Biodiversity in practice

From loss to gain

The right tools make biodiversity assessments more precise and efficient. Meet Anton, specially trained to find endangered animal species.

With about €9 trillion in infrastructure investment needed from 2025–2040, future development projects must embed biodiversity, carefully sited, designed and operated to reconnect ecosystems.

Biodiversity planning and design principles are about avoiding and reducing harm, amplifying benefits, and making choices that stand the test of time.

Increasing demand for biodiversity data requires innovative approaches to nature inventories, including leveraging NatureTech. Explore European case studies featuring drones, eDNA, and AI.

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Foreword: Momentum for action

Across Europe, a clear shift is underway in both policy and practice. The private sector is showing growing interest in biodiversity, viewing it as a business imperative: managing biodiversity-related financial risks makes good business in the long term, while offering real opportunities to innovate and create value. Many companies that once lacked biodiversity policies are now developing concrete commitments, driving investment and new ways of integrating nature into infrastructure and business development.

At the same time, public interest in biodiversity is surging. People are increasingly aware not only of ecological limits but also of nature's intrinsic value—from butterflies and bees to wetlands and meadows—and nature's role in human health. This cultural shift reflects a growing demand for nature-enhancing development and for greater accountability from both businesses and governments.

In development projects, by considering biodiversity from the very start, project owners and developers can help safeguard the essential services that healthy ecosystems provide—clean water, fertile soils, climate regulation, and more—while upholding our responsibility to future generations. Sweco's approach is rooted in interdisciplinary collaboration, technical expertise, and tangible outcomes. In development projects, Sweco together with clients focus on the opportunities that arise when nature is integrated into planning and development: adopting nature-based solutions that restore urban and rural ecosystems, using digital technologies and data-driven insights to enhance biodiversity outcomes, and designing infrastructure that supports both ecological and human well-being. Sweco supports clients with practical tools and methodologies—such as GIS-based biodiversity mapping, ecosystem service models and science-based targets—and works alongside project managers to embed biodiversity into every development project phase.

Many municipalities have already taken big steps to support biodiversity. Despite local progress, there remains a lack of cohesive strategies, methods and financing mechanisms to turn ambition into large-scale impact. All development projects need to pick up the pace and put biodiversity first, aligning policies, budgets and planning frameworks to meet biodiversity goals.

This report highlights a range of built environment projects that showcase innovative ways to enhance and restore biodiversity. These examples offer inspiration, but scaling them up will require a biodiversity-first approach—one that recognises nature's value in every decision. Biodiversity is complex, and no single model fits all. What works in a city may differ from what benefits rural areas. Understanding local contexts and the role of native species is crucial to achieving lasting, meaningful results. Often, lighter-touch management delivers better biodiversity outcomes.

This report is part of our biodiversity series. The previous reports—"The Five Key Trends Driving Europe's Biodiversity Agenda" and "Biodiversity: Key Steps to Future-Proof Your Business"—highlight the urgency of tackling biodiversity loss and European trends in bending the curve, as well as the business risks and opportunities linked to biodiversity impacts and dependencies. Together, they support developers in integrating biodiversity into decision-making, design, and planning to future-proof operations. In this report, Sweco, Europe's leading architecture and engineering consultancy, has compiled best practices from our client projects within buildings and urban areas; water, energy and industry; and transportation infrastructure, drawing on our experience from thousands of development projects. This report offers practical guidance for public and private development actors, outlining how to turn growing awareness into effective, coordinated action through better planning, collaboration, financing, and integration of biodiversity at every stage of development.

> "Nature is under pressure. Sharing what Sweco knows about concrete solutions for increased biodiversity is one way for us to help shift the needle from loss to gain. I hope you will get inspired by "the smorgasbord" of solutions and find use for them in your organisation.
>
> Andreas Gyllenhammar, Sustainability Officer at Sweco

Where infrastructure and nature connect:

Achieving biodiversity targets by 2030

Europe must modernise its roads, rails, energy and water systems while safeguarding nature. With about €9 trillion in investment needed from 2025–2040, future projects must embed biodiversity and be carefully sited, designed and operated to reconnect ecosystems.

From threat to opportunity: Rethinking the built environment

Infrastructure is the foundation of a productive, inclusive society supporting daily life and economic growth. Modern infrastructure—from roads, energy and water systems to industrial and urban areas—is increasingly being designed not only for function and efficiency, but also in harmony with nature. This shift reflects a growing awareness that a well-planned built environment can both meet human needs and strengthen biodiversity.

Roads, railways, energy and water infrastructure fragment landscapes and create barriers that hinder the movement of species. At the same time, large-scale development leads to the loss or degradation of key habitats such as wetlands, forests and grasslands, pushing many species into decline. Beyond this, infrastructure, including also industrial and urban environments, contributes to various forms of pollution and disturbance.

Careful site selection and thoughtful placement of development within a site can help avoid harming habitats that support high biodiversity. By designing with ecological connectivity in mind, species movement across landscapes can be maintained—helping to preserve genetic diversity, the foundation of healthy, resilient ecosystems. At the same time, integrating green corridors, wetlands, and forest restoration into planning can create valuable habitats and even reverse local declines in wildlife.

By reducing noise, light, and chemical pollution, and by managing stormwater more intelligently, we can further minimise disturbances and protect sensitive species. New technologies and materials, as well as circular economy, also make it possible to reduce impacts throughout the value chain, from construction to operation.

In this way, the built environment becomes part of the solution rather than the problem, supporting ecosystem services that help society adapt to climate change and other environmental challenges. Every new project, whether in transport, energy, industry, or urban development, offers an opportunity to design for both performance and biodiversity, ensuring that development projects and nature go hand in hand.

Principles for increasing biodiversity

Three principles - avoid negative impacts, minimise negative impacts and maximise positive impacts, guide decision-making throughout development projects to ensure that biodiversity is embedded into the heart of the project. The goal is to work together to create solutions that actively strengthen biodiversity and societal resilience.

THE THREE PRINCIPLES:

Avoid negative impacts 01

To avoid negative impacts, developers must ensure that location and design are guided by a detailed understanding of potential ecological impacts at the very start of the project. Avoid, where possible, land and sea use change, pollution, overuse of materials - particularly virgin raw materials - and enabling the spread of harmful species.

Minimise negative impacts 02

When avoiding negative impacts on biodiversity is not possible, reduce them by using land and resources sustainably, implementing circularity principles and minimising pollution and emissions that affect ecosystems.

Maximise Positive Impacts 03

After avoiding and minimising negative impacts, implement strategies that actively contribute to restoring and conserving biodiversity. This may include creating protected areas, promoting sustainable land use, choosing nature-based solutions and supporting research and education. Also consider increasing the focus on 'multifunctional' habitat creation. Prioritise natural vegetation and native plants, combined with ecological landscaping/managing.

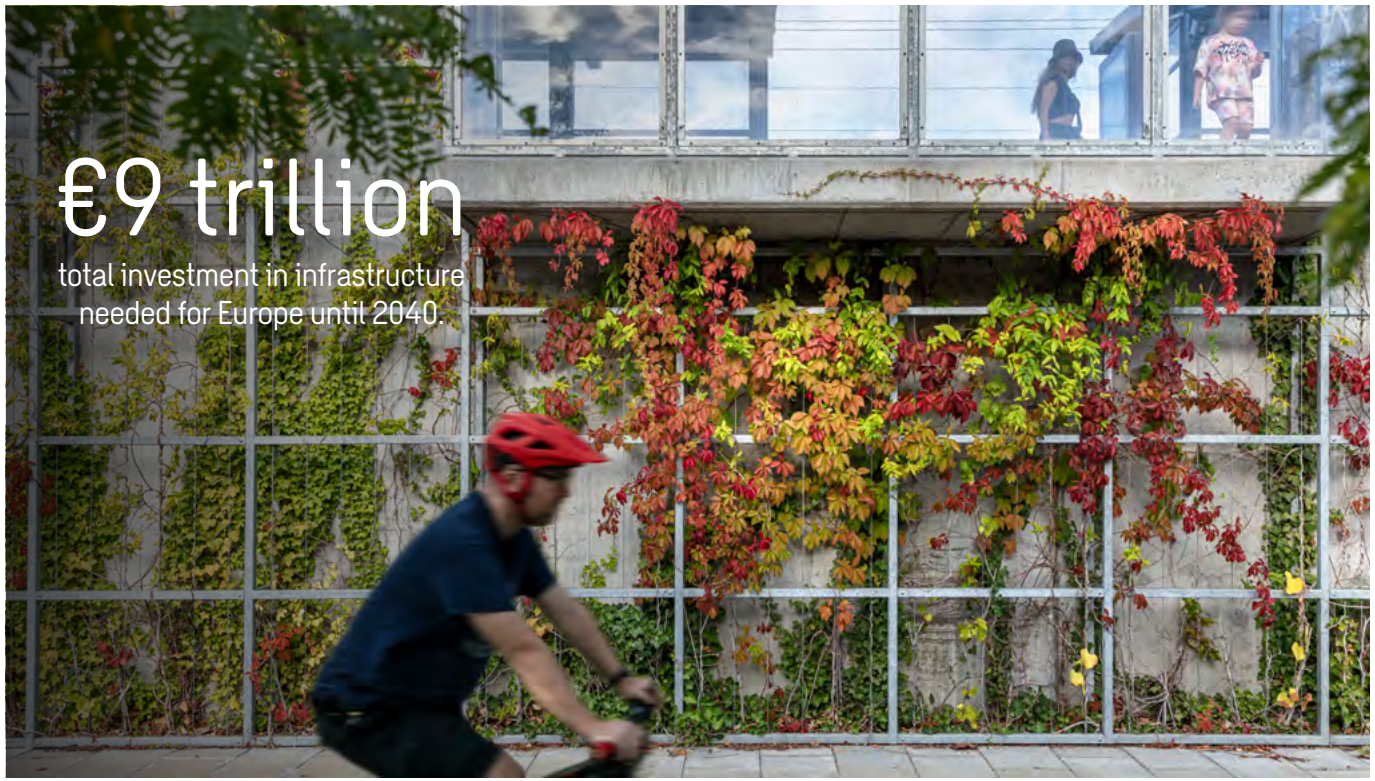
Solutions aimed at adding value to nature could generate nearly **€10 trillion** in business value and create **395 million** new jobs globally by 2030.[1]

Key drivers: Regulatory, financial, social and technology drivers

As Europe seeks to close its infrastructure gap, biodiversity has become a central concern. New EU regulations ensure that investments are no longer measured solely in economic terms, but also in how they affect ecosystems. The EU Biodiversity Strategy for 2030, the Nature Restoration Law and the EU Taxonomy together provide a policy and regulatory framework for ecosystem protection and restoration.

