important to ensure that they are of local origin. Building and gardening shops sell a lot of imported seeds. These should be avoided. Firstly, they often consist of annual plants that will only flower for one summer. Secondly, these mixtures may contain species that grow rapidly and take over natural habitats (e.g. lupins). Thirdly, foreign seed mixtures do not support local flora and fauna very well.



Establishing an urban meadow in Uueturu Park in the autumn of 2020.
The entire turf layer was stripped from the sowing area. Photo: Mana Kaasik.

Practical observations

There are different types of grass seed mixtures. In the city, it is always better to choose mixtures with fewer grasses and more flowering species, such as poppies and cornflower. Mixtures with more grasses do not bloom as attractively and can cause disappointment, as they look too ordinary and do not meet the aesthetic expectations of all city dwellers.

The following conclusions can be drawn from the experience in Tartu. It is good to add flowering annual species such as poppies, field larkspur (*Consolida regalis*), common corn-cockle (*Agrostemma githago*) and cornflower to the seed mixture in the first year. Flower fields that bloom profusely from the very first year are more appealing to people. Annual plants disappear from the community year by year and are replaced by perennials.

In Tartu, mixtures containing flowering native meadow plants such as common oxeye daisy, yellow chamomile (*Anthemis tinctoria*), clover, brown knapweed (*Centaurea jacea*), *Campanula*, common chicory, wild carrot, blueweed (*Echium vulgare*), *Hypericum* and cowslip have proved attractive.

In autumn, the meadow should be mowed and left in place for a while to scatter their seeds. The mown grass should then be removed so that it does not smother the plants sprouting in spring.



In the meadow plant mix, you can see oxeye daisy, yellow chamomile, and wild carrot.
Photo: Mana Kaasik, 2025.



An urban meadow sown with seeds from native meadow plants looks different every year. Blueweed (*Echium vulgare*), daisies and wild carrot in their second year.
Photo: Mana Kaasik, 2022.

Maintenance with livestock

Sheep and goats can be used for maintenance on smaller meadows and urban grasslands. While lawnmowers and tractors mow indiscriminately, at a single height, and remove everything in their path, livestock graze selectively. Uneven and gradual disturbance of plants preserves more delicate and fragile plants. The abundance of plants that are more palatable to animals – ground elder, dandelions, grasses – decreases over time, giving other plant species room to grow. Maintaining grasslands and meadows with grazing animals creates habitats and opportunities for many other smaller species and significantly increases the species richness of the area. Grazed areas are essential for many insects, reptiles, amphibians, small animals and birds. When grasslands are mowed or chopped with machines, many small animals and nestlings are killed. They have a better chance of escaping from grazing animals if necessary. In urban conditions, maintaining green areas with grazing animals promotes biodiversity and has a positive effect on the mental and physical health of city dwellers. Grazing animals do their maintenance work without producing exhausting noise and polluting emissions. A diverse natural environment and contact with livestock support the immune system and the proper functioning of the microbiome.

There are two different approaches to grazing with livestock. One option is to keep a smaller number of animals in the same area throughout the grazing period (depending on the weather, from May to September/October). The other option is to graze a larger number of animals in the area for a shorter period of time and then move the animals to the next pasture (so-called rotational grazing). If necessary and desired, animals can be kept on the same pasture at intervals of approximately 4–6 weeks when rotational grazing is used. This type of grazing allows for better use of feed and gives meadow flowers a chance to bloom before the animals arrive. Rotational grazing involves more work in moving the animals and requires the availability of several fenced pastures.

