

An aerial photograph of a city landscape, likely in the Ruhr region. The foreground shows a large, dark, circular lake or reservoir surrounded by green fields and trees. In the middle ground, there is a dense urban area with many houses and buildings. In the background, industrial structures and smokestacks are visible against a clear blue sky. The overall scene is a mix of urban development and natural green spaces.

Green infrastructure strategy Ruhr metropolis

People. Nature. Space.



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Introduction

On our way to becoming the greenest industrial region

Liveable, climate-resilient, biodiverse, economically strong and healthy: The Ruhr metropolis of the future is the greenest industrial region in the world. This goal was officially set by the Ruhr Parliament in Autumn 2022 with the adoption of the 'Green infrastructure charter'.

This unanimous decision means that the region has set itself the task of holistically developing the green capital in the Ruhr metropolis. As a voluntary commitment and joint declaration of intent, it unites all those who plan, develop, maintain and preserve green infrastructure on a daily basis.

This strategy shows how committed and hard the region has been working on this for several years: 27 specific objectives – derived from the charter. The following pages will provide you with a wealth of possible implementation methods for all the objectives and many successful practical examples taken from projects in the municipalities, thereby acting as a kind of toolbox. Put briefly, the strategy outlines the paths to implementation on the ground. The many existing and future projects, processes, and measures are to be bundled and systematically developed with the help of specific objectives.

This is about our lives in the region: How do we adapt our cities to cope with heat and other extreme weather events? How climate-friendly will our districts be? How will we feed ourselves, get around and relax? Green infrastructure provides the key to answering these pressing social questions in terms of the provision of basic services. Consequently, the preservation and further development of green spaces will determine whether we will continue to live well in the Ruhr metropolis.

We have already proven how adaptable this region is in the course of ongoing structural change. The Ruhr metropolis has mastered the transformation into an economically strong and liveable centre of innovation, culture and research. We want to build on this positive development and work together to shape and advance the green transformation of the Ruhr metropolis in a variety of projects, sponsorships and funding programmes.

I would be delighted if you continue to help us make the Ruhr metropolis the greenest industrial region in the world.



Frank Dudda
Dr Frank Dudda
President of the
Ruhr Parliament

How we are developing our green infrastructure

Only those who know the goal and how to get there will make progress. Our goal has been clearly decided by the Ruhr Parliament: The Ruhr metropolis will become the greenest industrial region in the world. This strategy shows us how to achieve this. More than 250 experts from science, the region and municipalities have contributed to this strategy as part of workshops, working groups and consultation processes. This is the only way it can work: clear goals and a wealth of implementation methods that have already been tried and tested in municipalities. Which of these can work best where is decided and implemented locally.

This strategy is based on the green infrastructure charter which was adopted by the Ruhr Parliament. The strategy acts as a toolbox for realising the objectives of the charter. Developed in the region for the region. This was made possible by all the people involved. We would like to thank everyone for their practical examples, project ideas and transferrable targets. We would like to thank the Ministry of the Environment, Nature and Transport of the State of North Rhine-Westphalia for their organisational, professional and financial support with this project.

Together we have created Germany's first regional strategy for developing green infrastructure. We can be proud of the interdisciplinary cooperation between municipalities, associations, science and politics in the Ruhr metropolis. The 53 member municipalities of the Ruhr Regional Association are united by the desire for resilient, liveable cities. We are on our way to achieving this. Make use of the practical examples as inspiration for new projects. In its capacity as a reference work, the strategy is also designed to support fundraising.

The green infrastructure strategy forms the basis for contemporary open space development: It's about improving and expanding this vital resource. This works really well when we work together in the same way as we did when developing this strategy: as a network and in partnership with one another. Let's work together to bring projects to the streets, green corridors and front gardens: Starting with specific measures in the districts through to large-scale projects with supra-regional appeal, such as the International Garden Exhibition (IGA) 2027. This is the way.



Nina Frense
Nina Frense
Associate for Environment
and Green Infrastructure at
Ruhr Regional Association

Green infrastructure as added value

Why does the Ruhr metropolis need a green infrastructure strategy?

The 'green infrastructure' approach sees green and open spaces not just as remnants of dispersed settlement development that are selectively decommissioned, improved or redeveloped. On the contrary, these areas are analysed on a systematic and interdisciplinary basis for their suitability and strategically planned as part of a coherent, multifunctional network. Instead of assigning them to one-dimensional usage categories (e.g. recreation versus nature conservation), the various requirements such as climate adaptation, recreation, active mobility and biodiversity are interlinked and a multi-coding of limited land resources is sought.

This green infrastructure strategy Ruhr metropolis is intended to contribute precisely to this systematic approach and serve as a planning and implementation tool for the various green infrastructure stakeholders by showing them how to take coordinated, targeted action that is geared towards the region's specific characteristics.

The green infrastructure strategy Ruhr metropolis directly implements the cooperation agreed in green infrastructure charter Ruhr metropolis. Although the charter has outlined its development vision for green infrastructure in the region and was politically adopted as a declaration of intent for further cooperation, this strategy fleshes out this vision in technical terms and identifies options for implementation.

The green infrastructure strategy Ruhr metropolis serves as a catalyst for integrated planning by sharing proven practical knowledge from existing projects on the one hand, and putting forward new approaches and project ideas on the other. It acts as a common basis for planning and project realisation for the stakeholders in the region as well as Germany's first regional green infrastructure strategy. It also aims to be a role model, source of ideas and a warm invitation to cooperate with other regions.

Who is the green infrastructure strategy for the Ruhr metropolis aimed at?

The green infrastructure strategy Ruhr metropolis is aimed at everyone who plans, cares for, maintains, creates, develops, renovates and assesses green infrastructure. First and foremost, these are the 53 municipalities in the Ruhr region, each with their specialised administrations, their politics and their regional association, but also other associations and clubs, business and science and many other stakeholders.

The green infrastructure strategy Ruhr metropolis was developed as part of a broad consultation process in which numerous stakeholders were invited to compile, comment on and prioritise 'their' objectives, in line with the motto: A strategy from the region - for the region.

The green infrastructure strategy Ruhr metropolis is an informal planning document and is therefore not legally binding. Instead, it leans more towards making recommendations or asking you to make your own personal commitments as well as acting as a guide for taking action and highlighting areas of opportunity. Every project that has already been implemented or will be developed, every specialised plan that is fleshed out and every intersectoral plan contributes to the development of the green infrastructure strategy for the Ruhr metropolis as well as the spatial development of green infrastructure in the region.

What does the green infrastructure strategy for the Ruhr metropolis involve?

In the following chapters, the green infrastructure strategy Ruhr metropolis will illustrate the importance of green infrastructure for the future viability of the region. It starts by painting a picture of what makes the green infrastructure in the Ruhr region so unique and how this contributes to the future viability of the region when its elements interact at different typologies of spatial images. It then uses a total of 27 objectives to flesh out how green infrastructure is to be developed and how this can be implemented in various ways. A toolbox clearly summarises which stakeholders can contribute to achieving these goals at the various geographic levels and how, i.e. with which (planning) instruments. Finally, there is a section which deals with the prospects of green infrastructure in the Ruhr metropolis.

UNDERSTANDING GREEN INFRASTRUCTURE

On the one hand, the term 'green infrastructure' refers to all green and open space elements at different geographic levels, ranging from trees along roads and in urban parks to forests and regional green corridors. The term also stands for a strategic planning approach that sees these elements as a network and plans them on an intersectional basis. Inherent in this approach is the inclusion of grey areas with potential for expanding the green infrastructure network on the agenda.

Green infrastructure fulfils a variety of essential functions such as the city's technical supply and disposal systems. It forms the backbone of biodiversity and is central to people's recreation, well-being and health. It produces food and raw materials, ensures that the climate is pleasant and makes cities and regions more resilient to extreme weather conditions such as heavy rainfall.

The term makes it clear that managing elements of green infrastructure does not follow an economic logic of renunciation, but that, conversely, functional green systems are a prerequisite for a good life and management success.

Green infrastructure draws the attention of politics, business and administration to the need for planning and development of this infrastructure - analogous to other infrastructure systems - which never arise purely by chance, but are always the result of a systematic approach.



Spatial images of green infrastructure for the Ruhr metropolis

The way in which green infrastructure is planned, developed and maintained is crucial to the quality of life in urban districts and the entire region. The existing greenery must be maintained, adapted to meet changing requirements and upgraded, and the network of green infrastructure must be expanded by considering the entire area of the city with its building roofs and façades, road space and brownfield sites as potential areas for greening and unsealing to ensure this quality of life for the future.

Green infrastructure in the Ruhr metropolis is extremely diverse, which is due in particular to the heterogeneous development of the former coal and steel industry region in terms of open space and settlement structure. In addition to 'universal' elements of green infrastructure such as city parks, pastures and meadows or woodland, the region possesses unique elements of green infrastructure such as the regional green corridors, slag heaps and recreation parks. The functions and services provided by these elements, as well as the transformation processes in the sub-regions of the region, are special and worthy of further development.