Maintenance and investments in Europe's infrastructure, from roads and railways to energy, have long fallen behind. The need for reliable and efficient infrastructure has been further accentuated by geopolitical uncertainty and heightened security risks. The total investment in infrastructure needed for Europe from 2025 until 2040 is estimated to be around € 9 trillion, according to The World Bank's Global Infrastructure Outlook[2].

As Europe seeks to bridge its infrastructure investment gap, biodiversity considerations are becoming increasingly important. The UN Global Biodiversity Framework (GBF) and targets agreed in Kunming-Montreal in 2022 aim to halt biodiversity loss by 2030. Specific targets under the GBF include, for example, conservation of 30% of land and water areas, as well as restoring 30% of degraded ecosystems.[3]



The EU Biodiversity Strategy for 2030, the Nature Restoration Law and the EU Taxonomy together provide an important policy and regulatory framework for ecosystem protection and restoration. New EU regulations ensure that investments are no longer measured solely in economic terms, but also in how they affect ecosystems.

However, regulation is only one of several key drivers accelerating change—and there is no time to wait for it to catch up. Financial and market incentives, including the EU Green Deal, sustainable finance criteria and investor pressure, are pushing companies to demonstrate nature-positive outcomes. Future investments must integrate biodiversity as naturally as climate targets and technical functionality. RESTORE, the first European investment vehicle dedicated to biodiversity restoration and conservation, along with the EU Nature Credits Roadmap, are some of the measures aimed at directing more funding to biodiversity efforts. Corporate sustainability goals and biodiversity reporting standards, such as the European Sustainability Reporting Standards (ESRS) and the reporting framework by the Taskforce on Nature-related Financial Disclosures (TNFD), are making biodiversity a strategic business issue.

Public awareness and stakeholder expectations are also growing, with cities, inhabitants and communities demanding solutions that deliver both ecological and social benefits. Meanwhile, technological innovation and nature-based design practices are enabling solutions that strengthen both resilience and biodiversity.

Together, these regulatory, financial, social and technological drivers are shaping a new European built environment, one that moves beyond compliance to actively contribute to ecosystem restoration and long-term value creation.

From knowledge to action: Best practices across Europe

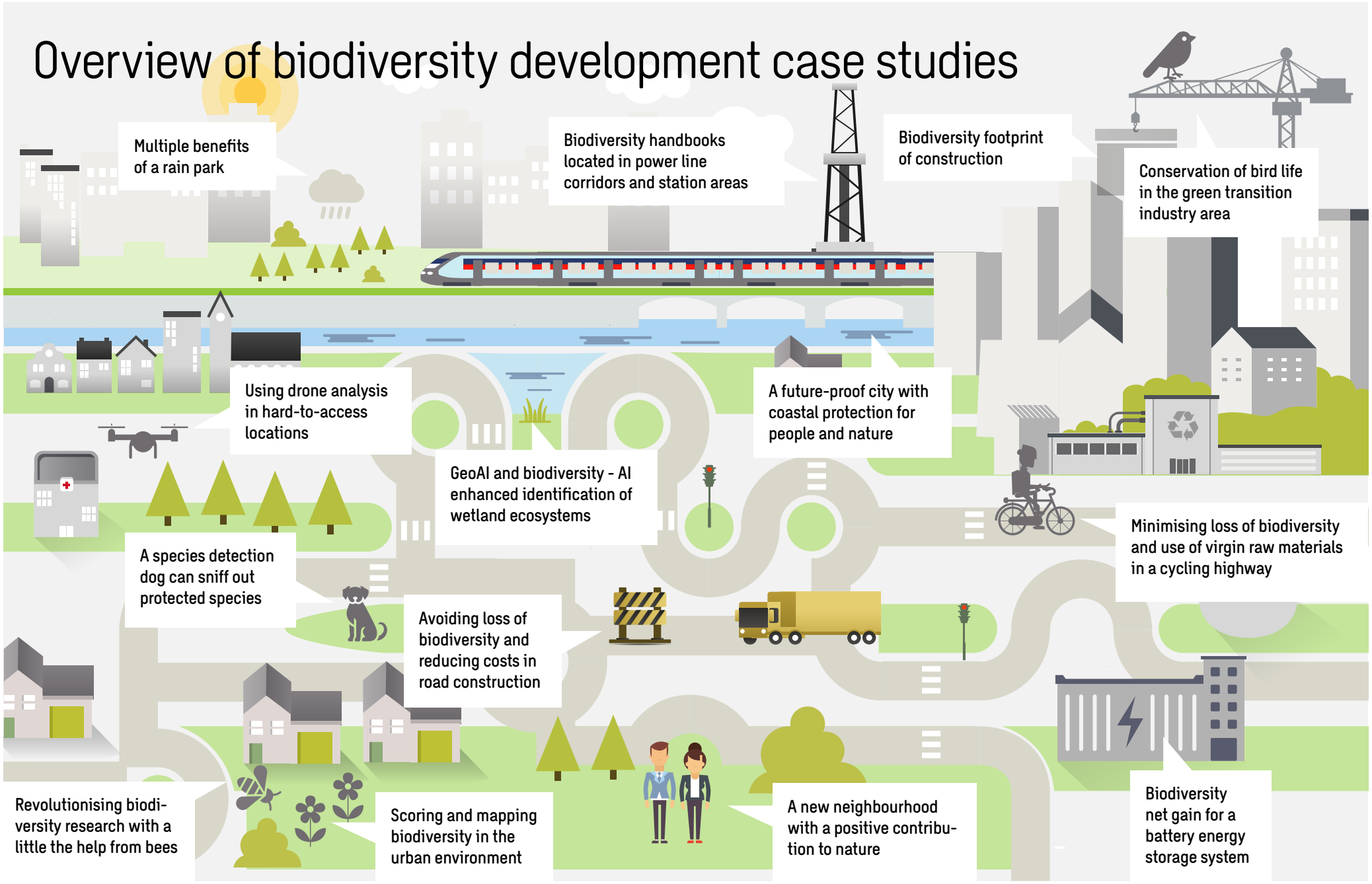
Embedding nature in all phases of development projects ensures long-term resilience. NatureTech can be used to optimise and enhance data collection, providing reliable data to measure biodiversity impacts for informed decision-making. Innovative solutions minimise negative impacts and maximise positive outcomes during project implementation.

Understand nature is vital to sustainable design and development. Optimising nature inventories is the first step: a thorough understanding of species, habitats and ecological interactions allows developers to take the right actions. Challenges often arise, such as how to conduct inventories cost-effectively in remote or hard-to-access areas, or how to analyse large datasets efficiently. Practical solutions highlighted in the next chapter include environmental DNA (eDNA), drone and AI-enhanced analyses, and even detection dogs for locating elusive species. These tools make biodiversity assessments more precise, efficient and scalable. Yet even as new tools are developed, data must still be evaluated and interpreted by biologists and biodiversity experts.

Once reliable data is in place, it is crucial to measure biodiversity from loss to gain. Quantifying impacts and improvements allows for informed decision-making and monitoring of outcomes. Methods such as biodiversity footprint calculations and offset systems provide a framework for evaluating interventions across value chains. Examples of offsetting systems include the UK's mandatory 10% biodiversity net gain and Finland's voluntary ecological compensation system. This report explores tools like biodiversity net gain for site selection, the Naturepoint system in urban areas, and biodiversity footprint assessments for construction materials. Comprehensive measurement supports a holistic approach that considers multiple ecological and societal gains beyond a single sustainability metric.

Finally, during the design phase, innovative solutions to avoid, minimise and enhance biodiversity can be incorporated. Avoidance is always the priority, but when impacts cannot be avoided, harm must be minimised. While some solutions are transferable, biodiversity's complexity requires context-specific approaches. Addressing these challenges cannot be left to biologists alone; a multidisciplinary approach that brings together technical and non-technical disciplines is essential for success. This report presents practical examples across urban planning, industrial sites, energy infrastructure and transportation projects, demonstrating how tailored strategies can protect and enhance biodiversity in diverse settings.

Overview of biodiversity development case studies



Data and knowledge:

Smarter nature inventories for better decisions

The increasing need for obtaining biodiversity data and optimising resources requires innovative approaches to nature inventories. In this chapter, explore case studies from Europe featuring drones, detection dogs, eDNA and AI.

CASE **Germany**

Conservation's best friend–Detection dogs protect biodiversity

During the approval and construction process for wind turbine, the Europe-wide protected hazel dormouse *(Muscardinus avellanarius)* must often be taken into account. The dormouse, only 6-9 cm long, builds summer nests in the underbrush of light forests, at their edges, and in clearings, where it raises its young from April to September. In September and October, the animals retreat into ground nests, where they hibernate.

To ensure no animals are harmed during wind power construction, vegetation in areas with hazel dormouse habitats is cleared during the period when when the species moves from summer to winter nests. But since the animals are rarely seen by the human eye, how can one be sure they are no longer present during clearing? That is where wildlife detection dogs come in– they are trained to sniff out the presence of hazel dormice or their nests. Lagotto male Anton is one such detection dog, specially trained to find endangered animal species. He can locate tiny nests in the leaves and search efficiently across large areas.

Dogs have an exceptionally strong sense of smell and can be trained to locate specific animal scents, making them valuable for biodiversity work such as surveying and monitoring rare or threatened species. By identifying target scents and tracking elusive wildlife, detection dogs help conservation teams gather data on populations and improve protection efforts. As a permanent employee of Sweco in Koblenz, Germany, Anton regularly assists in searches for hazel dormice, lizards, snakes, or stag beetles.

Credits Patrick Leopold, Sweco

Did you know?

The hazeldormouse is native to Europe, and its populations suffer from the fragmentation of their natural habitat due to forestry, agricultural and urbanisation. The species contributes to pollination, as it feeds on flower pollen, and is serves as major prey for raptors, weasel and wildcats.[4]

> **"Working with the search dog is a team effort. To have a certificate for the team, an extensive training period with tests is required as well as yearly follow-ups.**
>
> Patrick Leopold, animal ecologist and environmental consultant, Sweco

CASE **The Netherlands**

Drones map remote habitats for nature insights

The energy transition is in full swing, and efficient ecological research is crucial to ensure that projects progress smoothly. For the upgrade of the 42 km, 380 kV transmission line between Doetinchem and Dodewaard in the Netherlands, drones were used to effectively map the local ecology.

In this project, Sweco deployed drones to support ecological assessments for the high-voltage grid. These drones proved instrumental in identifying nests of protected birds in the transmission towers. When birds were present, high-definition cameras enabled accurate species identification and even the presence of eggs in nests, insights which would be impossible from ground-based inspections.