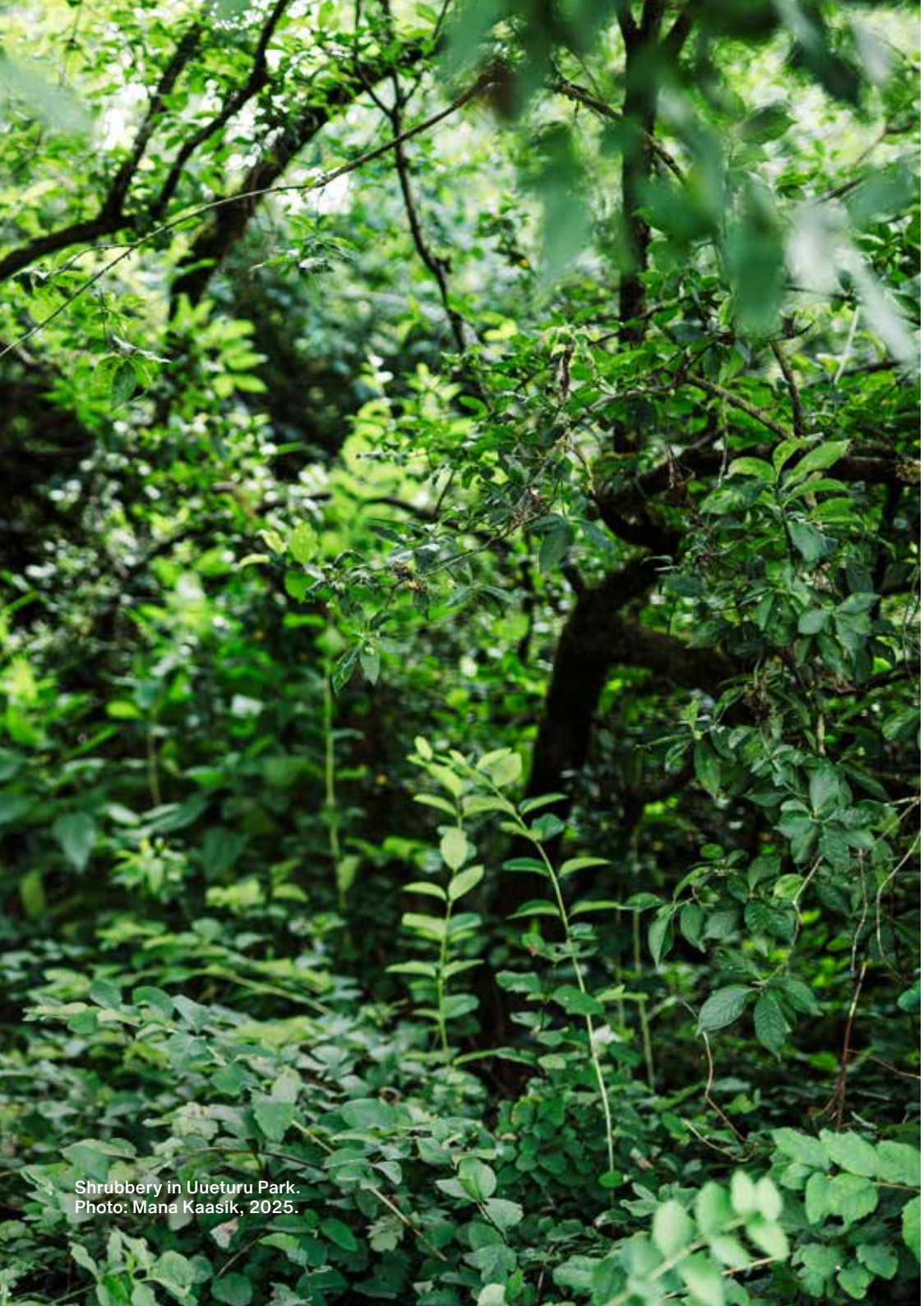


Sheep in the Maarjavälja urban nature experimental area in the summer of 2025.
Photo: Hendrik Kuusk.

Practical observations

Sheep require the least care and supervision. They are also popular with people and thus help to bring urban nature and people together. When keeping sheep and goats, it is important to bear in mind that they like to eat bushes, small branches and leaves, and gnaw on the bark of young trees. This is good because it prevents areas from becoming overgrown, but young trees and bushes that you want to preserve should be protected from them. They give large trees a nice trim by removing lower branches and leaves.

Livestock in the city are under intense public scrutiny, so it is essential to have a telephone number displayed near the animals where citizens can call with their concerns and observations. On the positive side, people are very quick to report anything that happens to the animals. At the same time, you have to be prepared to interact with people to a fairly large extent. Last but not least, the welfare of the animals must be ensured: water, minerals, shelter (e.g. under trees).



Shrubbery in Uueturu Park.
Photo: Mana Kaasik, 2025.

Restoring shrubbery

There is a shortage of shrubbery in Estonian parks. Shrubs were cut down in the 1990s in the hope of restoring safety to the parks. It is now understood that shrubs are an integral part of urban landscaping, with both ecological and environmental value. They help to create more diverse and resilient green spaces.

Shrubs provide habitats and shelter for various birds, insects and small animals. Shrubs are accompanied by abundant life – flowering species are vital for pollinators, birds eat buds, leaves attract insects, many species appreciate seeds and berries. Even the parasites of plants are, in turn, food for someone else.

In addition to providing food for birds with their fruits, shrubs also provide the space birds need to feed. Birds do not tend to feed in completely open areas. The denser the vegetation, the more hiding places there are for small birds. Shrubs can be cut back from time to time to make them denser. Conifers, thorny shrubs and climbers are good for providing shelter.

Shrubs help improve air quality and climate in cities. They bind carbon dioxide and reduce the amount of pollutants in the air. Shrubs also provide shade and cooling, that helps reduce the heat island effect in densely built-up areas. Shrubs have an important protective function. Dense shrubbery acts as a natural barrier against noise and dust, thereby improving the quality of the environment and increasing the well-being of residents.