Firstly, they break down the overall region into characteristic sub-regions, which are referred to below as 'spatial images'. These environments occur repeatedly across the 53 municipalities and almost 4,440 km² area of the region and illustrate that, despite the heterogeneity of the region, there are spatial patterns that allow for a transferable strategic approach to improving and further developing green infrastructure. Secondly, the spatial images locate characteristic elements of green infrastructure for these typologies, thereby creating an inventory of green infrastructure in the Ruhr metropolis as it exists today. Thirdly, the spatial images combine the existing inventory with future potential green infrastructure developments and therefore create a future image of what the greenest industrial region may look like if green infrastructure is strategically planned and developed.

The transitions between the three following spatial images of the 'inner city', 'conurbation' and 'countryside' are fluid, as the green infrastructure forms a network on several geographic levels and is therefore composed like a mosaic. The numbers in the spatial images provide a preview of the objectives.

What will the Ruhr metropolis look like when it becomes the greenest industrial region?

Schematic spatial images were developed to answer the question of what already characterises the green infrastructure in the Ruhr metropolis today and how the existing potential for achieving the vision of the greenest industrial region can be further developed. These aim to make three aspects of the complex concept of green infrastructure tangible and to put them into concrete terms for the region:

Inner city

The Ruhr metropolis, as an association of cities, has not just one, but at least 53 inner cities – one in each city or municipality. The close proximity of the major cities of Duisburg, Oberhausen, Mülheim an der Ruhr, Bottrop, Essen, Gelsenkirchen, Bochum, Herne, Dortmund and Hamm which form a dense conurbation strung together like a string of pearls is particularly striking. This polycentricity is characteristic of the region’s settlement structure, but also of its open space structure: although there are densely built-up city centres, the distance from the city to the countryside is the shortest of all metropolitan regions in Germany.

The inner city space type is characterised by closed row and perimeter block developments from the Wilhelmine period and post-war modernism as well as larger building complexes and high-rise commercial and social infrastructure buildings. There are approx. 3,000 hectares of dedicated parks throughout the Ruhr metropolis. There are also countless green city squares, parks on converted sites, green courtyards and roadside trees. The former industrial areas covering around 2,000 hectares, which have been reclaimed by nature and have now become ‘industrial nature areas’, are a typical feature of the Ruhr region.

Specific challenges in these spaces include heat island effects in the summer and other environmental burdens such as noise and air pollution. By today’s standards, there is often a deficit of green and open spaces -- close to residential areas -- that have a positive impact on the climate and recreation, which also means that there is a lack of opportunities for play and exercise. Added to this are the challenges posed by city planning: The dense inner cities are characterised by motorised private transport and, in some cases, oversized roadways and many parking spaces. All car parking spaces alone account for around 7,000 hectares of paved area. This high degree of sealing exacerbates the heat island effect and leaves little room for greenery and active, climate-friendly forms of mobility such as walking and cycling.

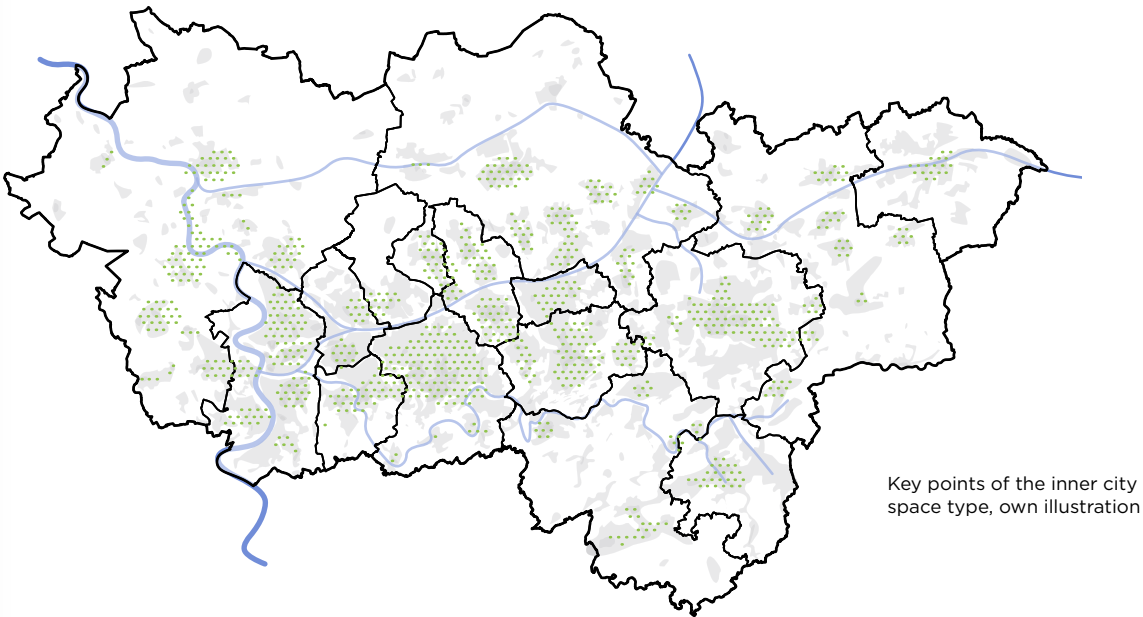
If, on the other hand, green infrastructure in city centres is improved and expanded as a fine-grained network,

important contributions can be made to climate protection and climate adaptation, biodiversity, quality of living, location and health. Urban green infrastructure reduces air pollutants, cools during hot spells and can reduce urban flooding during heavy rainfall.

Improving and expanding green infrastructure will mean creating an attractive living and working environment for the residents of the Ruhr metropolis as well as developing spaces for exercise, recreation and experiencing nature on their doorstep. To this end, existing green spaces, such as parks, need to be made fit and attractive for the future. The future of inner cities will be green, especially if the process of improving existing green spaces is combined with transforming areas previously designated ‘grey’, thereby creating healthier living conditions for everyone.

A key factor in city centres is the redesign of the road space, which not only serves to retain water by greening roads and parking spaces, but also creates attractive pathways and therefore contributes to the transition to sustainable transport. Another key factor is to recognise the horizontal and vertical greening potential of building roofs and façades, as well as the potential to use urban brownfield sites to create new green infrastructure such as pocket parks and tiny forests.

The following vision describes the impact that further development and expansion of green infrastructure may have on inner cities in the Ruhr metropolis.



Vision

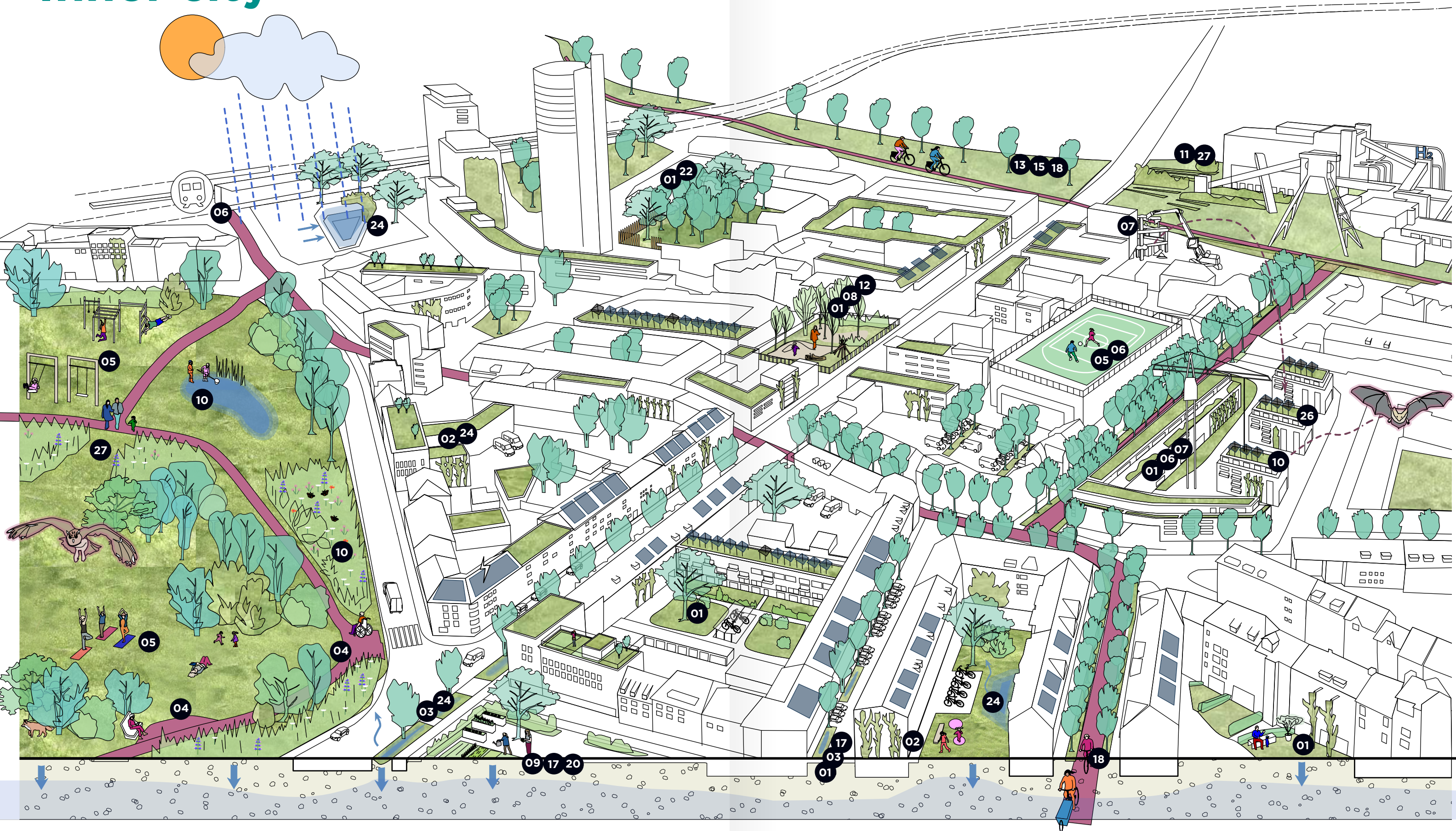
It’s hard to believe, but the inner city of the future will be climate-adapted, biodiverse and liveable – especially here in the Ruhr region! Flowering inner courtyards, shady roadside trees, pocket parks, green building façades and roof gardens form a green mosaic in the dense living space.