High-resolution orthomosaics of the project location were created during these field visits, providing a comprehensive digital overview with resolutions of up to 1 cm. This precision enabled ecologists to examine the site in depth and observe even the smallest features. Crucially, all of this was conducted non-intrusively from higher altitudes, ensuring that local flora and fauna were not disturbed.

Drones are increasingly employed in ecological research to map habitats efficiently and gain insights into plant communities—through both manual analysis and AI-powered identification of invasive or rare species. Thermal imaging is another valuable application, enabling the efficient detection of animals and their burrows or setts. These advanced techniques ensure accurate and rapid ecological assessments, providing new perspectives while maintaining safety and minimising disturbance to the environment.

Did you know?

Between 1990 and 2023, the index of 168 common birds included in the EU monitoring scheme decreased by 15%. To reverse the decline in populations of common birds by 2030, accelerated action is needed, such as new conservation and restoration measures.[5]

> **“ It's been almost 10 years since TenneT signed the national Green Deal Infrastructure. This initiative aims to improve biodiversity around our infrastructure. Together with all stakeholders, we want infrastructure management to go hand in hand with improving biodiversity and nature development. Drones are increasingly being used for maintenance and inspections. The fact that this is now also being applied to the ecological research necessary for replacing conductors to increase power capacity feels like a logical next step, allowing us to conduct ecological surveys even more accurately and without harming permanent flora and fauna.**
>
> Pauline Sterk-Tiecken, Community Relations Manager, TenneT TSO B.V.

CASE **Finland**

Revolutionising biodiversity research with a little help from bees

In a unique project, Sweco's experts have teamed up with leading specialists to turn bees into biodiversity researchers. This initiative is part of the Pirkkala-Linnainmaa Alliance of Tampere Tramway, which is planning and constructing the expanding tram route in Tampere, Finland.

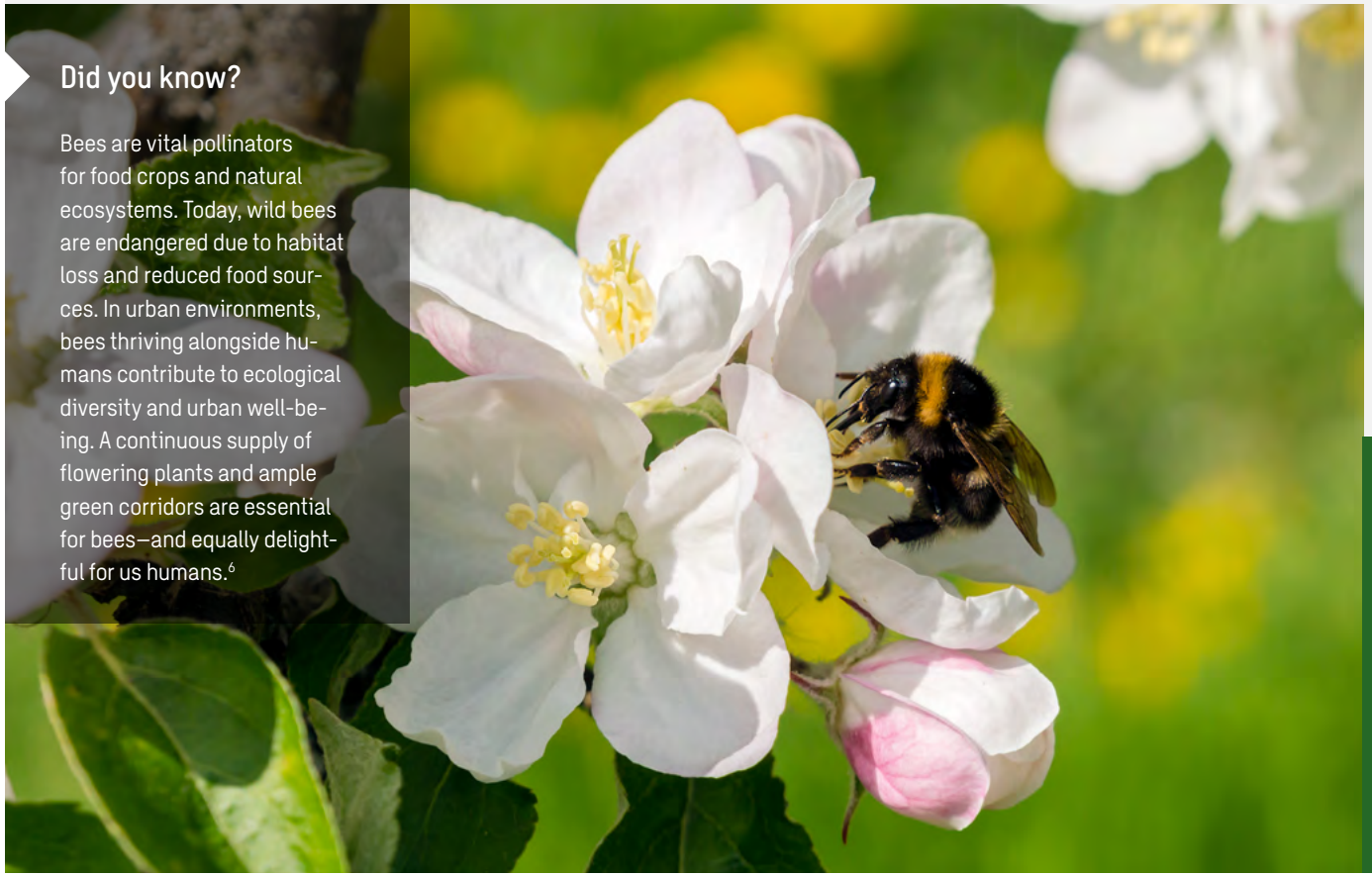
Using bees for eDNA-based research is the first project of its kind in similar infrastructure projects in Finland. The bee study supports the alliance's goals of discovering innovative solutions that integrate biodiversity considerations from the outset of the project.

The alliance partnered with Finnish HumbleBee Housing Project to explore how bees can actively contribute to the construction project, rather than being powerless bystanders. The research is conducted by the French laboratory Apilab, which specialises in bee-assisted biomonitoring methods. This technology-driven approach enhances understanding of plant-pollinator interactions and urbanisation impacts on natural habitats.

Two species of bees have already spent their first season in the bee towers located near the Tampere Tram construction site: mason bees and bumblebees, both native to Finland. The busy research bees return not only with pollen but also with plant eDNA from their foraging trips. By analysing this pollen using eDNA technology, experts can determine which plants the bees visit and assess how tramway construction impacts local vegetation and the bees' habitats.

The primary goals of the project include tracking plant diversity, detecting environmental changes, and identifying conservation needs throughout the multi-year construction period. Initial results have already uncovered intricate patterns of bee movement and valuable insights into how the construction site can be developed in a more pollinator-friendly direction.

The research will continue through at least the first phase of tramway construction in 2025–2028.



Did you know?

Bees are vital pollinators for food crops and natural ecosystems. Today, wild bees are endangered due to habitat loss and reduced food sources. In urban environments, bees thriving alongside humans contribute to ecological diversity and urban well-being. A continuous supply of flowering plants and ample green corridors are essential for bees—and equally delightful for us humans.[6]

> **"The importance of urban greening becomes more prominent with future challenges such as heatwaves and flood forecasting. Having bees collect undeniably accurate environmental data contributes to our mission to further improve environmental management and the resilience of urban areas.**
>
> Jyrki Lehtimäki, Urban green expert at Tampere city

CASE Sweden

AI meets ecology–Identifying wetlands with GeoAI

In Sweden, Sweco carried out a mapping of Gotland's alkaline fens (rikkärr) using GeoAI. Alkaline fens are a key wetland ecosystem on Gotland and biodiversity hotspots, hosting a specialised and species-rich flora. These fens are mineral-rich (typically calcareous) with a relatively high pH (6-8). Drainage, intensive agriculture, lapsed active management and eutrophication have all contributed to a serious decline of alkaline fens in Europe. The County Administrative Board of Gotland sought to identify any alkaline fens missing from earlier inventories.

Sweco´s assignment consisted of mapping unknown potential alkaline fens and assessing their ecological status, using remote sensing in aerial photos and other available geospatial data. The analysis combined two AI methods: machine learning, which is a well-known but iterative and manual method, and deep learning, which requires more annotated training data and longer training times but can offer higher accuracy. The methods were tested separately and in combination. The combined approach, where outputs from the traditional method were used to train deep learning models, proved most effective.

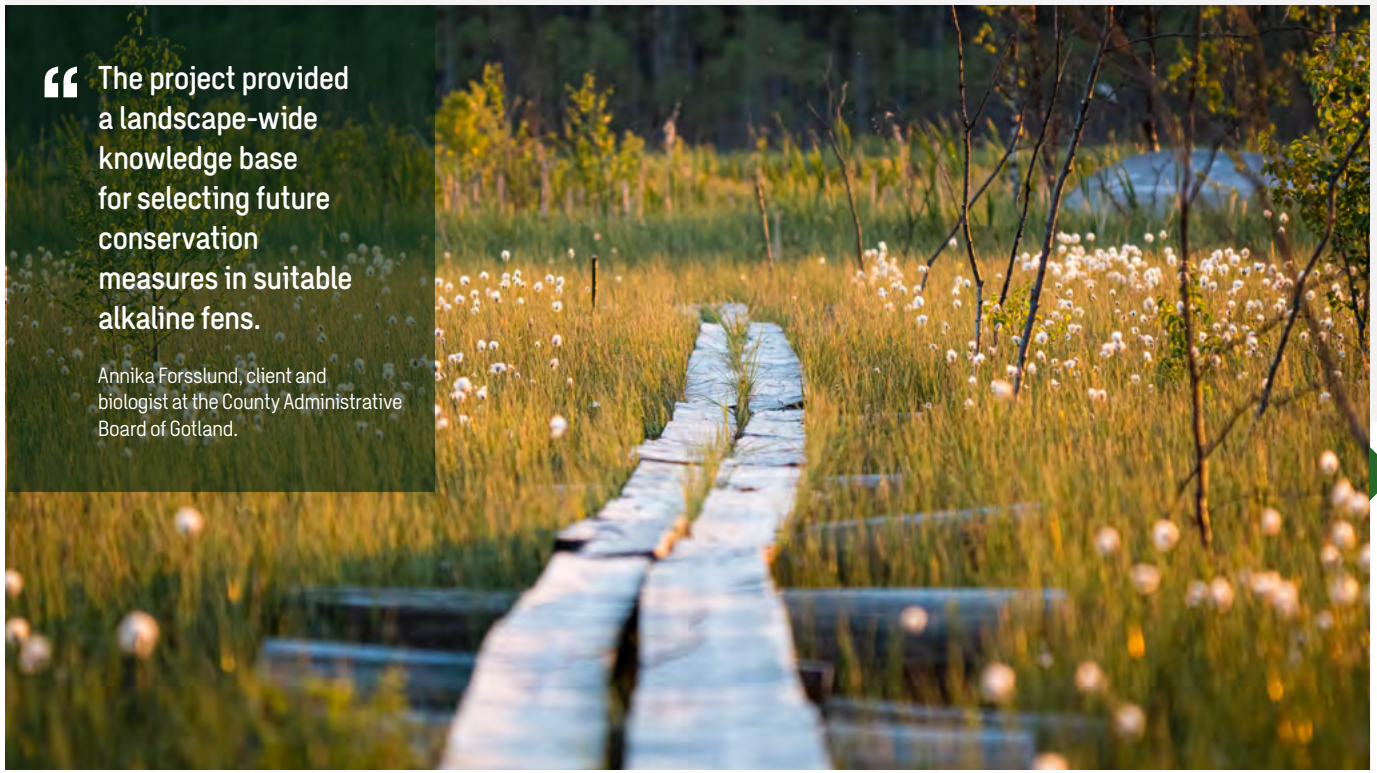
Because alkaline fens are visually heterogeneous and hard to map directly, the team first focused on a more easily detected species: Great fen-sedge (Cladium mariscus). Earlier inventories indicate that the conservation status of alkaline fens has deteriorated due to overgrowth of Great fen-sedge. While dense stands of this reed-like grass are detrimental to biodiversity, they are relatively easy to detect using GeoAI.