Practical observations

In the Tartu test areas, attempts have been made to restore the shrub layer in the Vabaduse Puiestik Park. The problem with restoring the shrub layer is that it is not always possible to plant new plants under large trees – the tree crowns cast too much shade and the tree roots dominate as consumers of water and nutrients. Another problem is the availability of local species: nurseries mainly offer ornamental plants that do not occur naturally in our region. On a small scale, it is possible to restore shrubbery by replanting undergrowth plants from a forest, but when large numbers of seedlings are needed, the scarcity of available plant material can hinder good intentions. It is nevertheless possible to achieve good results by planning the work well in advance.

Deadwood

Trunks felled during tree maintenance are an important part of the ecosystem in urban environments, supporting both biodiversity and natural cycles. Deadwood in green areas refers to natural systems: we don't expect fallen tree trunks and branches to be removed from natural forests! Although deadwood may be considered untidy or unnecessary, it has many ecological and social values.

Firstly, deadwood provides habitat for many species. Insects, lichens, mosses and fungi use it for nutrition and development, whilst birds, small mammals and amphibians find shelter and nesting opportunities in it. Several rare and endangered species depend directly on decaying wood, making its presence in the city critical for biodiversity.

Secondly, deadwood provides important ecosystem services. Its decomposition enriches the soil with nutrients, improves moisture retention and promotes plant growth. Deadwood also helps to sequester carbon and reduce soil erosion, that is particularly important in urban environments where natural processes are limited.

In addition, deadwood has educational and aesthetic value. In urban parks and green areas, it provides an opportunity to observe natural processes directly. This increases awareness of nature. Trunks also add seating and climbing opportunities to parks.

Practical observations

At the urban grove in Vabaduse Puiestik Park, deciduous deadwood has been placed, that decomposes slowly. For a quicker effect, parks could also use coniferous deadwood, that decomposes faster and is colonised by life more quickly. If possible, trees that have fallen with their roots intact could also be left in place. The exposed root system of a tree adds structure to the green area and provides unique habitat opportunities.



Deadwood and piles of branches in the urban grove of Vabaduse Puiestik Park.
Photo: Mana Kaasik, 2024.

Dead hedges

Dead hedges built from decaying wood can help to create and connect habitats. Decaying wood supports diverse life. Insects, fungi, mosses and lichens thrive on decaying wood, whilst birds, small mammals and amphibians use it for nesting and shelter.

Thanks to decomposers, dead wood enriches the soil by returning valuable nutrients to it. At the same time, creating dead hedges is a good way to utilise branches generated during tree maintenance. These can be woven into fences or piled up on site, reducing the costs of branch removal and disposal. In Tartu, dead hedges have been created in the Maarjavälja urban nature experimental area.



Dead hedges in the Maarjavälja urban nature test area. Photos: Mana Kaasik, 2025.





Branch piles

Branches resulting from the pruning of trees and shrubs or natural fall are a valuable natural structure. Although they may appear to be waste, they fulfil important ecological and social functions. Branch piles provide habitats for many species. They provide shelter and nesting opportunities for small mammals (e.g. hedgehogs), birds and amphibians. Brush piles are also important for insects and other invertebrates, that in turn support food chains in urban ecosystems. Decaying wood enriches the soil with nutrients, promoting soil life and plant growth. This sets natural cycles in motion even in urban environments. Branch piles create moist and shaded microenvironments that are important during heat waves and droughts.

Many shrub birds also feel comfortable in larger brush piles. The bird nesting season begins in mid-April and lasts until mid-summer. During this time, it is the responsibility of humans to ensure that birds can raise their young in peace. If it becomes necessary to remove (or burn) a pile of brushwood that has been standing for a long time, this must not be done during the nesting season, and at other times, care must be taken to ensure that no one is living in the pile.

Hedgehogs also like to live and be active in sheltered places, such as branch piles, but also under bushes, fences or terraces. When tidying up such places, keep in mind that hedgehogs hibernate until March or April. Hedgehogs usually give birth twice a year (in May and July–August) and usually leave their nest three weeks after the birth of their young. Therefore, litters born in May are likely to be out of the nest by Midsummer, but this does not happen at exactly the same time every year.

Practical observations

People are more comfortable with piles of brushwood and branches if the branches are arranged orderly, giving them a sculptural value. In Tartu, there is a pile of branches in the urban grove in the Vabaduse Puiestik Park where thinner and thicker branches are arranged in a flowing pattern. Children also like this pile of branches.

A pile of branches from tree maintenance in Vabaduse Puiestik Park. Photo: Mana Kaasik, 2022.

Microhabitats

Microhabitats are small, often inconspicuous habitats that arise both naturally and as a result of human activity. Examples include cracks in asphalt and walls, tree hollows, piles of stones, overgrown roadsides and even rainwater puddles. Although small in size, they play an important role in maintaining and promoting biodiversity in urban environments.