If that’s not enough, you can relax in modern parks: they are green oases for the young and old, inviting you to get sporty, play and switch off from everyday life. Urban gardening brings together people from different cultures and nationalities. Rare animal species such as owls and bats have also moved back into the urban space: It’s now possible to experience wilderness in the urban jungle up close. Once unused brownfield sites are now bursting with biodiversity and are home to unique, sometimes rare animal and plant species.

The well-developed and shaded paths are preferably travelled on foot or by bike – people feel healthier and fitter. Green spaces and green-blue road space soak up rainwater and store it so that the urban greenery can be sustainably watered and kept alive. The water also cools the environment as it evaporates, creating a pleasant urban climate, meaning that people can finally spend time in the streets even on hot days.

And when new buildings are constructed, they are built as resource-efficiently and sustainably as possible. The built city is seen as a material source, existing buildings are remodelled and repurposed rather than completely demolished. Recycled and recyclable building materials, green roofs and façades as well as the supply of renewable energy form the focus in new buildings.

Inner city



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Conurbation

There are numerous spaces in the Ruhr metropolis that can be described neither as high-density city centres nor open landscapes. These transitional areas are represented in the conurbation space type and include, on the one hand, peripheral areas or suburbs of larger cities, such as Wattenscheid-Höntrop, Essen-Werden or Bottrop-Kirchhellen, and, on the other hand, large parts of smaller cities and municipalities that are less densely built-up, such as Breckerfeld, Bönen or Alpen. From an open space perspective, the conurbation includes important connecting spaces that are particularly essential for (local) recreation and the well-being of people as well as for the biotope network.

The conurbation is characterised by a rather low-rise, dispersed but nevertheless large-scale development. This includes both colliery and other terraced housing estates with front and back gardens, garden city districts, large housing estates and new detached house areas. Large industrial and commercial areas, logistics centres and other supply and disposal infrastructures, which have been relocated from the old city centres to the outskirts of the cities, are also characteristic. Peripheral farms have adapted to their proximity to the city and market their food directly to city dwellers.

From an open space perspective, the conurbation is characterised by a significantly higher proportion of green space than in the inner city. Allotment gardens, agricultural land, forests and parks repeatedly break up the built-up areas. The region's numerous slag heaps are iconic and stand out from the city skyline. A large proportion of these open spaces are part of the 112,000 hectares of regional green corridors that both separate and connect inner cities of the Ruhr region, supplying them with fresh air and offering recreation in nature while being right on the doorstep.

The conurbation is strongly characterised by roads and other transport infrastructure for motorised private transport due to the dispersed settlement structure and the spatial distance from the inner city. It is difficult to reach places of work and leisure outside these residential areas without a car and the associated CO₂ emissions. Commercial and industrial areas are often highly

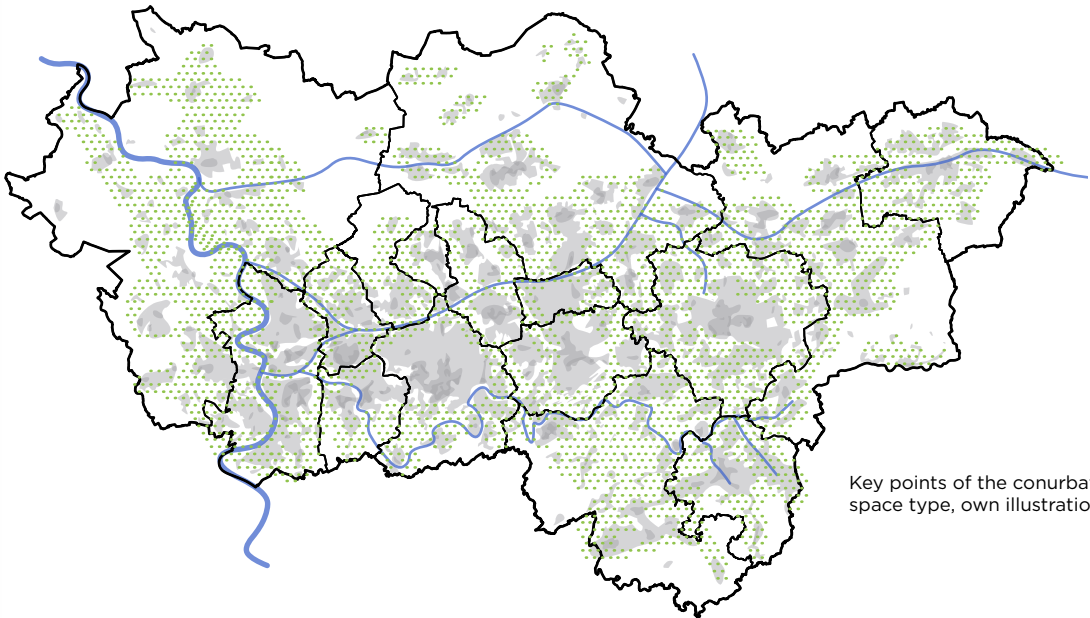
sealed and aspects such as open space quality, climate adaptation and biodiversity play a subordinate role.

With over 15,000 hectares of private gardens and almost 3,000 hectares of allotments, a large part of the green infrastructure is privately owned. Depending on how they are designed by their owners, they can have a negative impact on the surrounding area, for example as sealed courtyards or gravel gardens. As structurally rich, flowering gardens, on the other hand, they ensure a high quality of life, climate comfort and strengthen the biodiversity typically found in the neighbourhood.

Larger cemeteries are also typically found on the outskirts of towns and cities. Their utilisation is declining due to a change in burial culture and they have the potential to promote biodiversity and the experience of nature.

It is therefore essential to understand and develop private green spaces as well as 'grey' commercial and industrial areas as potentials for the green infrastructure network. The green corridors along existing linear infrastructures such as roads, railway lines and waterways can also be optimised in terms of their networking function.

The following vision describes the impact that the further development and expansion of the green infrastructure may have on conurbations in the Ruhr metropolis.