Results: The automated workflow identified alkaline fens and vegetation structures. Trained deep learning models learned patterns typical of alkaline fens and Great fen-sedge. The final output was a geodatabase with detailed mappings of Great fen-sedge, potential alkaline fens, water, shrubs and trees, providing the County Administrative Board of Gotland with map data to help prioritise conservation and restoration measures.

Collaboration and validation: Close cooperation between Sweco and the County Administrative Board of Gotland ensured methods and models were adapted, tested and verified for reliability and accuracy. The project delivered an innovative, useful dataset, demonstrating both the potential and the practical challenges of using GeoAI to support biodiversity conservation and sustainable environmental management.

Practical outcome: The geodatabase helps identify areas to conserve or restore and supports the planning of nature conservation actions on Gotland.

> **“ The project provided a landscape-wide knowledge base for selecting future conservation measures in suitable alkaline fens.**
>
> Annika Forsslund, client and biologist at the County Administrative Board of Gotland.



Did you know?

About 80% of European wetlands that existed 100 years ago have been lost. This has led to a substantial decrease in the number, size and quality of large bogs and marshes, and small or shallow lakes. Having high ecological value and contribution to climate change mitigation, wetlands are one of the priority habitats for restoration actions.[7]

Measurement and management:

Quantifying losses and gains

As the push for nature-positive outcomes accelerates, a key question emerges: how do we measure the gains without common certification frameworks? In the following section, we showcase inspiring examples demonstrating how to measure biodiversity gains.

CASE **The United Kingdom**

Biodiversity net gain for a battery energy storage system

Biodiversity Net Gain (BNG) is a legal requirement in England under the Environment Act 2021. It mandates that developers leave nature in a measurably better state after construction than before.

Sweco UK supported an outline planning application for a circa 50 MW Battery Energy Storage System (BESS) at the former Rooscoote Power Station in Barrow-in-Furness, England, for CBS Energy Storage Assets UK Limited. To inform BNG calculations, the ecology team conducted a UK Habitat (UKHab) classification survey across 3.35 hectares of land. The UKHab survey mapped habitats and assessed their condition—vital data for completing the Statutory Biodiversity Metric. Biodiversity value is expressed in Biodiversity Units, with more valuable habitats being assigned higher Unit scores.

Using the Metric, the site's baseline was calculated as 3.17 Biodiversity Units for area-based habitats and 0.04 Units for linear habitats. To achieve the statutory 10% net gain, post-development targets were 3.487 area-based Units and 0.044 linear Units.

Sweco created a colour-coded map showing the relative value of habitats on-site. This was used to guide planning application boundaries and layout, helping avoid high-value habitats, optimise project viability and reduce costs associated with BNG. Our team presented the client with four scenarios ranging from achieving BNG within the site boundary to purchasing Biodiversity Units from a 'habitat bank'—where third-party sites that legally commit to maintain habitats for 30 years and generate Units for developers to purchase.

After a cost-benefit assessment, the client selected Sweco's recommended option. This scenario delivered an 11.99% net gain for area-based habitats and an impressive 763.05% net gain for linear habitats, satisfying Metric trading standards by replacing lost habitats with those of equal or higher ecological value. With the BNG scenario agreed, Sweco produced a Biodiversity Gain Plan for inclusion in the client's outline planning application. The client is awaiting a decision from the local authority.

> "BNG was introduced to help halt biodiversity loss and embed nature within the planning system. It requires most developments in England to deliver at least a 10% net gain in biodiversity value, making early engagement with ecologists essential. This is particularly important as the cost of purchasing Biodiversity Units -or more expensive Statutory Biodiversity Credits - to offset habitat loss can be high, and developers must ensure that habitats created or enhanced for BNG are maintained for at least 30 years after completion."
>
> Martin Brammah, National Ecologists, Sweco

Establishing 11.99% net gain relied on:

- The retention of two medium-sized, moderate-condition trees on site.
- The retention of 0.50 ha of modified grassland in poor condition.
- The retention of 0.01 ha of bramble scrub.
- The creation of 0.12 ha of other neutral grassland in moderate condition.
- The creation of 0.14 ha of mixed scrub in moderate condition.
- The planting of 35 small individual trees in moderate condition.
- The creation of 0.05 km of native hedgerow with trees in a moderate condition.

Did you know?

Biodiversity Net Gain (BNG) presents major challenges for developers in England, with poor planning resulting in significant costs—Government Statutory Credits can exceed £1.3 million per Biodiversity Unit for rare habitats! Early engagement with ecologists enables developers to optimise their BNG strategies, helping them understand the financial implications, balance project objectives, and minimise redesign, delays, and land value losses.

CASE **The Netherlands**

Scoring and mapping biodiversity in urban environments

The municipality of Eindhoven in the Netherlands is actively working to increase biodiversity. To achieve this goal, it collaborates with organisations, companies and residents, guided by a comprehensive action plan.

Sweco has created nature point maps for the entire municipality. These maps provide an objective, science-based score for biodiversity. Nature points are calculated based on factors like the value of habitat types, presence of indicator species and surface area.

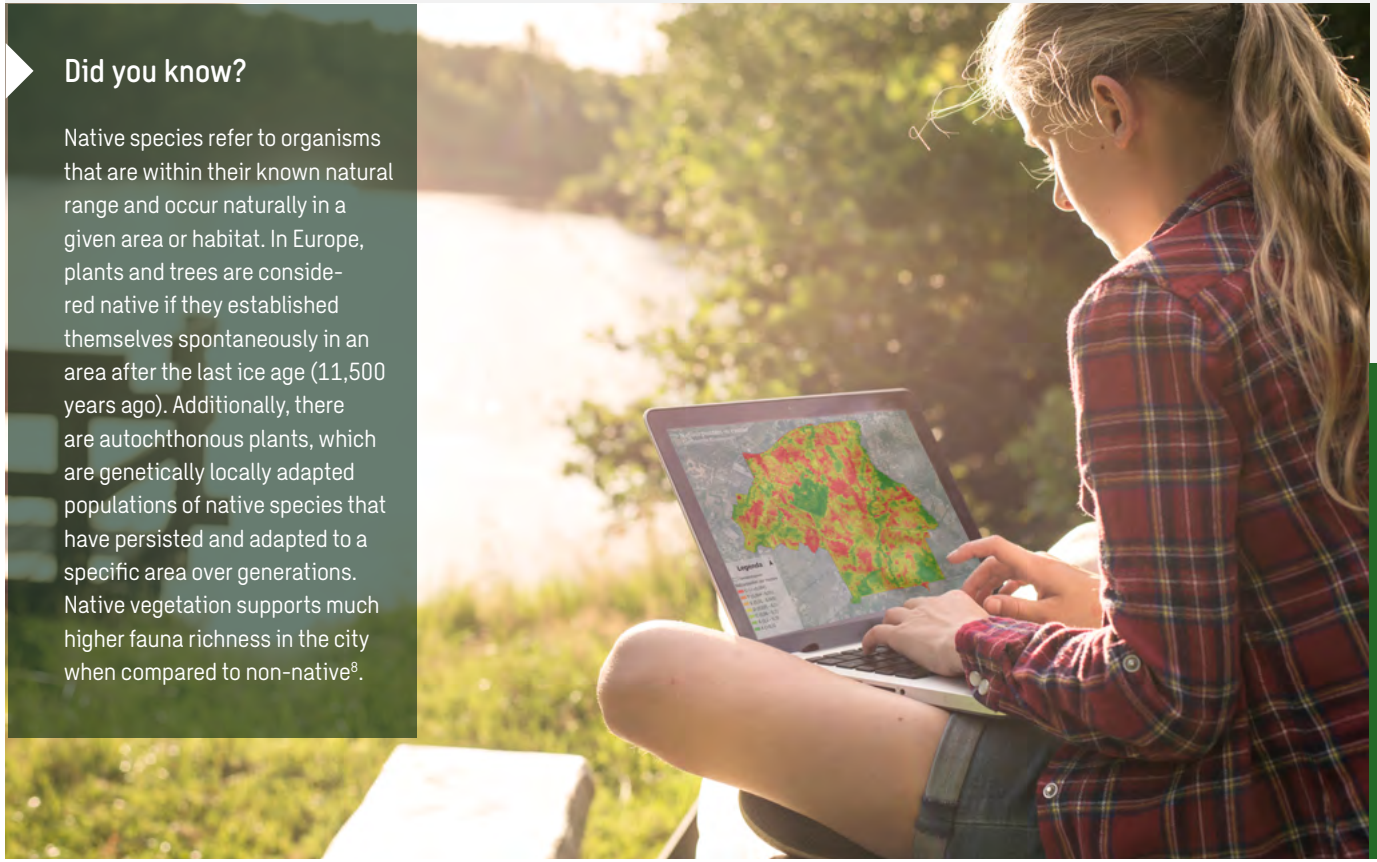
The scores are displayed in clear, easy-to-read maps that show biodiversity levels across different areas. This allows for comparison between various regions, habitat types, districts and neighbourhoods. The maps identify ecologically important areas, connections, hotspots and zones with low biodiversity value. Regular updates enable easy monitoring of biodiversity change over time.