Microhabitats provide shelter, food and nesting opportunities for many insects, lichens, mosses, birds and small animals. Often, these are the only places in the city where rarer or more sensitive species can survive. Microhabitats act as stepping stones that connect larger fragments of green space. They help species move and spread across the city, creating a green network.

In Tartu, microhabitats have been created consciously in collaboration with designers, landscape architects and architects. Nature is certainly capable of creating the most suitable habitats itself, but in the city, human influence and aesthetic preferences must also be taken into account. The human eye is more receptive to small, orderly forms created by human hands than to simply disordered piles of branches.

Therefore, habitat design has also been tried in Tartu. ‘Tüvekimp’ (architects Laura Linsi and Roland Reemaa) mimics the verticality of the forest and offers cracks and habitats that fallen tree trunks do not provide. The architectural form helps to reconcile the chaos of nature with the order loved by humans.

‘Lusikas’, created by landscape architects from Tajuruum, is a trench dug across a park path, covered with a metal grate for viewing and crossing. The trench is lined with clay so that rainwater does not immediately seep into the ground. This temporary wetland provides a habitat for species that love moisture. In an otherwise very flat and featureless park, this small depression is a microhabitat that did not exist before.

The solution by the Latvian landscape architecture firm ALPS focuses on connecting the river and the shore. Stones and tree trunks have been used to create a small artificial island at the water’s edge, that serves as a resting place for water birds, whilst life that would otherwise be washed away by the water gathers between and under the stones.



3D-printed ceramics designed by Lauri Kilusk in the urban grove of Vabaduse Puiestik Park. Photo: Mana Kaasik, 2024.

Ceramicist Lauri Kilusk brought ceramic 3D-printed objects to the city park. The sculptural, and porous objects are beautiful, whilst their nooks and crannies provide shelter for insects and other small creatures in the park.

Practical observations

The greatest threat to microhabitats is the desire to tidy them up too much. There are already many microhabitats in cities, and it is important to notice and preserve them. Microhabitats could be additionally planned and created in green areas with very uniform relief and structure. In order for microhabitats to also have aesthetic value for humans, it is worth involving designers, architects and landscape architects in some places.



Leaving fallen leaves in place

At least some of the leaves that have fallen in autumn should be left uncollected. Leaves can be removed from park paths and places where they may become a nuisance, but a thick, undisturbed layer or pile of leaves should be left somewhere over winter. Many insects, worms and small mammals, such as hedgehogs, use this for hibernation. This also allows the leaves to decompose on the spot, and countless microorganisms that are beneficial to us get to work creating humus.

Bumblebees also hibernate among the leaves and branches, as they often have no place to hibernate in cities that have been tidied up too much.

Leaf crushing and discarding should also be reduced. Such activities are noisy and have a negative impact on wildlife.

Practical observations

Leaves should still be removed from park paths. This will prevent the paths from becoming slippery and muddy during autumn rains.

Soil enriched with mycorrhiza

In Maarjavälja, Tartu, experiments have been conducted on adding soil with a mycorrhizal community characteristic of species-rich grasslands to the existing soil before sowing seeds. Soil taken from an area that has been maintained as grassland for a long time contains a new seed bank, and the arbuscular mycorrhizal fungi associated with these species help plants to grow better and promote the restoration of soil life.

Since autumn 2021, leaves have not been cleared from the urban grove at Vabaduse Puiestik Park. Only the paths are cleaned. Photo: Mana Kaasik, 2025.



Jaamamõisa stream, cleaned and supplemented with habitats.
Photo: Mana Kaasik, 2024.

Wetlands

Wetlands, including ponds, ditches and small bodies of water, are extremely important for urban biodiversity. They provide diverse habitats for aquatic life: amphibians, birds, insects and aquatic plants. Even small bodies of water can be the only places where certain species can survive in an urban environment. They also provide feeding and nesting sites and create ecological diversity hotspots.

Small water bodies are essential for frogs and other amphibians (e.g. *Triturus*), whose reproduction process is directly linked to standing or slow-flowing water. The presence of wetlands in cities is often crucial for the survival of amphibian populations. Wetlands provide food, water and nesting opportunities for many birds: they find food on and around the water's surface, but many small birds also use them as drinking places and for catching insects. Wetlands are an important habitat and feeding ground for butterflies, dragonflies, mosquitoes and many other insects, many of which use water bodies for larval development or pollination. Ponds and ditches create growing conditions for reeds, cattails, water lilies and many other aquatic plants.

In Tartu, a shallow pond was created on the banks of the Anne Canal according to the recommendations of scientists, that quickly filled with life and fulfilled its purpose.

Practical observations

When establishing a wetland or shallow pond in a place where there has not been one before, it must be taken into account that this is a completely new ecosystem. This means that in the first few years, faster-growing species such as cattails may take over the wetland. They should be weeded out in the autumn to give other plants a chance to grow. It is important not to leave the weeds on the banks of the same water body, but to take them further away, otherwise the nutrients will still end up in the water. Over time, the community will stabilise and require less and less maintenance.