Key points of the conurbation space type, own illustration

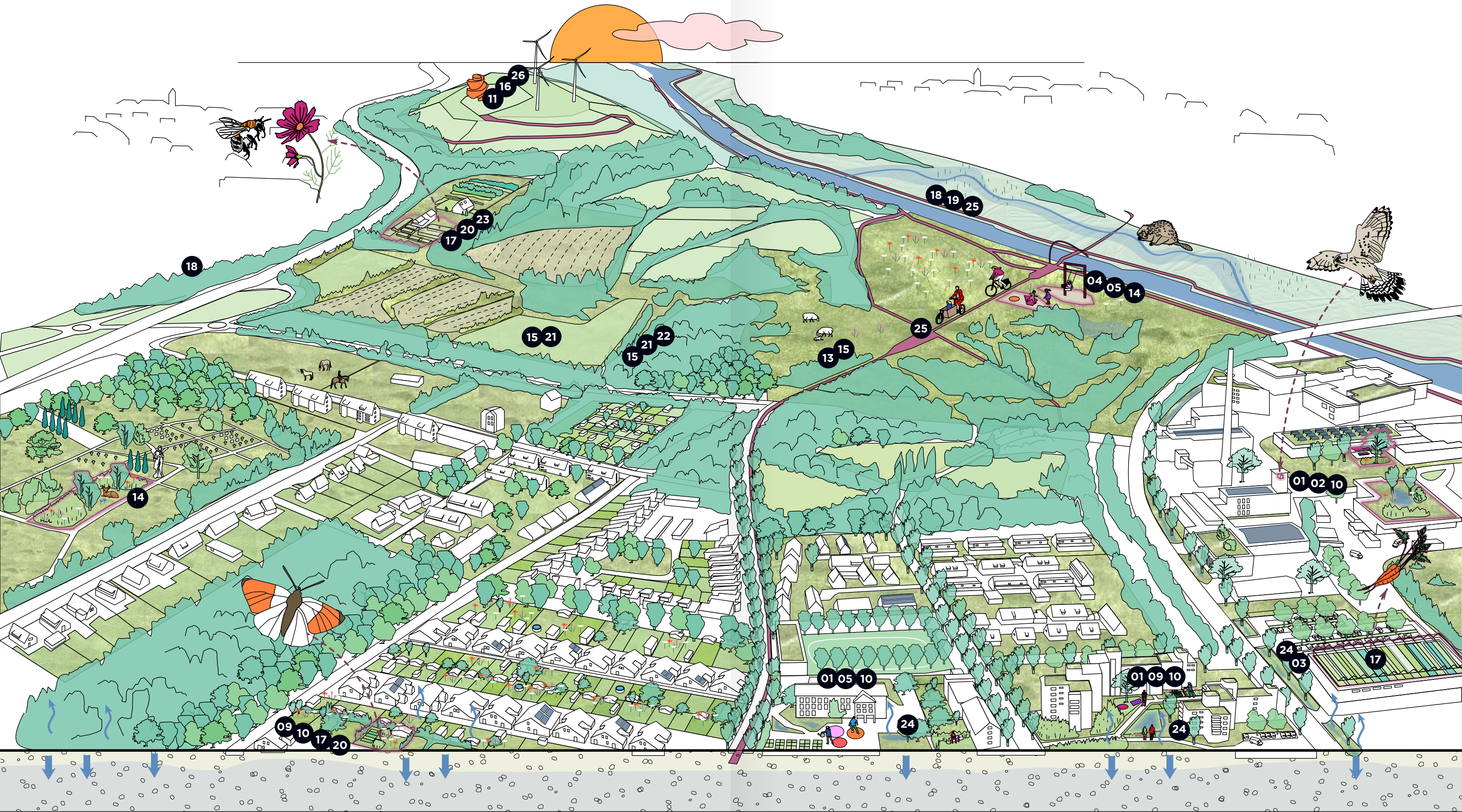
Vision

The conurbation of the future connects the vibrant inner cities with the expansive countryside. Bees and butterflies can be seen visiting front gardens full of flowers as you walk through the neighbourhood. The nearest park, field or cemetery is not far away – with continuous green links, it's not just people that find their way there, but animals too.

The green banks of the rivers, canals and meadows are perfect for cycling, relaxing and cooling off on hot days. Those who prefer to aim high can climb the region's unique slag heaps: for sporty mountain bikers, culture enthusiasts attending a festival or those wishing to spot plants and animals in unspoilt industrial green spaces.

Green spaces are not just an inviting place to relax in your free time: People even enjoy travelling to work to spend their lunch break on their company's own roof garden or in shady, green courtyards. Schools are no longer grey concrete jungles. They all offer plenty of opportunities for exercise and large school gardens for exploring animals and plants. Ingredients for lunch are harvested from the community garden. The rest comes from local farmers who supply the entire city with fresh food, most of which is organically grown.

Conurbation



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Countryside

The countryside spatial image addresses the diverse open landscape areas on the edges of the conurbation. These are very different areas, such as the lower Rhine plain, the wooded hilly landscape of the Haard or the foothills of the low mountain range in the Ruhr valley.

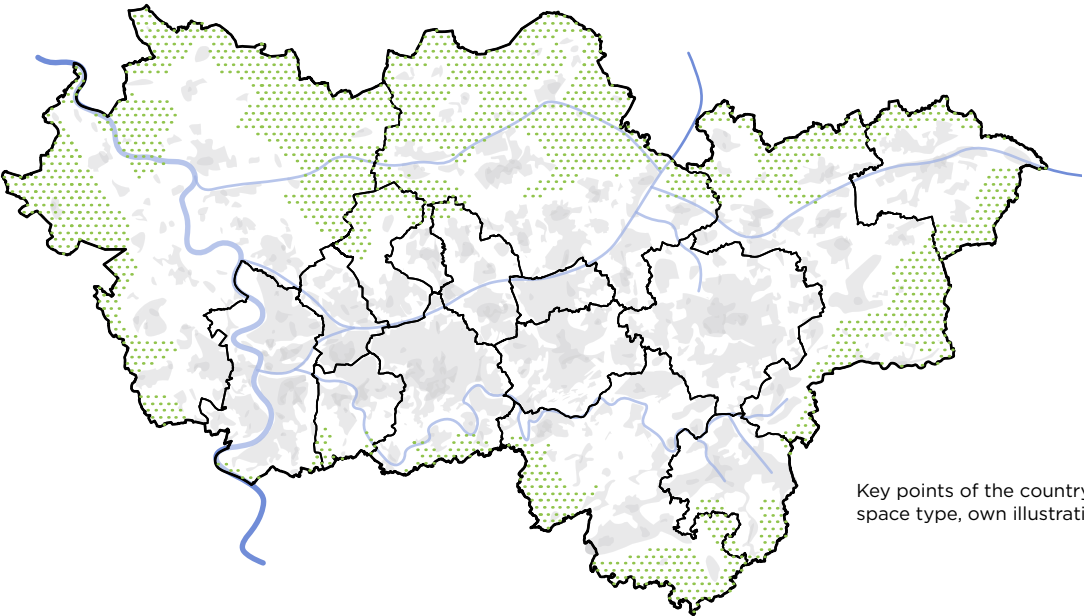
The majority of the region’s agricultural land (a total of around 160,000 hectares) and forests (a total of around 70,000 ha) are located in the countryside. Resources such as food and wood are produced here, thereby supporting entire economic sectors. Permanent grass-land such as meadows and pastures, as well as woodland and moorland, serve as important carbon reservoirs that contribute to natural climate protection. Development is limited to smaller villages, individual farms and large infrastructure routes. Open landscapes are important climate compensation areas in which fresh air can be produced and water can be retained.

One challenge is that the demands on forestry and agricultural land are becoming increasingly diverse. Producers are under high economic pressure in EU-wide competition. Crop failures are increasing due to climate change and there is a call for agricultural practices to be adapted or converted. Social considerations also call for a decisive counter-movement to tackle the intensification of the cultivated landscape in view of the massive loss of species. Setting real incentives for ecological and

soil-vitalising cultivation methods and creating more structural diversity and retreat areas in the cultivated landscape is therefore a major task for the future. This not only strengthens the function of the habitat, but also the recreational value for residents.

Another challenge is the eternal and energy-intensive task of pumping the water out of the 40,000 or so polder areas to prevent them from flooding. At the same time, water is becoming increasingly scarce as a resource in times of increasing drought, which could lead to new potential uses.

The following vision describes the impact that the further development and expansion of green infrastructure may have on the countryside in the Ruhr metropolis.



Vision

The countryside in the Ruhr metropolis is the region’s ‘green pound’. Walking, hiking and cycling through forests, grassland and fields is not just a way to relax and take a deep breath. A special biodiversity can be marvelled at along the streams and rivers, which finally all have clean water again and are allowed to meander in their original paths.

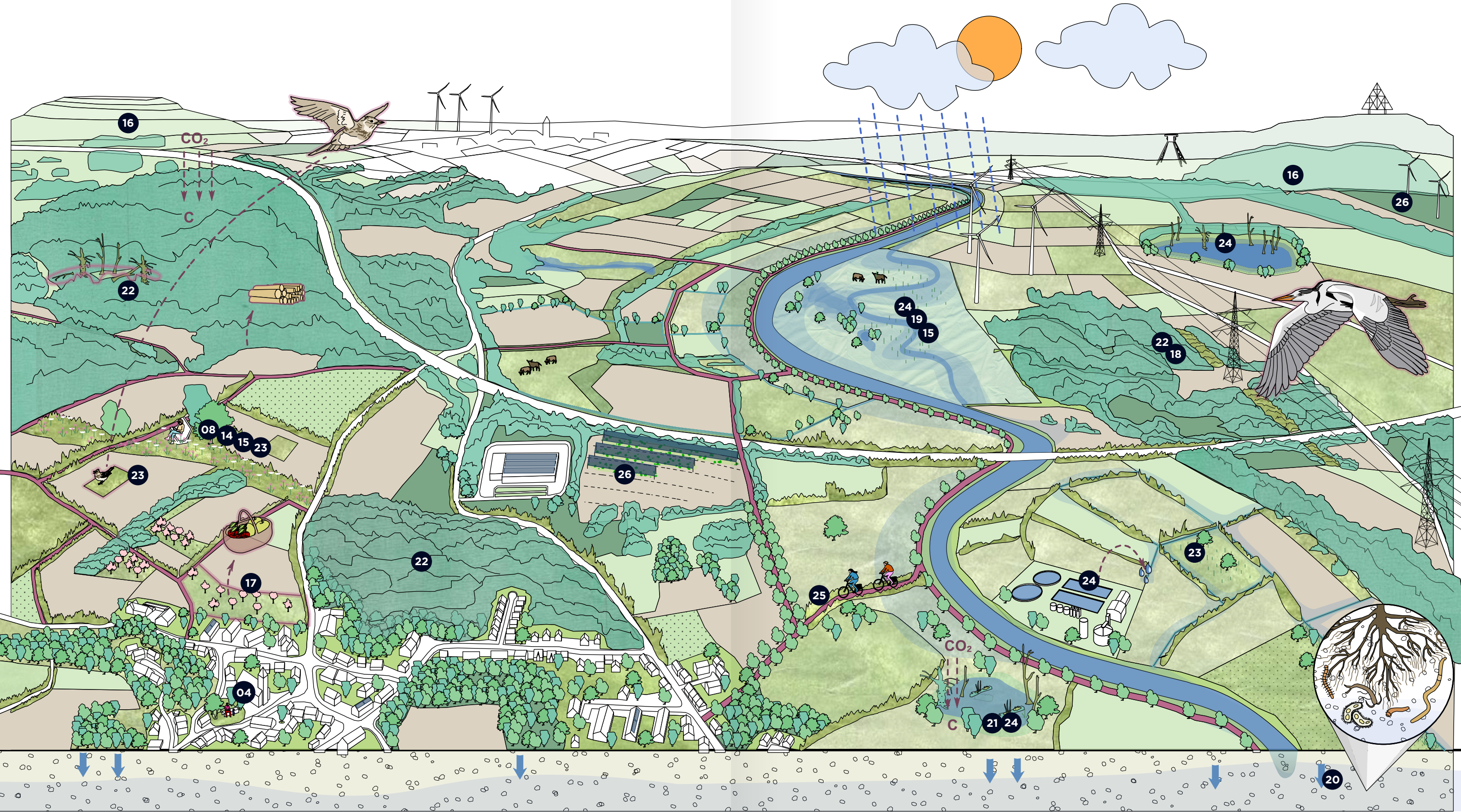
The forests are spaces for taking a deep breath even on hot summer days. The tree species are adapted to the climate and can withstand drought and heat, meaning that they can continue to act as green lungs for the region. Some areas are left to their own devices as process conservation areas and are biodiversity hotspots. Instead of repeatedly clear-cutting forests under power lines, a biotope network of low-growing plants has been created.