Using the same system, the municipality's nature network has been mapped, revealing key ecological structures and providing valuable input for developing strategies to strengthen them. The maps highlight opportunities and bottlenecks, linking these to specific measures. Robust ecological corridors and fauna passages are crucial to the network, but the maps also show that a dense, connected green structure in residential areas is vital for many plant and animal species. Enhancing biodiversity therefore requires action at multiple scales.

To encourage public participation in improving biodiversity, Eindhoven introduced the '40 of 040' system. Research conducted by Sweco in the city centre demonstrated that the presence of at least 40 native plant species significantly increases biodiversity and more than doubles the number of insect species it supports. Building on this insight, Sweco developed plant lists featuring 40 native species that thrive in local gardens and public spaces. This system provides an easy, engaging way for everyone—residents, visitors, companies, governments, designers and architects—to contribute to biodiversity. By planting native species, small patches of nature are effectively restored across the city.

Did you know?

Native species refer to organisms that are within their known natural range and occur naturally in a given area or habitat. In Europe, plants and trees are considered native if they established themselves spontaneously in an area after the last ice age (11,500 years ago). Additionally, there are autochthonous plants, which are genetically locally adapted populations of native species that have persisted and adapted to a specific area over generations. Native vegetation supports much higher fauna richness in the city when compared to non-native[8].



> **Biodiversity is essential for a healthy living environment. As a municipality, we bear responsibility for the wellbeing of our residents, and biodiversity plays an important role in this. With the nature point map in conjunction with our long-term monitoring and observations by the residents, among others, we make biodiversity measurable.**
>
> Ellen van Rosmalen, Green and Ecology, Municipality of Eindhoven

CASE **Denmark**

Measuring construction's biodiversity footprint

Sweco has helped develop a new tool that enables the industry to measure, understand and act on its biodiversity footprint. At the same time, Sweco advises both private companies and municipalities on incorporating biodiversity into their decision-making processes.

One example is Aarhus Municipality, where a pilot project covering four buildings, including daycare centres and schools, has demonstrated how biodiversity data can be combined with climate data. The municipality is now working on integrating biodiversity data into its building and construction material databases, enabling benchmarking and the setting of requirements for suppliers.

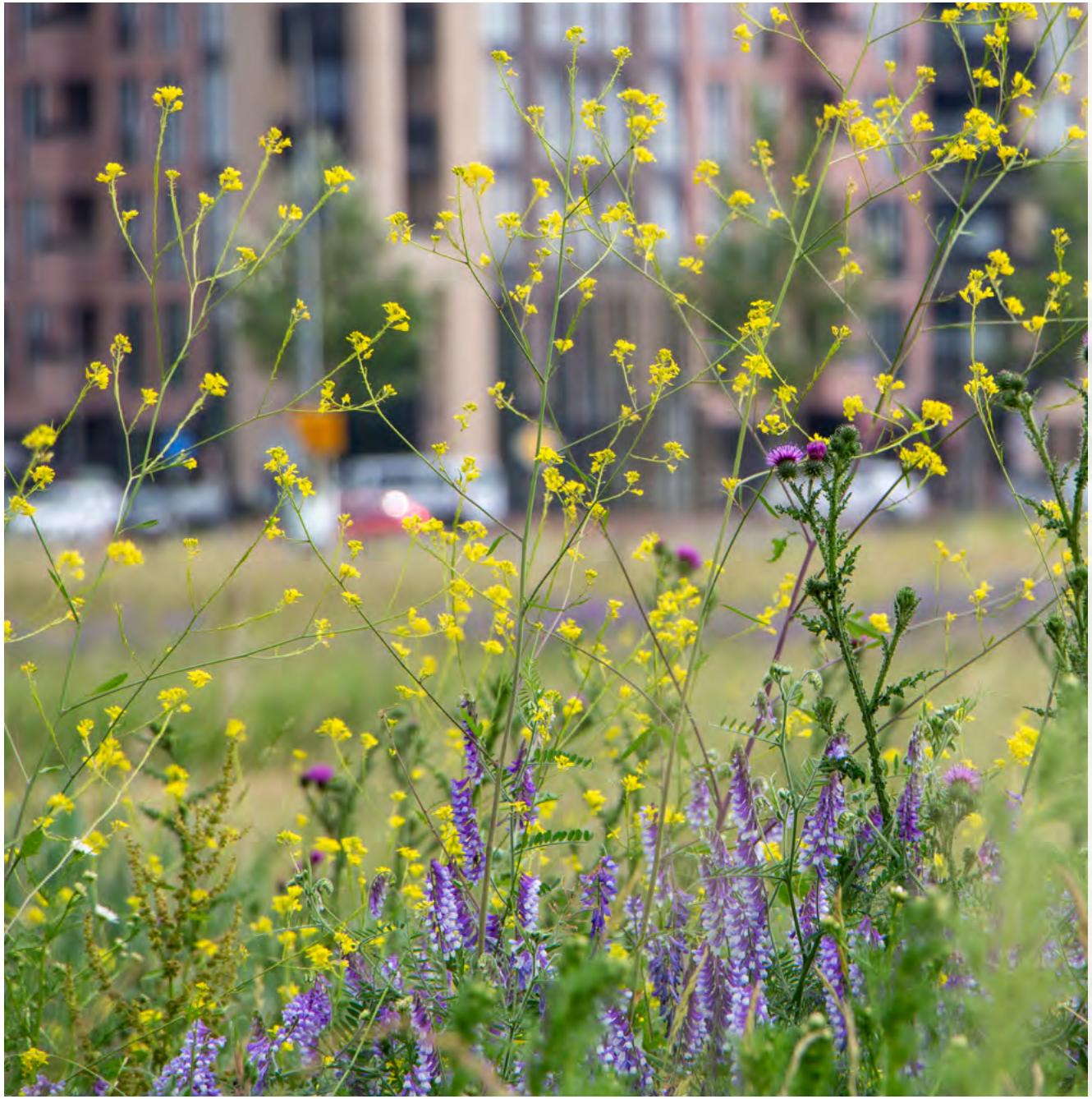
Sweco is moving into the next phase of its work on off-site biodiversity. By using product-specific and regionalised biodiversity data, clients will be able to document and reduce environmental impact through informed material choices and design. In this way, biodiversity becomes a concrete design parameter on par with CO2, representing an important step toward more responsible construction.

It is Sweco's rough assessment that the work on biodiversity is currently at the stage where the climate agenda was roughly a decade ago. Drawing on lessons from climate initiatives, development can now accelerate with a long-term ambition not only to stop biodiversity loss but also to restore natural habitats.

> **We do not want to evaluate projects solely on the basis of economics and climate but also consider off-site biodiversity. The drawback of a purely climate-focused approach is, for example, that it can lead to overexploitation of bio-based materials. We need to take a more holistic approach.**
>
> Rune Skjøt Andersen, civil engineer, Aarhus Municipality.

Did you know?

The construction industry has long experience in addressing climate impacts, but by measuring only CO_2, we risk overlooking biodiversity loss. In fact, the largest environmental footprint does not occur on the construction site itself, but off-site in global value chains, where 95% of the impact on biodiversity takes place[9].



Implementation:

Practical solutions for protecting bio-diversity in development

This section offers practical examples from urban planning, industrial sites, energy and transport projects, demonstrating how tailored solutions can help avoid and minimise biodiversity loss and maximise positive outcomes.

CASE Norway

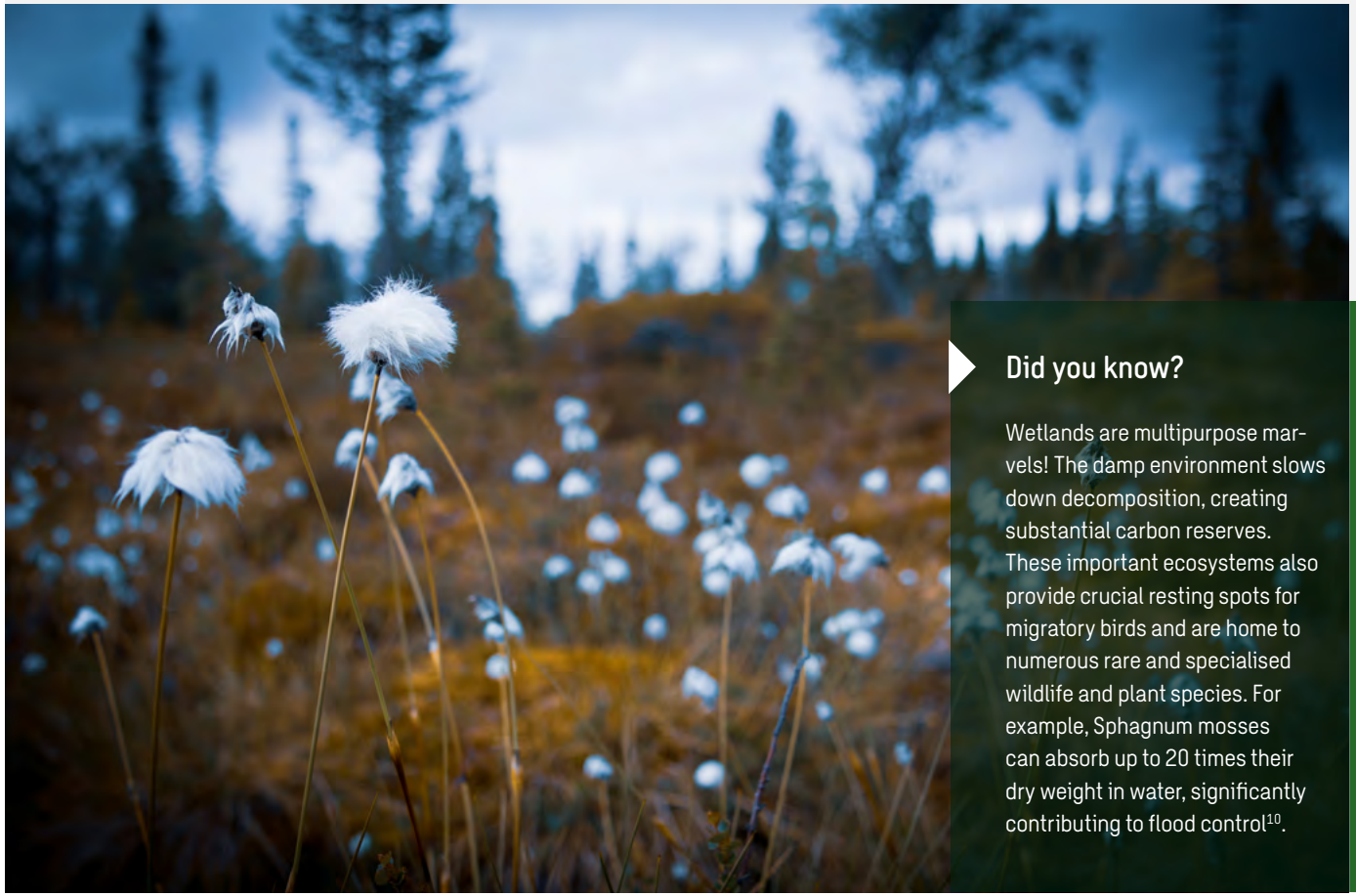
Avoiding biodiversity loss and reducing costs in road construction

The proposed new zoning plan for the E18 motorway through Kragerø and Bamble municipalities in Norway aims to avoid interventions in sensitive natural areas, reducing impact on biodiversity.