In order to add microhabitats, stones and tree trunks can be added to watercourses that interact with the water flow.



The second year of a meadow sown from seed. In spring 2024, after cleaning and restoring the Supilinn pond, meadow plant seeds were sown along its banks.
Photo: Mana Kaasik, 2025.

Preference for native plants

When planning urban greening, the use of native plant species is ecologically and socially justified. Native species are adapted to the local climate, soil and other ecosystem conditions, that often makes them easier and more cost-effective to grow than alien species. Native species provide suitable habitats and food sources for many local insects, birds and small animals. This ensures the functioning of ecosystems and strengthens urban green corridors. For example, the caterpillars of some butterfly species, such as the peacock butterfly, feed on nettles. By preserving nettles in cities, we also support butterfly species diversity. Constant mowing and over-maintenance are causing the disappearance of the globeflower (*Trollius europaeus*), that is vital for the globeflower fly. The latter has adapted to this particular plant, and if the globeflower disappears, so will the fly.

Native species have adapted to local climatic conditions and are more resistant to drought, cold and disease. This reduces maintenance costs and the need for chemicals (e.g. fertilisers and pesticides). Alien species can become invasive, threaten local ecosystems and displace native species. Giving preference to native plants helps to prevent such risks. For example, common lupine, Japanese knotweed (*Reynoutria*) and Canadian goldenrod have taken over the habitats of local species. Native species give urban areas a characteristic appearance and help to preserve the natural and cultural heritage of the region.



A combination of native plant species next to Tartu Cathedral.
Photo: Mana Kaasik, 2024.



Practical observations

There are native species sold in nurseries, but with the landowner's consent, they could also simply be brought into the city from the wild. Based on Tartu's experience, shrubs and undergrowth brought from the forest have grown better in shady park areas than those brought from nurseries. In Tartu, meadows have been created with native species, and shade-tolerant native shrubs (e.g. common rowan, common bird cherry, common hazel) and herbaceous plants (e.g. musk strawberry, wood anemone, common hepatica) have been replanted from nearby clear-cut forests.

Globeflowers, cowslips, hepatica, anemone, etc. could also be planted in the lawn and under shrubs, as they bloom in spring and provide early visual appeal and food. It is important to note the growing conditions of the transplanted plants. For example, globefowers love moisture, whilst hepatica and wood anemones tolerate shade well. Suitable conditions should be found for them.

Over the years, a variety of understory plants have been relocated to the urban grove at Vabaduse Puiestik Park from other areas. The vegetation has been able to grow undisturbed. Photo: Mana Kaasik, 2022.



Adding greenery as curated compositions

It may be necessary to enrich an existing plant community mainly to make it more acceptable to the human eye. The fastest results can be achieved by planting ready-grown seedlings or creating completely new communities. For example, this may be necessary in central grasslands to extend and enrich the flowering period of the vegetation cover: add spring flowers so that the area starts flowering earlier. In general, the use of native species that can compete with existing fast-growing grasses gives more reliable results. More cultivated and delicate species tend to lose out to grasses.

More extensive planting areas or flower beds can also be created by planting groups of the same species. The aim is to appeal to the human aesthetic sense whilst providing ecosystem services to pollinators and birds.

The urban grassland in Uueturu Park in Tartu is based on this principle: a new ecosystem with cultivated varieties of native species. It is a park area with diverse vegetation, where natural communities are mainly imitated with native plant species. The urban meadow has been designed to offer something beautiful to look at at all times of the year. This could be flowers, leaves with interesting structures or distinctive colours. The species have also been selected to enrich the food supply for pollinators. Trees, shrubs and herbaceous plants are important in urban green spaces. They are arranged in such a way as to create dense, varied groups of plants.

In 2021, volunteers helped replant understory species gathered from nature and shade-tolerant perennials sourced from home gardens in the urban grove at Vabaduse Puiestik Park.
Photo: Evelin Lumi.

Practical observations

In Tartu, for example, plant communities have been successfully and sustainably established using seedlings of native plant species or their cultivated varieties from nurseries and tree nurseries: oregano, *Achillea*, tansy (*Tanacetum vulgare*), lady's mantle, columbine, forget-me-not, *Sedum*, cowslip, globeflower, common mullein.

A selection of native flowering plants that could be planted in larger patches: lily of the valley (poisonous berries!!!), common anemone, yellow anemone, *Hepatica*, cowslip, yellow chamomile, daisies, globeflower, forget-me-not, common mullein. In spring, green spaces can benefit from less demanding varieties of tulips, wild tulips, crocuses and daffodils, but also *Hepatica*, wood anemone, Solomon's seal (*Polygonatum*). The latter competes very well with ground elder – *Aegopodium podagraria*).