Fresh food is produced directly in the region. Extensive fields, meadows and pastures are farmed sustainably and with care. They ensure a rich harvest and have healthy and vibrant soils. The neighbourhood also helps: by growing fruit and vegetables together which encourages healthy eating, or by planting colourful flowering strips at the edge of the fields where bees and other insects can be found.

Solar energy is generated in open spaces, but sometimes in places where agriculture is already being practised too. The plants enjoy the shade and the available space is utilised efficiently. The sight of wind turbines has also become a source of joy – not least because of the fall in energy prices, but especially because of the certainty that energy supplies for future generations will also be protected.

Countryside

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Objectives for developing green infrastructure in the Ruhr metropolis

From guiding themes to objectives

By adopting the Green infrastructure charter Ruhr metropolis (09/2022), the region has agreed on five guiding themes for the development of green infrastructure in the Ruhr metropolis. The guiding themes represent the major challenges of our time, which green infrastructure can make an important contribution to overcoming: regional identity and a high quality of life, adaptation to climate change, achieving climate neutrality and environmental justice, preserving biodiversity and the transition to a sustainable, circular economy.

These guiding themes were further fleshed out in terms of content and space and developed into implementable goals, or objectives, as part of a consultation process. Before we introduce the objectives, however, it is worth taking a look back at the guiding themes:

I. LIVEABLE RUHR METROPOLIS

Protecting quality of life and creating an identity through green infrastructure

Green infrastructure in the Ruhr metropolis has a considerable impact on quality of life in the region as a whole and in the different districts. The unique inventory of green and open spaces must be safeguarded, further developed as a geographically networked open space system with its diverse functions and adapted to changing conditions as a means of contributing to social cohesion, the well-being and health of people and ecosystems and of further strengthening the region's green image.

II. CLIMATE-ADAPTED RUHR METROPOLIS

Ensuring resilience and climate comfort through green infrastructure

Green infrastructure is an essential prerequisite for preparing our urban landscape for climate change. The aim is to densify the network of green infrastructure with a systemic understanding of the interrelationships between rainwater management, flood and heat prevention to improve it in a climate-adapted manner and to make use of the advantages of a polycentric region as a means of developing the Ruhr metropolis into a sponge region. At the same time, well-developed, carefully planned and maintained green infrastructure reduces damage caused by drought, storms and erosion.

III. BIODIVERSE RUHR METROPOLIS

Enabling co-habitation and greater biodiversity through green infrastructure

Much more far-reaching efforts are needed to counteract the rapid loss of species and ecosystems. Instead of mere 'coexistence', the guiding theme strives for the active 'co-habitation' of humans with other creatures. Green infrastructure forms the basic framework for biodiversity and stands for always thinking, networking and improving both urban greenery and large open spaces in their function as habitats for humans and animals. With its former industrial areas, the Ruhr metropolis has special potential for developing a unique industrial nature.

IV. CLIMATE-JUST RUHR METROPOLIS

Strengthening climate protection and environmental justice through green infrastructure

Achieving climate neutrality by 2045 as a response to climate change requires profound adjustments to urban development and mobility. Green infrastructure, in the form of green routes, provides important impetus for the transition to sustainable transport. The often unevenly distributed consequences of climate change and other negative environmental impacts should also be better absorbed for the benefit of already disadvantaged population groups. This is achieved by specifically retrofitting green infrastructure in densely populated and socially deprived districts and integrating it into new developments from the outset. Improved access to green and open spaces also makes a significant contribution to promoting health in the Ruhr metropolis, so that the region, which once played a key role in shaping industrialisation in Germany and Europe, now acts as a role model for climate justice.

V. CIRCULAR RUHR METROPOLIS

Understanding the region as a system and using green infrastructure to promote sustainable and regional added value

A shift towards a regenerative economic model is needed for the Ruhr metropolis to become the greenest industrial region. In this context, the productive and value-adding properties of green infrastructure should be promoted, for example in relation to food, energy, water cycles and recyclable materials. Green infrastructure will also be strengthened as a location factor for business and tourism and material flows, regional resource management and soil care are to be focussed on.

27 Objectives as good professional practice and source of inspiration

A total of 27 objectives were developed as a result of fleshing out the guiding themes of the green infrastructure charter for the Ruhr metropolis in terms of space and content. They form the centrepiece of the green infrastructure charter for the Ruhr metropolis and make the agreements of the charter tangible. The objectives show which stakeholders at the municipal and regional level are able to contribute to making the region even greener and therefore more sustainable, and with which approaches, measures and instruments.

The diverse objectives open up a wide range of possibilities, from the protection and the qualitative further development of existing green spaces to a different approach to current ‘grey’ areas in the form of conversion, partial or complete unsealing and retrofitting with green infrastructure. The green infrastructure strategy for the Ruhr metropolis brings together the perspectives of nature conservation, urban and open space development, mobility, climate adaptation and climate protection and forms an overarching framework for the existing specialised strategies.

The 27 objectives refer, on the one hand, to established, good professional practice that can be applied to and rolled out in other subregions of the Ruhr metropolis. On the other hand, they provide new impetus for topics and projects that still represent uncharted territory in the Ruhr region and that are worth exploring under the integrated planning concept of green infrastructure. This range between established practice with extensive experience and targets and completely new approaches and trends results in the objectives being fleshed out to varying degrees. Planning green infrastructure also requires consideration at different levels, from the level of the individual property and the urban district to the region, so that geographic networking and the strengthening of the respective ecological functions can succeed.