Biodiversity considerations were critical to obtaining approval for the plan. Sweco Norway's interdisciplinary team, together with the client, Nye veier, developed solutions to improve socio-economic outcomes and address feedback on the 2021 zoning plan for the same road stretch. A key success factor was weekly project meetings involving not only technical planners, but also experts in landscape architecture, ecology, geology, environmental science and land use.

One major strategy was to reuse the current E18 infrastructure more than the 2021 plan. By reusing existing roads, bridges and lanes where possible, important natural areas could remain undisturbed or see much smaller interventions. A critical factor for increased reuse was reducing the speed limit from 110 km/h to 100 km/h. In Bamble and Kragerø municipalities, the new plan achieves 100% and 30% reuse of the existing E18, respectively. This approach reduces the need for new land, lowers costs and decreases greenhouse gas emissions. Additionally, reuse generates fewer small residual areas, reducing fragmentation and edge effects on natural habitats. Barrier effects are also minimised. The estimated reduction in emissions ranges from 30% to 50% in areas where existing roads are reused.

Despite extensive efforts, some environmental impact is unavoidable. To offset these, significant work has been done. This includes preserving local wetlands, guided by detailed mapping from a wetland expert. Proposed compensatory measures involve peatland restoration and creating mire depositories.



Did you know?

Wetlands are multipurpose marvels! The damp environment slows down decomposition, creating substantial carbon reserves. These important ecosystems also provide crucial resting spots for migratory birds and are home to numerous rare and specialised wildlife and plant species. For example, Sphagnum mosses can absorb up to 20 times their dry weight in water, significantly contributing to flood control[10].

> **At Nye Veier, we strive to enhance societal benefits by balancing economy, time, climate, nature and other important considerations. The ability to work multidisciplinary is crucial for reducing negative impacts on biodiversity and the environment, with the biggest gains often achieved in the early project stages. This comprehensive approach enables us to deliver optimal value for road users, society and the future.**
>
> Stian Blindheim, project manager E18 Kragerø-Bamble, Nye Veier

CASE **Belgium**

Minimising biodiversity loss and use of virgin raw materials in a cycling highway

Limburg plays a crucial role in preserving biodiversity within Flanders. The province contains 40% of all protected natural areas in Flanders and supports around 90% of Flemish plant and animal species, including several rare and endangered species unique to the region.

Ecological ambitions are deeply integrated into Limburg's infrastructural projects, with spatial connectivity central to the province's long-term vision. The Ruimtepact 2040, Limburg's policy plan for spatial development, actively works to connect open spaces and combat nature fragmentation. The Kolenspoor cycling highway project exemplifies how regional mobility goals can align with biodiversity conservation.

Historically, seven coal mines formed Limburg's economic backbone, with the 77-kilometer Kolenspoor railway transporting workers, coal and materials. After the mines closed, these sites found new purposes. Now, the Kolenspoor is being reborn as a major corridor for cyclists, with Sweco Belgium commissioned to design this transformation.

The area's unique ecological value posed challenges. The sun-warmed stones of the old railway bed create an ideal microclimate for species like the sand lizard and grizzled skipper butterfly. The open, linear landscape attracts bats and nocturnal butterflies. The route crosses valuable habitats for protected species like bats, smooth snakes and natterjack toads, necessitating careful balancing between infrastructure development and biodiversity conservation.

Preparing the cycling highway required avoiding negative impacts on the sensitive environment. As an example, to limit the impact on flora and fauna, lighting was designed around bat behaviour: light beams do not extend beyond the width of the bicycle path, and lighting poles remain below the flight paths of bats and moths. For the smooth snake, which needs warmth on both sides of the path, eco-tunnels, combined with ecoconductive screens, were installed to allow safe passage.

Modern infrastructure increasingly emphasises on-site reuse and recycling of materials as was done at Kolenspoor. Before reusing the original stone bed as a foundation, rigorous testing for asbestos was conducted. Once confirmed uncontaminated, the existing stones were crushed on site using a Swiss milling machine to achieve the required thickness. This innovative approach used local material for stabilisation, eliminating around 800 truck journeys for material transport. This minimised site disturbance and reduced the environmental footprint, setting an example for how circular construction and biodiversity can coexist.

Did you know?

The EU aims to double the share of recycled material use between 2020 and 2030 to reduce the need for primary raw material extraction and related negative environmental impacts. Recycled material accounted for 11.8% of material used in 2023, with only a minor increase from 11.2% in 2020.[11]

> **"The biggest challenge lies in realizing infrastructure projects in ecologically sensitive environments, where every step must be carefully weighed to preserve and enhance local biodiversity – while also promoting innovative, sustainable construction solutions wherever possible.**
>
> Stijn Van Dingenen, Projectmanager, Limburg

CASE Sweden

A future-proof city with coastal protection for people and nature

Expansion of the Port Gate (Hamnporten) in Malmö, Sweden, is part of the city's long-term development vision. Since the early 2000s, the area has been transitioning from an industrial zone into an attractive, sustainable district with innovative environmental solutions. Malmö's comprehensive plan foresees expansion within the next 11–20 years. As part of the progress, the city identified a need for coastal protection outside its harbour to reduce storm impacts expected to increase with rising sea levels. It sought solutions that minimise negative effects on marine and coastal environments. Sweco was engaged to help align coastal protection and district development with biodiversity goals.

The environmental optimisation of the city's coastal development was based on a district concept prepared by Sweco Architects. Sweco's assignment included assessing and adapting the concept to support a vibrant urban environment close to nature, applying smart blue design to promote marine environments and ecosystem services and focusing on shoreline biotopes and nearshore seabeds so newly created land represents geographically relevant habitats.

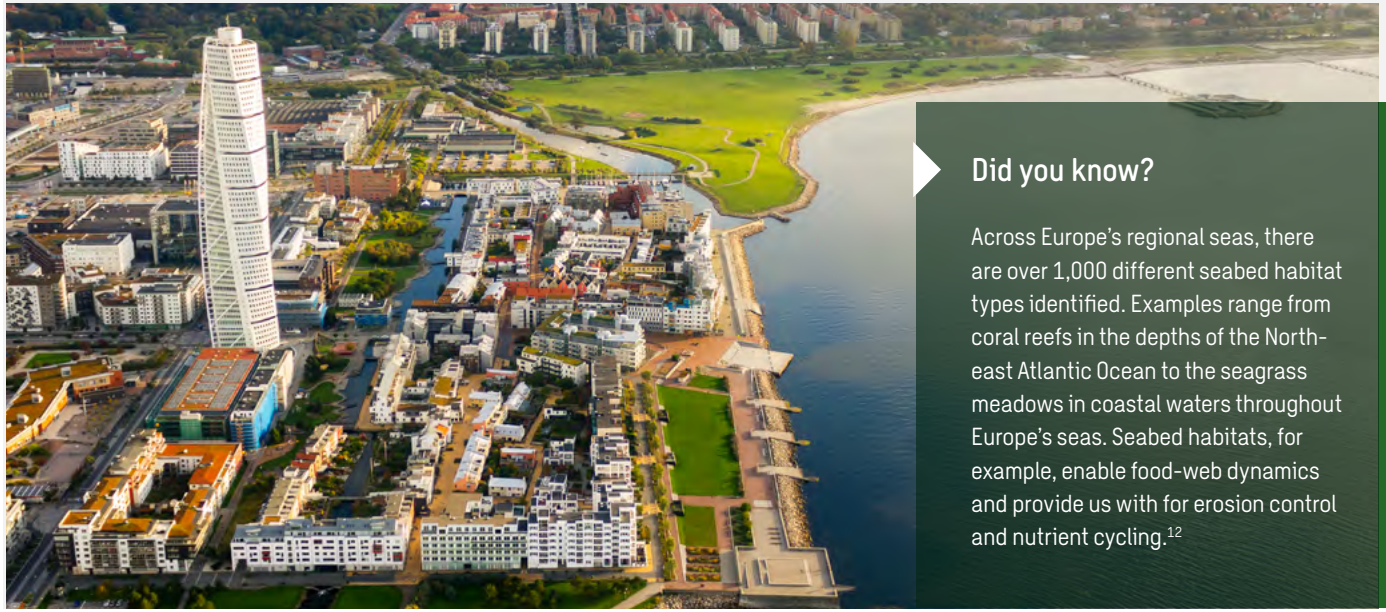
The future scenario described in "Hamnporten–The District That Secures Malmö for the Future" guided the evaluation and the promotion of biodiversity. 1,331 hectares of sea area were surveyed using a drop-video system and side-scan sonar. The datasets identified multiple coastal and marine habitats, including 308 hectares of eelgrass–a key habitat that underpins important ecosystem services. Sweco also conducted a literature review to identify species groups and local habitats (birds, fish, marine vegetation). In Malmö, brackish Baltic waters mix with more saline inflows, creating unique biological conditions where species' distributions are shaped by their adaptation to salinity.

In addition, Sweco studied artificial reef concepts and designs that promote macroalgae and blue mussels, which supports water purification and habitat complexity. CAD and GIS were used to produce detailed maps and figures.

Key results included:

- Designed a multi-section shoreline enabling natural encounters between people and nature.
- Created space for recreation and everyday contact with nature.
- Planned activity areas for play, sport and excursions, with small ponds that benefit a wide range of birds, insects and plants.
- Designed promenades and brackish coastal meadows that act as rich habitats and storm buffers.
- Recommended solutions that incorporate natural infill materials to create a more nature-like shoreline. Harbour and quay structures were optimised with green-blue design to support key habitats and organisms, such as filtering blue mussels.

The project demonstrates how urban development and climate adaptation can coexist with biodiversity restoration–creating accessible recreational areas while restoring authentic habitats for wildlife in a previously industrial urban waterfront.



Did you know?