Wilted plant parts should only be cut back in spring, as they provide shelter for overwintering insects and their seeds are a good source of food for birds in winter. Plants of different heights and structures are also pleasing to the human eye, and they also provide themselves with winter cover.

In the first few years, such communities need supportive maintenance: before the plants grow large and dense, it is necessary to weed out self-sown ruderal plants a few times. During planting and in the event of a dry summer, watering is necessary for a few weeks afterwards to allow the plants to take root.



Urban grassland in Uueturu Park in the summer of 2025.
Photo: Mana Kaasik.



Reducing paved surfaces

There is a lot of hard surfaces in urban environments, such as asphalt, concrete and other paving. Extensive hard surfaces cause the heat island effect, i.e. they heat up significantly more in the sun than green environments and raise the air temperature of the surrounding urban space. Reducing hard surfaces, breaking them up with greenery and expanding green areas can help to solve and prevent this problem.

Hard surfaces also prevent water from naturally seeping into the soil, causing excess water to accumulate and flooding. Green areas allow rainwater to be absorbed, reducing the load on stormwater systems. Green areas cool and humidify the air and provide shade for people and other urban species on hot summer days. Vegetation binds carbon dioxide and pollution particles and provides habitats for various species. In this way, green areas support biodiversity and help improve air quality.

Green areas that replace pavement offer residents opportunities for recreation, increase visual diversity and improve the aesthetic appearance of the city. This, in turn, supports the mental and physical well-being of residents. Removing hard surfaces and covering the soil with vegetation allows natural ecosystem services to be restored, including carbon sequestration and nutrient cycling.

Good examples are given in Tartu in recent years with street reconstruction projects, where the minimum area necessary for traffic has been paved, leaving room for landscaping on the streets.

Practical observations

It is worth using native species along streets that can tolerate poorer conditions, such as salt in winter or being run over by cars. It is worth taking inspiration from the communities growing by the sea. In Tartu, for example, despite the harsh conditions, both leymus grasses and native rosehip varieties, as well as purple willow, thrive.

In addition to the street and sidewalk, the renovated Oa street now also features extensive street greenery (designed by Kino Landscape Architects). Photo: Mana Kaasik, 2025.



During the reconstruction of Veski Street, space was also made for landscaping. The spacious asphalt intersection, that was previously difficult for pedestrians to cross, now even has a small pocket park (project designed by Roadplan). Photo: Mana Kaasik, 2023.



Information and cooperation

When increasing biodiversity, it is also important to inform and continuously explain why something needs to be done. Informative signs are particularly effective. Tours, articles, social media posts, press releases and responses to negative criticism are also relevant. Together with city residents, you can sow, plant, mow or build, thereby explaining the main objectives and working methods of the activities and increasing the sense of place. These are all necessary measures to bring about a change in mindset and to see the city as part of a wider ecosystem. Often, biodiversity in the city looks unfamiliar, a little dangerous, reminiscent of neglect, and generates a lot of discussion and criticism. Targeted and informed communication helps to avoid confusion. People's fears are often linked to ignorance, so it is necessary to raise awareness and address the fears that have arisen.

Mowing with a scythe helps to preserve biodiversity. Mowing in the urban meadow of Uueturu Park. Photo: Nele Tammeaid, 2022.

Frequently asked questions



Riparean species in river Emajõgi near the Vabaduse Puiestik Park.
Photo: Mana Kaasik, 2025.

Why do we need biodiversity?

Scientific research generally confirms one thing: contact with nature and spending time in nature in the city helps people relax and recover from mental stress. It has also been shown that children in more biodiverse environments are healthier and have fewer allergies. A connected green network, where parks, squares, gardens, forests, meadows, bushes and street edges form a continuous green wave, gives people the opportunity to constantly move around in green spaces in the city.

If children grow up in a lifeless environment, this becomes normal for them and they do not know how to demand a better environment. The more biodiverse a city is, the calmer its residents are and the healthier they are, both mentally and physically. A good city is one where you don't have to escape to nature in the evenings and on weekends; it is important to be able to be surrounded by biodiverse nature in the city, even more so in the city centre.

There is plenty of biodiversity outside the city!

There exists a myth that there is enough biodiversity around cities and that everything you need to relax is just a short drive away. Unfortunately, we are no different from the rest of the world in this respect. Large fields with monocultures and new residential areas surrounded by lawns are increasingly dominating the areas around cities.

It should be possible to enjoy the benefits of nature without owning a car and without having to take a special trip. It is precisely for these reasons that biodiversity needs to be promoted in cities.



Urban wildlife in Uueturu Park. Photo: Mana Kaasik, 2025.



Mushrooms on a tree trunk in the urban grove of Vabaduse Puiestik Park. These mushrooms were not among park wildlife before. Photo: Mana Kaasik, 2025.

Why should biodiversity be promoted in cities?