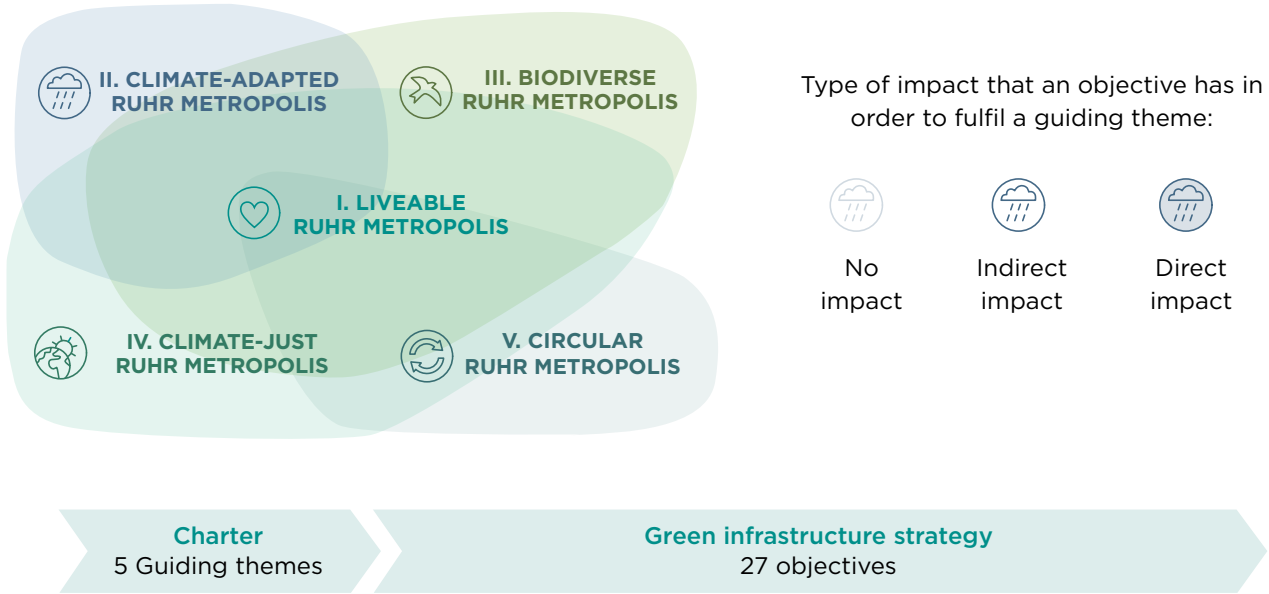
Designing the objectives

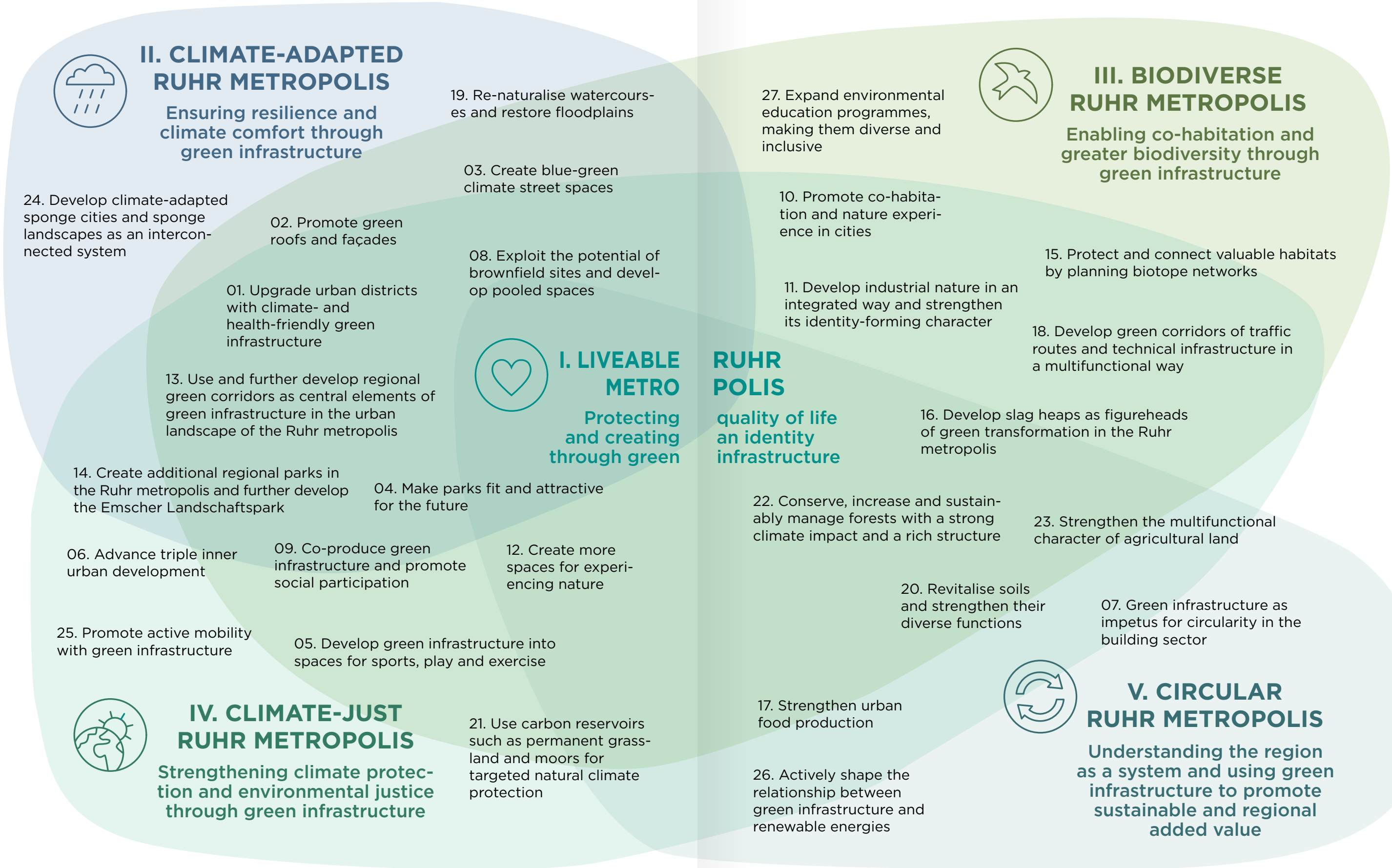
These objectives have been sorted on the basis of the spatial images, thereby creating a thematic structure in line with the scale of the region’s major future tasks. There are also numerous thematic overlaps between the guiding themes, as each of the objectives contributes not just to one, but to several of the major guiding themes in a direct or indirect way, thereby generating added value. For example, expanding nature experience spaces (see Objective 12) not only contributes to an improved quality of life for children and young people, but also supports the promotion of biodiversity and creates climate justice, if nature experience spaces are specifically created in socially deprived districts. This added value that each of the objectives generates by fulfilling the guiding themes is symbolised with the help of five icons that represent the respective guiding themes.

Each objective lists options for implementation that range from a macro-regional to a municipal level and are entitled ‘Ways to reach the goal’. The latter are to be understood as selected suggestions and technical recommendations as to which measures can contribute to realising the objective at which level. Tried-and-tested approaches and new ideas can be selected and adapted to the individual circumstances and needs of individual creators of green infrastructure in a kind of ‘modular system’.

The objectives are flanked by a presentation of existing projects in the region – where available. These serve explicitly as an invitation to imitate, in the spirit of mutual learning.

The respective statement of objectives contains the specific mandate for action that the region has set itself for the development of green infrastructure. This will be underpinned by a brief technical introduction as a means of creating a shared understanding of the relevance and topicality as well as the specific challenges in the Ruhr metropolis. The central development plans for which the Ruhr metropolis is striving are summarised in the form of agreements.









OBJECTIVE 01

Upgrade urban districts with climate- and health-friendly green infrastructure

The quality of life in the cities of the Ruhr metropolis is largely determined by the availability of green infrastructure in the immediate neighbourhood. That is why retrofitting densely populated districts with green infrastructure in particular is essential for the future. Small and large green spaces such as leafy city squares, private gardens, green outdoor areas of schools, daycare centres and hospitals as well as parks and allotment gardens cool surrounding residential areas and therefore create climate comfort spaces within the densely populated city. In addition to reducing heat stress, green infrastructure also has a positive effect on air and noise pollution in densely populated areas.

Urban green spaces are also essential for physical and mental well-being, as they contribute to relaxation and stress reduction and encourage outdoor exercise. In terms of environmental justice, green spaces are places of encounter and social exchange as well as habitats for countless plants and animals. The integration of green infrastructure into existing urban structures is essential for the quality of life there given its diverse functions and great importance. This integrative planning approach can also be enriched with further added value in the sense of triple inner urban development (see Objective 06).

An important step towards improving green spaces in urban districts specifically involves agreeing on benchmarks. The geographic distribution of open spaces can be analysed on the basis of this and the focus can be placed on districts with a particular need for retrofitting with residential green spaces. The use of suitable instruments such as qualified open space design plans also helps to promote green spaces.

Another field of action is industrial estates, whose integrated green infrastructure is an important location and economic factor. To this end, identity-forming landscape elements, such as old tree populations or small bodies of water, must be preserved in the new development of commercial sites and made the starting point for planning. It is also important to equip the usually large surfaces of commercial buildings with green infrastructure such as green roofs and façades, and to design rainwater management infrastructure in a decentralised manner. Company gardens promote social interaction and contribute to a healthy and attractive working environment.

AGREEMENTS	Contribute to a better quality of life in places where people live and work with green infrastructure. Develop municipal benchmarks for the provision of green infrastructure and its accessibility with the support of the regional level and underpin them with open space plans.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL → Develop a recommendation based on nationwide benchmarks for the provision of green infrastructure, which are currently defined as follows¹: → Green space supply: – Neighbourhood green spaces: 4 m² of public green space per capita, accessible within 250 m on foot/150 m as the crow flies – Green space in residential areas: 6 m² of residential area-related public green space per capita, accessible within 500 m on foot/300 m as the crow flies – Green space in districts: 7 m² of public green space close to the settlement per capita, accessible within 1,000 m on foot/650 m as the crow flies – Total urban green space: 7 m² of public green space per capita: up to 5 km public transport distance → Availability of green spaces: – 100 % of residents live within walking distance of approx. 5 minutes (this corresponds to max. 500 m/approx. 300 m as the crow flies) from public green spaces of at least 2 hectares in size → Regional geo-based needs analyses to identify urban districts that are particularly affected by environmental pollution, social problems and a lack of green spaces and for which there is a particular need for action (regional environmental justice analysis) → Stimulate discourse at the state level to incorporate the use of qualified open space design plans into building regulations AT THE MUNICIPAL LEVEL → Consider urban spaces in their totality and further develop green infrastructure → Enter into a broad discourse on municipal benchmarks for green infrastructure based on the regionally recommended benchmarks by working with specialist administrations in the areas of urban planning, green spaces and the environment as well as health and social affairs, the participation of educational and health facilities as well as housing associations and other large land owners → Prepare geo-based open space supply analyses and informal, city-wide open space plans to define suitable guidelines for the urban space and develop projects for retrofitting with green infrastructure → Ensure high-quality green infrastructure in urban development → Draw up open space design plans as part of urban development processes to ensure that new open spaces are of high quality and functional; deriving specific requirements for open spaces and translating them into technical and design solutions, e.g. in the form of qualified development plans
PRACTICE	The University of Dortmund and the city of Bottrop developed a guideline for making climate change-adapted improvements to commercial and industrial areas as part of the 'KlimaWaGe' project. → https://www.umweltbundesamt.de/themen/klima-energie/klimafolgen-anpassung/werkzeuge-der-anpassung/projekte-studien/klimawage-klimawandelangepasste-gewerbe

¹ Nationwide benchmarks were presented in 2021 as part of the Urban Nature Masterplan - 'Recording, Protecting and Developing Urban Nature' - Expert Supervision during Implementation of Urban Nature Masterplan, Weißenstephan-Triesdorf University of Applied Sciences, Difu i. A. BfN (2021). In terms of green accessibility, the Urban Nature Masterplan envisages a value of one hectare of green space. The regional study by the Wuppertal Institute on the transformation to the 'greenest industrial region in the world' - shown for the Ruhr metropolis (2021) - suggests a figure of two hectares in this regard.