Across Europe's regional seas, there are over 1,000 different seabed habitat types identified. Examples range from coral reefs in the depths of the North-east Atlantic Ocean to the seagrass meadows in coastal waters throughout Europe's seas. Seabed habitats, for example, enable food-web dynamics and provide us with for erosion control and nutrient cycling.[12]

> **"Biodiversity is a fundamental prerequisite for a sustainable society and a resilient city. For our organisation, it is not only about conserving nature–but about being part of it. We see nature-based solutions as a way to bring together climate adaptation and coastal protection, recreation, and ecological values.**
>
> Pär Svensson, Acting Section Manager, Land Development Division, City of Malmö

CASE **Denmark**

A new neighbourhood with a positive contribution to nature

Can a new urban district—built on a former landfill—contribute positively to local biodiversity? Fælledby, an 18-hectare urban development project in Copenhagen, Denmark, aims to do just that by 2030. The strategy focuses on offsetting lost green space by creating higher-quality habitats and fostering citizen engagement.

The Fælledby site, a former landfill sealed in 1975, had low ecological value. During pre-construction, the site was 'reset': soil was cleared, compacted and topped with over a metre of clean clay, subsoil and nutrient-poor topsoil. With this new foundation, the ambition was clear: to create new, functional ecosystems from scratch and establish habitats for 72 characteristic species (36 plants and 36 animals), inspired by the nearby Amager Fælled, a 3,500-hectare nature park.

Fælledby's biodiversity strategy, developed by Sweco's biologists, defines three clear objectives:

- Create high-quality local habitats to support rich biodiversity, inspired by Amager Fælled
- Re-establish 72 characteristic local species in the new district.
- Ensure continuous documentation and knowledge sharing through monitoring and citizen science.

Fælledby goes beyond most projects that focus mainly on compensation. Here, the goal is to enhance natural value and deliver a measurable positive contribution by 2030. While the total green area is reduced from roughly 15 to 10 hectares, the quality of habitats is significantly increased. This plan combines five habitat typologies, from scrubland and wetlands to sandy slopes and applies nature-based management such as hay cutting and grazing. It also includes a resident-led nature guild.

The project thus challenges traditional perceptions of urban nature. It demonstrates how biodiversity can be intentionally designed, embedded in local identity, and sustained beyond construction—allowing nature and community to evolve together over time.

> **"Biodiversity matters to us because it matters to the people who will live in Fælledby. Our ambition is to create the best possible framework for life to benefit people and nature.**
>
> Martin Baltser, Project development director, Fælledby

Did you know?

While urbanisation and related land conversion are major drivers of biodiversity decline, urban areas can harbour a wide range of species, sometimes exceeding the species richness of surrounding agricultural landscapes. Diverse communities of wild bees, for example, persist in cities worldwide, including Berlin and London[13]. In remnants of natural habitats and mature novel ecosystems, even rare species can survive in urban areas[14].

CASE **Finland**

Conservation of birdlife in a green transition industrial area

The Port of Oulu is a key logistical hub in northern Europe. Northern Finland has significant wind power production and robust electricity transmission networks, making the region attractive for green transition industry investments. Against this backdrop, Sweco received a commission from the City of Oulu to prepare the draft detailed plan for expanding the Port of Oulu and the green transition industrial area. Like the existing port, the new area will be built on land reclaimed from the sea.

At first glance, reclaimed industrial land may not appear to hold significant biodiversity value. However, the Port of Oulu area supports important ornithological values, and highly endangered species also nest in the region. These birds of barren shores have found a new habitat entirely on human-created reclaimed land, as their natural habitats have almost entirely disappeared from the Gulf of Bothnia shores due to overgrowth, eutrophication and construction.

The task in the draft detailed plan was to determine how to reconcile the needs of the green transition industrial area with the conservation of bird habitats. Since the birds prefer open and barren environments, the goal was not to preserve the existing habitats but to ensure that suitable bird habitats remain available as land reclamation progresses. This was solved through a phased approach to land reclamation and area construction.

Additionally, once the area's construction is completed over the years, a permanent coastal field will remain solely for bird use. The draft detailed plan also incorporated other essential measures for bird conservation, such as predator fencing, necessary movement restrictions in nesting areas and species-specific soil management. With these solutions, the human-created industrial environment can continue to evolve into a green transition industrial environment while still providing a habitat for the birds that have adapted to its human-made shores.

Did you know?

There are over 540 species of birds occurring regularly and naturally in Europe. Of the main habitat types in Europe, farmland, grassland, and marine habitats have the highest number of associated threatened and Near Threatened species.[15]

> **“ The starting point for the detailed plan was interesting: birds had found a habitat in the industrial and port area created by humans. How can the birds' habitat be secured in the future when a large green transition industrial hub is planned for the area?**
>
> Venla Leppänen, Architect, Sweco

Credits: City of Oulu

CASE **Sweden**

Biodiversity handbook in power line corridors and station areas

Sweco led a project in Sweden to help grid operators promote biodiversity through a comprehensive handbook for the client Energiforsk. While many operators actively support biodiversity, this handbook provides guidance and a knowledge base for those starting out.

Combining practical strategies, case studies and scientific validation, the handbook presents real-world experiences from operators already engaged in biodiversity initiatives. It also highlights the importance of collaboration, such as through industry forums and the coordinating role of Swedenergy.

As part of the assignment, literature searches were carried out in scientific databases to identify relevant studies. The findings confirmed that the ongoing work by network companies, regarding focus areas and recommended actions, aligns well with current research. The values and management proposals are in line with the scientific evidence.

The method presented for geographical analysis with the aim of identifying high nature values can be applied with the programmes FME, ArcGIS Desktop or QGIS. The selection of regionally adapted input data for the analysis is fundamental for obtaining the desired result. The results of the analyses then form the basis for determining which areas warrant a field inventory.

The handbook ultimately serves as a toolbox for developing biodiversity strategies. A recipe for success is establishing a multidisciplinary working group/steering group with representatives from sustainability, concession and maintenance to lead the effort. It is recommended that each grid company develops a strategy document that describes how the grid company intends to work with biodiversity, such as priorities, classifications, suitable management measures, inventory guidelines, contractor training, implementation and documentation procedures, and methods for visualisation.

> **“This handbook empowers grid operators to make biodiversity a core part of their operations: collaborate, map high-value nature with GIS, manage corridors as habitats, and document progress to meet environmental objectives and international frameworks.**
>
> Eva Grusell, Ecologist, Sweco

Did you know?

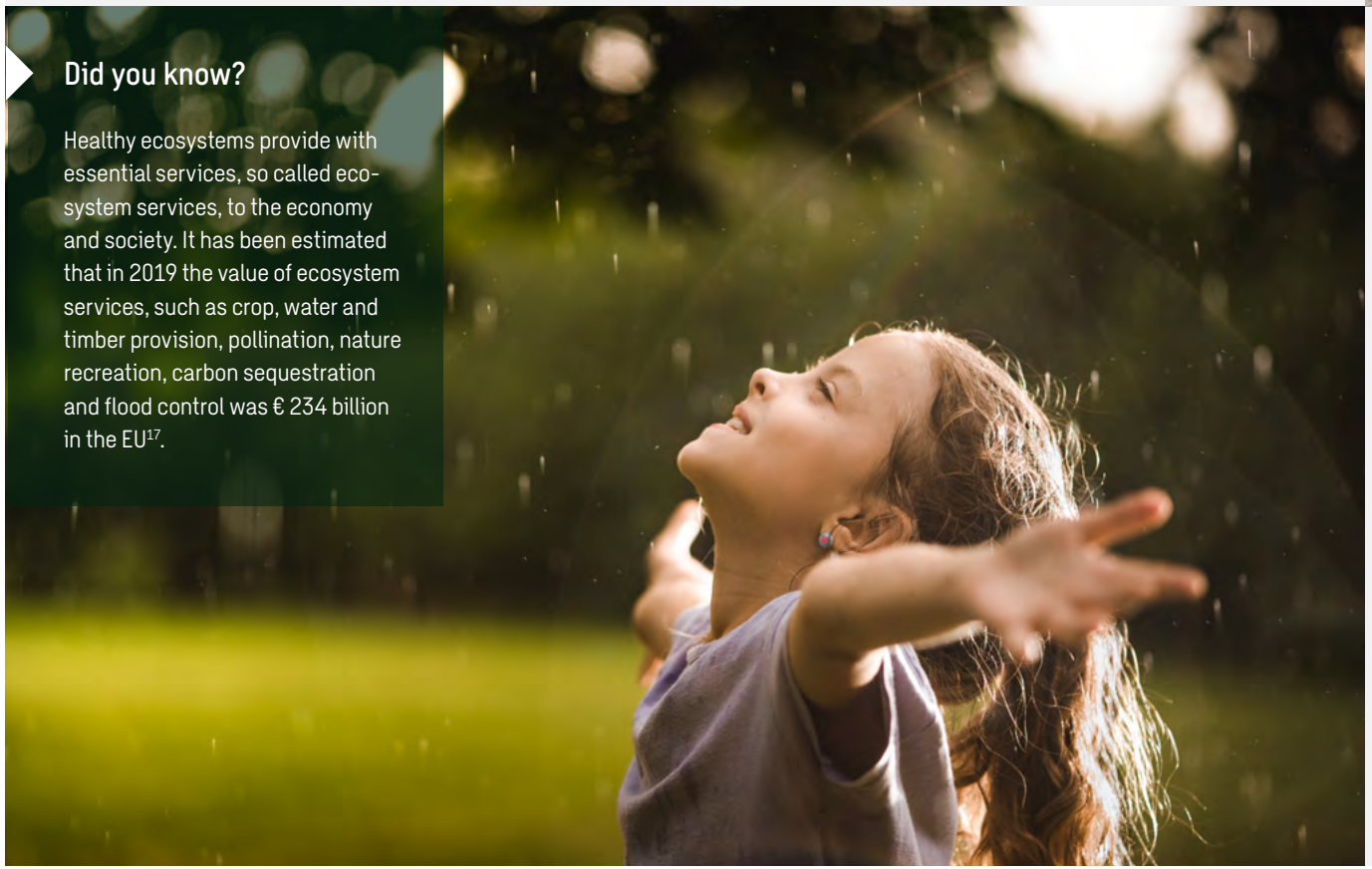
Powerlines corridors, while posing a collision risk for birds, can serve as ecological corridors when the area beneath them is managed sustainably, helping to reduce habitat fragmentation. They provide habitat for vertebrate and invertebrate generalists and specialists of grasslands. There are approximately 500 000 kilometres of transmission lines in Europe – a significant opportunity to be harnessed to promote biodiversity.[16]

CASE **Lithuania**

Multiple benefits of a rain park

The project aimed to address stormwater runoff issues while offering recreational and environmental benefits to the community in Vilnius, Lithuania. While working on stormwater management ideas, the team created a multifunctional space that combines green infrastructure with public amenities. The “rain park” serves as a model for sustainable stormwater management and urban planning, demonstrating how environmental and social objectives can be achieved simultaneously. Not only do the stormwater management practices implemented in the park help mitigate the effects of heavy rainfall and reduce the risk of flooding, but the park's green spaces and wetlands also provide habitats for various plant and animal species, increasing urban biodiversity.