Scientific articles highlight that the establishment of suburbs and the growth of cities have a devastating impact on biodiversity. Many natural areas are destroyed by fragmentation, road construction, the establishment of car parks and the erection of buildings. However, it has been pointed out that cities can offer a better habitat for many plant and insect species due to the diversity of the urban environment and its unique environmental conditions compared to the often intensively farmed landscapes surrounding cities. Many species can be found primarily in cities, as this is where they find the most suitable living conditions. Therefore, it is also necessary to work on preserving, supporting and increasing biodiversity in cities. Large areas of land are not needed to promote biodiversity; small corners and strips of land are sufficient.

Biodiversity in the city is ugly! The city looks neglected and overgrown!

For a very long time, green areas in cities have been designed and planned with conservative standards of beauty in mind. Over time, an understanding of what is appropriate in the city and what is not has developed. For example, it is believed that mowed grass is good, whilst overgrown grass is bad, signifying neglect, abandonment and a careless owner. We are used to thinking that species and varieties imported from abroad are suitable for the city, but that there is no place in the city for local bellflowers or daisies. The ecological aspect has so far been largely irrelevant in the design of parks and gardens. Unfortunately, the principles that have brought us here will not take us any further. The current role of urban greenery needs to be turned upside down and we need to think first and foremost about how urban landscaping can help us alleviate current problems: reduce heat islands, provide shade, help slow down the loss of biodiversity, and absorb rainwater.

So what's wrong with lawns?

Measurements taken in Europe show that 50–70 per cent of urban green areas consist of intensively mowed grass. We don't have specific local data, but there is no reason to believe that there is less lawn here. Lawn is the main 'green material' in parks, traffic islands, private gardens and around industrial buildings, forming an inconspicuous backdrop to the urban environment. Mowed grass is nothing more than a decorative backdrop, but grasslands could be so much more: they could support the urban ecosystem. The most species-rich plant community in Estonia is the Laelatu wooded meadow, where 74 plant species have been found per square metre; our usual mowed lawns, for example, have 3–7 species.

If you want to make room for shrubs and trees in the city, one way to do so is to sacrifice your lawn. Plants never bloom in a closely mowed lawn, so they do not provide food for pollinators. Insects and animals cannot find shelter in short grass. Frequent mowing makes green areas drought-prone. Based on the examples of projects in Tartu, it can be said that areas that were not mowed withstood the heat better. If you take a picture with a thermal camera on a hot day, you will see that the hottest places after pavement are mowed lawns. Not mowing reduces the surface temperature by several degrees, and trees, shrubs and rich grass vegetation are key factors in making a city more pleasant.

But there must also be trimmed grass in the city! Grass is essential for urban green spaces – where else can you play ball games, lie down, or have a picnic? But only where it is actually used.



In Tartu keskpark, grass grows side by side with a simple urban meadow.
Photo: Evelin Lumi, 2020.

What do tourists think of our overgrown parks?

Similar measures to increase urban biodiversity – leaving grass uncut, creating urban meadows, etc. – are being implemented in almost all European cities. Behind the Royal Palace in Oslo, there are areas that are mowed once a year, where ground elder blooms in all its beauty. In London, behind Buckingham Palace in Hyde Park, there are both fallen trees and mowed areas. All in the king's own backyard. Zurich, one of the richest cities in the world and considered one of the most liveable cities, systematically invests in the biodiversity of its urban greenery. This means less mowing, favouring native plants, creating meadows, bee gardens, dead hedges, deadwood, rain gardens, living with thistles, *Achillea*, dandelions and nettles. We are equal dialogue partners to these distinguished European capitals, because the art of dealing with green issues is currently, and unfortunately will continue to be for a long time to come, a matter of survival.



Ueberlandparks in Zurich. A biodiverse linear park was created above the motorway, featuring innovative ecosystems, places for deadwood and meadows. Concrete benches are designed with cracks where insects can hide. Design by Agps architecture and Kerbs und Herde Landschafts-architecten. Photos: Merle Karro Kalberg.

Oh my God, ticks!

Although tall grasses can provide favourable living conditions for ticks, studies do not confirm that less frequent mowing would lead to an increase in the number of ticks in cities. Tall grass does not produce ticks, they are brought into the urban environment by their host animals. Biodiverse plant communities actually help to curb the spread of ticks and pathogens, as they increase the abundance of animal species that feed on ticks. People themselves also have a role to play in reducing risks – when spending time in natural environments, always check your clothing and remove any ticks immediately.