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OBJECTIVE 02

Promote green roofs and façades

The roof and façade landscape represents a barely utilised resource for creating green infrastructure in the cities of the Ruhr metropolis. Their greening is a key factor in arming cities against extreme weather conditions caused by climate change (RVR, 2017). Green roofs and façades can buffer heat island effects and heavy rainfall and contribute to more biodiversity in the city.

Depending on the thickness of the substrate and vegetation, green roofs improve thermal insulation and relieve the burden on the sewage system by absorbing rainwater. Retention green roofs are therefore particularly useful for areas that are equipped with a combined sewer system and are at risk of flooding. Façade greening provides relief through cooling and shadowing, especially in urban areas with a heat island effect. Green roofs and façades are an important vehicle for creating climate-adapted sponge cities (see Objective 24).

Green roofs and façades also increase the possibilities for food and nesting for animals in the city. Designed as biodiversity green roofs with mounds, diverse shrubs, deadwood and other biotope structures, they represent valuable stepping stone biotopes for flying insects and many bird species in the urban ecosystem (see Objective 10). A high substrate structure is particularly important for insects so that they can survive in the soil even in dry and frosty

conditions. Green façades, which are also equipped with nesting blocks for animals that nest on buildings or roosts for bats, also make an important contribution to biodiversity in the city.

Publicly accessible roof gardens also help to compensate for deficits in the provision of open spaces in densely populated districts (see Objective 01). Green roofs can also be developed as combined solar/green roofs with elevated photovoltaic systems and synergies can be created by increasing the share of renewable energies (see Objective 26).

When promoting green roofs and façades, public property management plays a special exemplary role.

The regional green roof register provides information on the suitability of roofs and potential benefits such as wastewater savings². Following on from the 'Green Roofs in the Ruhr Region' working group's recommendations for action and the resulting strategy and implementation paper of the same name, further efforts are required to increase the proportion of green roofs in the Ruhr metropolis.

AGREEMENTS	In the long term, 'green' all flat roofs unless there are structural or other reasons not to do so; initially 50% of flat roofs and 5% of façades in city centres by 2030. Make the installation of green roofs in new buildings standard and disconnect new buildings from the municipal sewage system as a matter of principle; any unavoidable connection between new buildings and the sewage system should become an exception.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL ➔ Set up a broad-based information campaign aimed at municipal planning authorities, private owners and building cooperatives to highlight the benefits of green roofs and façades and options for their implementation ➔ Develop a template for a municipal agreement that makes green roofs and façades standard in new construction projects AT THE REGIONAL AND MUNICIPAL LEVEL ➔ Test all public buildings suitability for retrofitting green roofs and façade greening and successive implementation in 80 % of suitable buildings AT THE MUNICIPAL LEVEL ➔ Drawing up simple development plans with mandatory greenery in the case of conversions and new builds for areas that are particularly susceptible to heat stress and flooding ➔ Establish municipal funding programmes for private green roofs and façades in existing buildings; this should include an examination of potential accompanying funding programmes ➔ Draw up municipal agreements such as green roof regulations to make green roofs and façades standard in new buildings and mandatory under building law
PRACTICE	Existing development plans and buildings can be supplemented by green roof regulations or new development plans can be drawn up in accordance with section 30 (3) of the Federal Building Code (BauGB). The city of Essen has introduced a greening requirement as part of its 'Flat roof greening in Essen city centre' development plan that applies to changes to roof surfaces or new buildings that require planning permission. → geoportal.essen.de/planenbauen/ Some cities in the Ruhr metropolis already provide support for green roofs and façades with their funding programmes. The city of Dortmund, for example, subsidises green roofs with a substrate layer of at least 8 cm as well as ground and wall-based green façades. → https://www.dortmund.de/themen/foerderungen/foerderprogramme/begruenungsfoerderung/



OBJECTIVE 03

Create blue-green climate street spaces

In the Ruhr metropolis, partly oversized traffic areas and parking spaces are large areas with potential for retrofitting with green infrastructure. Sealed roads with little greenery and no shade and large car parks become hotspots for heat on summer days. At the same time, a high proportion of sealed road space harbours the risk of flooding, as drainage into the sewer system leads to overloading. Redesigning road space and parking spaces is a key factor in subsequently improving the greenery in very densely populated districts and converting rainwater management infrastructure. This allows water to be stored temporarily in the soil, in retention areas and in cisterns and made available for plants (BlueGreenStreets Toolbox, 2022).

The road is an extreme climatic location for which only certain tree species are suitable. Climate change is exacerbating drought and heat stress, making trees more susceptible to diseases and pests. Formerly proven roadside tree species such as chestnut and ash are suffering massive losses. It is important that we plant road tree species that are as resilient and sustainable as possible to tackle this challenge. A closed canopy should be avoided on roads with heavy traffic to prevent air pollutants from accumulating and to ensure sufficient ventilation. The living conditions of trees at their location must also be improved. Sufficient rooting space must be provided,

circular beds around trees must be designed accordingly and rainwater management must be adapted in a way that makes water available to the trees. It makes sense to increase the use of tree trenches, which are a combination of infiltration area and roadside tree location (see Objective 24).

Large car parks, which currently cover a total area of around 7,000 hectares in the Ruhr metropolis, represent further areas with potential. The size of car parks needs to be scrutinised when adapting cities to climate change and against the backdrop of triple inner urban development (see Objective 06). The expansion of environmentally friendly mobility options can reduce the need for car parking spaces. The areas that are freed up by such measures can be partially unsealed and retrofitted with trees that provide shade. According to state building regulations, it is a formal requirement that new car parks with 35 or more commercial parking spaces be covered with photovoltaic systems. In this case, urban trees can be planted in the peripheral areas that are less suitable for photovoltaics.

AGREEMENTS

- Plan pilot projects for the creation of green-blue road space equipped with vital tree locations, evaporation and infiltration beds.
- Work together to define benchmarks for the provision of roadside trees and partial unsealing, and anchor them in voluntary municipal commitments and master plans.
- Use hardy tree species and create the best possible growing conditions and water availability for roadside trees.

WAYS TO REACH THE GOAL

- AT THE REGIONAL LEVEL
 - Enter into a regional discourse between the RVR, municipal road and green space authorities, civil engineering offices, tree nurseries and experts on sustainable roadside tree species
 - For the creation of green-blue road space
 - As well as suitable benchmarks for the provision of roadside trees, which are currently defined nationwide as follows³:
 - Main roads and access roads: one tree/15 m on both sides
 - Side roads: one tree/15 m on one side
 - Narrow side roads: one tree/33 m on one side
 - Parking spaces: one large-canopy tree per four parking spaces or part thereof
 - Derive suitable benchmarks for the Ruhr metropolis based on this and establish a joint commitment by all municipalities to create standardised conditions for project developers throughout the region
- Further develop the RVR's tree location tool for heat stress analyses and expand the planning information maps and make this available to municipalities
- Resume regional climate tree campaigning and promote roadside trees in particular
- AT THE REGIONAL AND MUNICIPAL LEVEL
 - Successive review of and greening measures for public car parks, where possible with one tree for every four parking spaces
- AT THE MUNICIPAL LEVEL
 - Develop mobility plans for traffic avoidance and traffic shifting, and implement pilot projects for the redesign of roads and parking spaces
 - Plan 'road space' pilot projects in heat-stressed urban districts for partial unsealing, decoupling and 'greening' parking spaces in the road area by creating elements such as evaporation basins and infiltration troughs and deep beds; select roads and implement measures in close dialogue with residents; evaluate the pilot projects and use ideas in other road reconstruction projects
 - Increase the number of roadside trees and compensate for lost trees by replanting
 - Draw up tree master plans to determine the need for measures and quality criteria for roadside tree locations
 - Accompanied by roadside tree campaigns in which citizens and institutions are encouraged to fund and/or maintain/water trees through sponsorship
 - Improve large parking areas with partial unsealing and by planting trees that provide shade, especially for shopping centres/businesses/industry
 - For new builds: stipulate that one tree is planted for every four parking spaces as standard in development plans

PRACTICE

The 'Liveable streets, places and neighbourhoods' (LesSON) concept study used one road in Dortmund and one in Gelsenkirchen to discuss how residential and street spaces can be made liveable in the context of the transition to sustainable transport and climate adaptation.
→ https://www.klima-werk.de/visionblau_gruen/stadtwandel/lesson.html

³ Nationwide benchmarks were presented in 2021 as part of the Urban Nature Masterplan – 'Recording, Protecting and Developing Urban Nature' – Expert Supervision during Implementation of Urban Nature Masterplan, Weihenstephan-Triesdorf University of Applied Sciences, Difu i. A. BfN (2021).