The main goal was to sustain the natural water cycle by retaining and absorbing rainwater into the ground, instead of immediately directing it through pipelines to the river. To achieve this, a stormwater treatment plant and an open retention pond were built. The underground stormwater treatment plant cleans up to 3m3/s of polluted stormwater, which is 15 percent of the maximum flow of the stormwater basin. The treated water then flows into an open retention pond that can hold up to 20,000 m3 of runoff, with an outflow of 1 m3/s.



Did you know?

Healthy ecosystems provide with essential services, so called ecosystem services, to the economy and society. It has been estimated that in 2019 the value of ecosystem services, such as crop, water and timber provision, pollination, nature recreation, carbon sequestration and flood control was € 234 billion in the EU[17].

To support biodiversity, 60 herbaceous plant species and 13 tree and shrub species were introduced in the park. The slopes of the constructed retention pond were planted with species suited to the local conditions—a thin layer of fertile soil, potential rapid changes in water levels during periods of heavy rain and drought. To achieve maximum purification of collected surface runoff, priority was given to water-purifying plants that would improve the chemical and biological properties of the water, utilising nutrients and heavy metals washed off from urban surfaces. Vegetation located at the lowest parts of the slope (reeds, irises, bulrushes and striped grass) remains submerged and performs the main water-purification functions.

This project created a space that complies with the principles of Sustainable Stormwater Management, where engineering, ecological and recreational functions are seamlessly integrated.

Conclusion:

Scaling nature-enhancing outcomes

Now is the time to scale up innovative solutions for biodiversity to secure resilient societies and businesses for the future. Development projects can have a significant impact on nature—but by planning and executing them mindfully, it's possible to avoid unnecessary impacts and contribute positively to biodiversity.

Embedding biodiversity considerations into every development project phase, while identifying synergies with climate adaptation, circular economy and stakeholder engagement, is essential for future-proof development. Bolster project resilience, reduce long-term operational risks and generate measurable community benefits through habitat restoration, green infrastructure and innovative design.

New tools are transforming how we understand and deliver on biodiversity. Wildlife detection dogs, environmental DNA (eDNA) surveys, drone-based remote sensing and AI-driven habitat identification enable richer, more accurate baseline data and better decisions tailored to local conditions. There is also a growing shift toward outcome-based accounting to transparently assess impacts and set clear targets for improvement.

Innovative design solutions are helping avoid and minimise loss, from creating functional ecosystems as part of urban redevelopment on former landfill sites to weaving biodiversity into the design of cycleways and other infrastructure. By leveraging these advances, it is possible to move beyond mitigation toward regeneration, ensuring each development contributes positively to nature.

Reversing biodiversity loss is complex, yet a major opportunity. Early, coordinated action, smart planning, working together across public and private sectors, appropriate financing, and embedding biodiversity in every project can turn awareness into practice and create built environments that minimise harm and actively contribute to the health and vitality of nature and society.

Recommendations for scaling up biodiversity action in development projects

1

Adopt a biodiversity-first approach

Place biodiversity on equal footing with other design priorities such as safety, cost, and technical performance. Land use competition often pushes nature to the margins, unless biodiversity is integrated from the outset. Embed ecological goals in early-stage planning, policy, and procurement to ensure nature is considered before design choices are locked in.

2

Involve ecological expertise early

Engage ecologists and biodiversity specialists from the very beginning of project development. Their insight ensures that digital tools such as AI-based inventories are correctly interpreted and that design decisions reflect ecological realities. For large organisations operating globally, adapt biodiversity strategies to each location's unique ecosystems, regulations, and cultural contexts.

3

Foster interdisciplinary collaboration

Addressing complex biodiversity challenges requires the combined efforts of multiple disciplines. Facilitate cooperation among biologists, engineers, urban planners, economists, sociologists, and other experts. Through interdisciplinary teamwork, innovative and effective solutions that balance ecological and development goals can be achieved. Promoting such collaboration ensures comprehensive approaches to biodiversity conservation.

4

Integrate multiple functions

Plan to deliver multiple benefits, combining water management, mobility, and ecology rather than treating them separately. Design solutions such as ponds that serve both flood control and wildlife habitats, or corridors that link transport and ecological networks, using nature network planning to connect fragmented areas across ownership boundaries.

5

Design and build nature-inclusively

Scale up ecological landscaping and landscape management as well as nature-inclusive design across cities and infrastructure. Integrate habitats into built environments through green roofs, nesting sites, and connected green-blue areas that enhance both biodiversity and urban liveability. Use natural vegetation and native plants. Remember that in many cases, doing less is best. Leaving areas to naturalize can be more beneficial than overdesigning interventions.

6

Strengthen collaboration and knowledge transfer

Biodiversity requires shared responsibility. Improve collaboration and resource allocation across government levels, contractors, consultants, and maintenance teams, ensuring smooth "passing of the stick" throughout the project lifecycle. Form coalitions between governmental bodies, research institutions, and the private sector to align standards, share data, and accelerate learning.

7

Engage and empower citizens

Citizens are increasingly motivated to protect biodiversity. Involve them through participatory planning, citizen science, and awareness campaigns that, for example, explain why biodiverse environments may look "untidy" but are ecologically richer. Encourage local actions, such as removing asphalt or planting native species, to extend nature networks beyond project sites.

8

Finance and monitor for long-term impact

Include biodiversity measures in financial planning across all departments. Explore co-financing models and public-private partnerships where benefits, for example reduced flooding, increased property value, are shared. Track progress through consistent biodiversity metrics and monitoring programs, using technology to complement, not replace, expert analysis.

9

Embrace tailored solutions

There is no one-size-fits-all solution. What works in an urban park may not fit a coastal or rural landscape. Success depends on context, understanding native species, local habitats, and how ecosystems function in each setting. Biodiversity has no boundaries. Collaboration across disciplines, sectors, and regions is essential to shift from biodiversity loss to ecosystem gain and design for a nature-enhancing future.

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Reference list

1) World Economic Forum (2020) New Nature Economy Report II The Future of Nature and Business, retrieved on May 23 2025, from https://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf

2) Global Infrastructure Outlook, Investment forecasts for Europe (2025). Retrieved October 15, 2025, from https://outlook.gihub.org/region/Europe

3) Kunming-Montreal Global Biodiversity Framework, CBD Secretariat, 2022.

4) Animalia, Hazel dormouse (2025). Retrieved October 15, 2025, from Hazel Dormouse - Facts, Diet, Habitat & Pictures on Animalia.bio

5) European Environment Agency, Common Bird Index in Europe (2025, Jul 15). Retrieved October 15, 2025, from Common bird index in Europe | Indicators | European Environment Agency (EEA)

6) Lima, M.A.P., Cutler, G.C., Mazzeo, G. and Hrncir, M. (2022) Editorial: The decline of wild bees: Causes and consequences. Front. Ecol. Evol. 10:1027169. doi: 10.3389/fevo.2022.1027169

7) Biodiversity information system for Europe, BISE, Wetlands (coastal and inland) Retrieved October 15, 2025, from Wetlands (coastal and inland) | Biodiversity Information System for Europe

8) Tartaglia, E.S., Aronson, M.F. (2024) Plant native: comparing biodiversity benefits, ecosystem services provisioning, and plant performance of native and non-native plants in urban horticulture. Urban Ecosyst 27, 2587–2611. https://doi.org/10.1007/s11252-024-01610-5

9) Nørrekær Mortensen, N., Kjørup Rasmussen, K., Rex Elmgreen, A., Stoustrup, D., Sigvert, L., Brauer, F., Hald, J., Baun Dantzer, L., Francart, N., Røtzler Lind, S., Nørgaard Holm, T. (2025). Biodiversitetspåvirkning fra 50 byggerier Forslag til metode og baseline for måling af byggeriets biodiversitetspåvirkning i hele værdikæden. Retreived October 29, 2025, from Biodiversitetspåvirkning fra 50 byggerier.

10) Yang, R.-R., Yang, Z.-J., Ma, X.-Y., Cheng, X.-F., Shu, L. and Zhu, R.-L. (2024) 'The water absorption capacity of 21 Sphagnum species', Bryophyte Diversity and Evolution, vol. 47, no. 1., pp. 182-192. Available at: https://doi.org/10.11646/bde.47.1.13

11) European Environment Agency (2025, Jan 6) Circular material use rate in Europe. Retrieved October 15, 2025, from Circular material use rate in Europe | Indicators | European Environment Agency (EEA)

12) Marine information system for Europe, WISE MARINE, Retrieved October 29, 2025, from Benthic habitats | Biodiversity | WISE Marine Marine Information System for Europe

13) Hall, D. M., Camilo, G. R., Tonietto, R. K., Ollerton, J., Ahrné, K., Arduser, M., Ascher, J. S., Baldock, K. C. R., Fowler, R., Frankie, G., Goulson, D., Gunnarsson, B., Hanley, M. E., Jackson, J. I., Langellotto, G., Lowenstein, D., Minor, E. S., Philpott, S. M., Potts, S. G.,.. Threlfall, C. G. (2016). The city as a refuge for insect pollinators. Conservation Biology, 31(1), 24–29. https://doi.org/10.1111/cobi.12840

14) Kowarik I, von der Lippe M (2018) Plant population success across urban ecosystems: A framework to inform biodiversity conservation in cities. J Appl Ecol 55(5):2354–2361

15) BirdLife International (2021) European Red List of Birds. BirdLife-European-Red-List-of-Birds-2021.pdf.pdf

16) Cremona, E. and Rosslowe, C. (2024) Putting the mission in transmission: Grids for Europe's energy transition. Retrieved November 5, 2025, from: Short_Transmission Grids Report

17) Vysna, V., Maes, J., Petersen, J.E., La Notte, A., Vallecillo, S., Aizpurua, N., Ivits, E., Teller, A., Accounting for ecosystems and their services in the European Union (INCA). Final report from phase II of the INCA project aiming to develop a pilot for an integrated system of ecosystem accounts for the EU. Statistical report. P ublications office of the European Union, Luxembourg, 2021. Accounting for ecosystems and their services in the European Union (INCA) - 2021 edition

Urban Insight

By Sweco

Urban Insight is Sweco's international knowledge platform, where experts come together to develop and share insights, facts and solutions for how to plan and design sustainable cities and the societies of the future. Global and local initiatives will be organised throughout the year to inspire and open up discussions about sustainable urban planning.

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