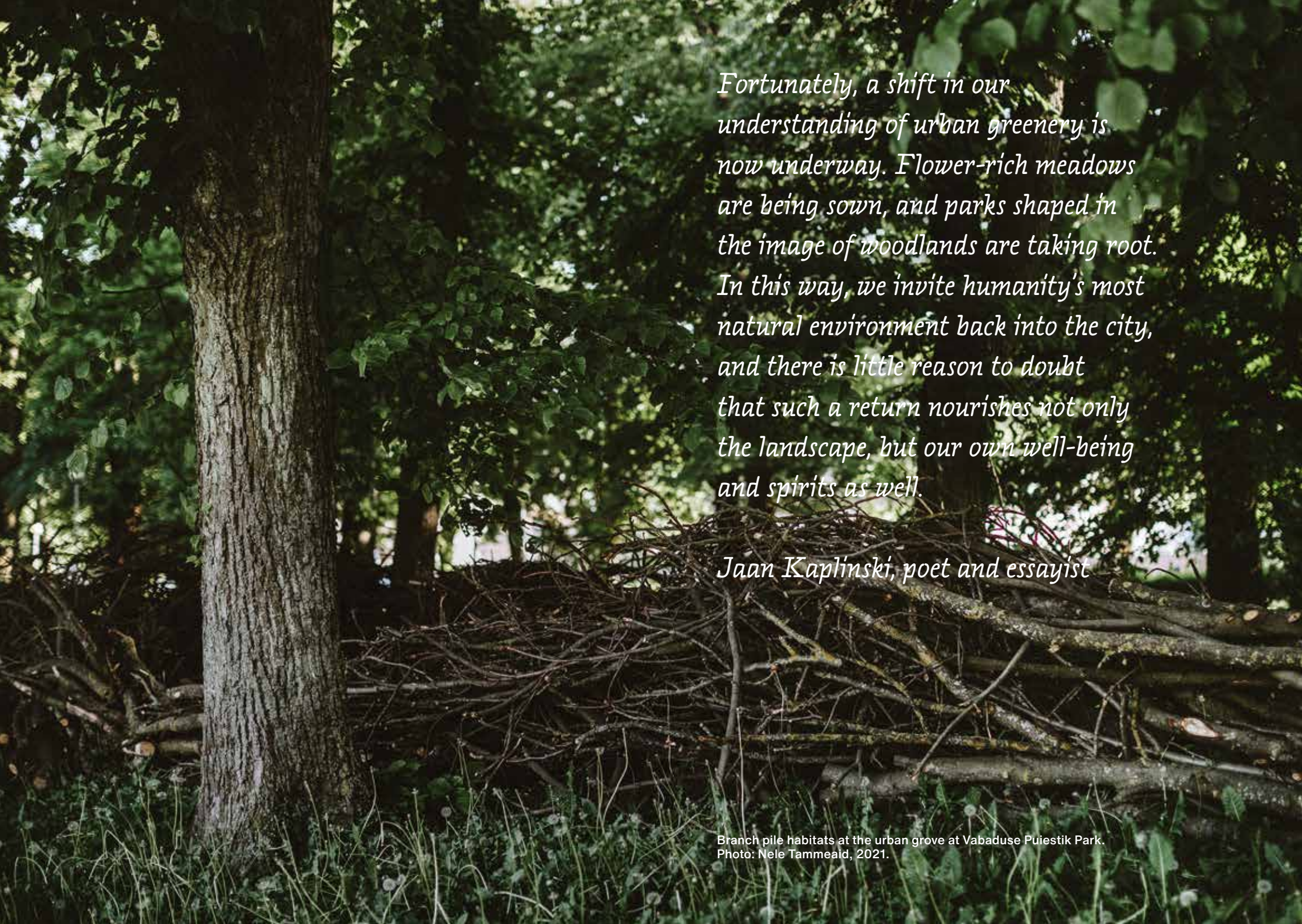
Ticks move very little on their own – only up to 10–15 metres in their entire lifetime. Most of the time, they stay on the ground, where they climb onto blades of grass in damp and cooler weather to wait for passing animals. The spread of ticks is closely linked to the movement of host animals. In urban environments, their main carriers are domestic animals, which means that the presence of ticks is directly dependent on the movement patterns of humans and their pets.

After five years of implementing biodiversity enhancement measures in the centre of Tartu, a tick survey was conducted. The result was that not a single tick was found at our biodiversity sites. Therefore, based on our experience, it can be said that taller grass and biodiversity measures have not increased the number of ticks. The survey collected three ticks from the entire territory of Tartu altogether.



Pollinator census in the urban meadow in Uueturu Park. Photo: Mana Kaasik, 2023.

Biodiverse urban landscaping that has developed naturally in Tartu on the banks of the Emajõgi River. Photo: Mana Kaasik, 2023.



Fortunately, a shift in our understanding of urban greenery is now underway. Flower-rich meadows are being sown, and parks shaped in the image of woodlands are taking root. In this way, we invite humanity's most natural environment back into the city, and there is little reason to doubt that such a return nourishes not only the landscape, but our own well-being and spirits as well.

Jaan Kaplinski, poet and essayist

Branch pile habitats at the urban grove at Vabaduse Puiestik Park.
Photo: Nele Tammeaid, 2021.