OBJECTIVE 04

Make parks fit and attractive for the future

Parks form the anchor points in the open space system of the Ruhr metropolis. These include the civic gardens, town and spa parks created in the course of industrialisation, the public parks of the 20th century, the Ruhr area-specific district parks of the 1960s and numerous federal and state garden shows. According to land use mapping, over 3,000 hectares are dedicated parks, including zoological and botanical gardens. A selection of larger parks and their significance are recorded in the region's recreation and tourism plan (RVR, 2023a). These parks are of particular relevance for people's recreation and exercise in green spaces, the supply of cold air in cities and urban biodiversity. As garden monuments of their time, they form part of the city's history.

The demands on park maintenance and upkeep are high in view of intense pressure from users. In addition, many parks are already several decades old and are in need of modernisation to meet current requirements. We need to strengthen the appeal of parks as places of well-being on hot days and at the same time gear maintenance plans and new planting towards increasing heat and drought stress. It is also of central importance that the parks, as low-threshold recreational facilities, allow for social participation and exchange. Intergenerational design often requires removing barriers. Incorporating trend sports such as callisthenics into park design provides an opportunity to specifically promote health and general well-being (see Objective 05).

AGREEMENTS	Ensure the necessary care and maintenance of parks as important infrastructure. Gradually make parks in need of modernisation fit for the future and continue to make them attractive for everyone in the Ruhr metropolis.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL ➔ Promote the exchange of knowledge on current incentives and requirements of open space development, and highlight funding opportunities by re-establishing working groups, as practised in the context of the IBA Emscher Park ➔ Consolidate the new incentives of the International Garden Exhibition (IGA) on the exhibition levels 'Our Gardens' and 'Future Gardens' ➔ Market the parks as part of the 'Route of Industrial Heritage' projects and in the context of the European Garden Network, of which the RVR is a member; further profile the parks based on the RVR's regional recreation and tourism plan AT THE MUNICIPAL LEVEL ➔ Identify modernisation requirements for parks in view of the need to adapt to climate change, promote biodiversity and nature experience as well as accessibility, and prepare corresponding care and maintenance plans ➔ Districts with inadequate open space provision, high levels of environmental pollution and social problems should be prioritised when it comes to designing the identified parks
PRACTICE	The five large recreation parks were modernised on the basis of an integrated action plan and reopened in summer 2023. The modernisation includes an ecological upgrade and revitalisation of the parks. The experience of nature and extracurricular learning will be promoted and accessibility will be encouraged. ➔ www.rvr.ruhr/themen/tourismus-freizeit/konzept-revierparks-2020/ Another example is the new park development plan for Grugapark Essen. One of the five objectives involves drawing up a maintenance and conservation plan to optimise maintenance in view of climate change and the desire for greater biodiversity despite limited resources. ➔ www.grugapark.de/aktuell_1/aktuelle_meldungen/parkentwicklungskonzept.de.html



OBJECTIVE 05

Develop green infrastructure into spaces for sports, play and exercise

Sport, play and exercise are becoming increasingly important as a factor in urban development, as they form a cross-cutting issue in the areas of environmental justice, quality of life and health. More and more people are taking part in non-club sports and using public green and open spaces to do so. The quality and design of green infrastructure plays a key role here. Green infrastructure also has the potential to make a contribution in the Ruhr metropolis by specifically improving it with sports, play and exercise programmes or by using it to upgrade existing facilities. An important aspect here is to design green infrastructure in such a way that it invites people of all generations to play and exercise without barriers.

On the one hand, the focus is on improving the quality of existing purpose-built and non-purpose-built sports, play and exercise areas. Playgrounds in particular, but also school playgrounds, for example, often have a low design quality and variety of facilities. These areas are often characterised by sealed areas that lack elements of green infrastructure such as shady trees or other vegetation. Designing these

places in a more natural way would also create a positive link to the topic of environmental education (see Objective 27). The partial opening of municipal and club sports facilities for public use represents further potential for promoting sport and exercise.

On the other hand, it is expedient to create new spaces with attractive opportunities for sport, play and exercise. The Ruhr metropolis has great potential for implementing opportunities like these thanks to its diverse open spaces. This ranges from smaller selective offers such as play and sports facilities along paths, trails or outdoor fitness equipment to the profiling of entire open spaces as sports and exercise parks.

Sports, play and exercise facilities are to be established as a priority in already densely populated, socially and environmentally deprived districts to promote environmental justice in particular.

AGREEMENTS	Create more sports, play and exercise facilities in green infrastructure and further develop the quality of existing facilities in the interests of environmental justice and promoting healthy lifestyles. Use elements of green infrastructure in a targeted way to make existing sports, play and exercise facilities more climate-adapted and bring them closer to nature.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL → Further support for local authorities by the RVR in terms of planning and implementing accessible and intergenerational sports parks with a wide range of uses AT THE INTER-MUNICIPAL LEVEL → Agree on quality standards for playgrounds and school playgrounds, e.g. with regard to near-natural design, the shadowing play equipment, seating for accompanying persons and the like, as well as the publication of an inter-municipal blueprint AT THE MUNICIPAL LEVEL → Strengthen play and sports master planning as an integral part of open space planning by integrating it into formal planning for green space authorities or municipal political decisions → The accessibility and quality of play, sport and exercise programmes should be improved by: → Developing plans closely coordinated with open space planning at the district or city level, which weigh up measures with nature conservation concerns and develop them in an integrated manner → Upgrading and ‘greening’ existing sports and play areas → Creating equipment for all generations, e.g. movement, balancing or outdoor fitness elements (e.g. callisthenics equipment), also by integrating this ‘incidentally’ into public green spaces → Creating and profiling further sports and exercise parks in existing public parks → Entering into a discussion with local authorities and sports clubs about the extent to which municipal and club sports facilities can also be partially or temporarily opened up to individual sports enthusiasts and non-club members
PRACTICE	Examples of high-profile sports and exercise parks include the RVR projects ‘Park in Bewegung’ at the Vonderort Recreation Park in Oberhausen and the AktivLinearPark at Hoheward Landscape Park, which were developed in cooperation with the respective municipalities. At the instrument and planning level, examples include the integrated sports development plan in Essen and the ‘Play and Exercise Masterplan, Mülheim an der Ruhr’. AktivLinearPark → www.rvr.ruhr/themen/tourismus-freizeit/aktivlinearpark/ Park on the Move → www.rvr.ruhr/themen/tourismus-freizeit/konzept-revierparks-2020/vonderort/ Sport development planning, Essen → www.essen.de/meldungen/pressemeldung_1482116.de.html Play and Exercise Masterplan, Mülheim an der Ruhr → www.muelheim-ruhr.de/cms/masterplan_spielen_und_bewegen1.html



OBJECTIVE 06

Advance triple inner urban development

Triple inner urban development is a model that is geared towards environmental urban development and should be applied to both new and existing buildings (UBA, 2022b). Triple inner urban development combines structural compactness ('city of short distances') with elements of green infrastructure for climate adaptation and quality of stay as well as climate-friendly mobility options. This approach minimises the negative effects of densely built-up areas, increases quality of life and reduces CO₂ emissions. Already densely populated and polluted inner (urban) areas in particular will benefit from this, which can contribute to environmental justice in the Ruhr metropolis.

Triple inner urban development should be applied as a guiding principle of urban planning not just for the development of new residential districts, but also for mixed-use and commercial areas. In commercial areas in particular, there is often great scope for climate upgrading using green infrastructure and reducing CO₂ emissions through the provision of better, climate-friendly mobility options. In existing areas, internal development should, where possible, be considered in conjunction with mobility offers and implemented in line with 'triple inner urban development', but these existing areas should at least be developed 'twice' using the climate-effective elements of green infrastructure.

By developing new and existing sites in this way, the municipalities in the Ruhr metropolis can deal more efficiently with competing uses for inner-city areas. In city centre locations in particular, new qualities are created in urban development and challenges such as climate pollution and a lack of environmental justice are considered together.

New instruments are required if we are to implement these in a more targeted manner. Firstly, areas to be developed as part of land use planning should be analysed in terms of their potential for accessibility by public transport. This should form the basis of future urban consolidation checks, which should serve as a two-stage development guideline. The implementation of a climatic district-wide survey for land developments or competitions using suitable balancing software is also conducive to the implementation of triple inner urban development. Such programmes can be used to test different urban development designs and their green features for parameters such as green space supply, CO₂ reduction, heat prevention or rainwater management infrastructure.

AGREEMENTS

Build new residential districts and commercial areas in a space-efficient and compact manner and integrate them with climate-effective elements of green infrastructure and climate-friendly mobility options (triple inner urban development).

Retrofit existing residential and commercial areas with green infrastructure (double inner urban development) and, where possible, add climate-friendly mobility options.

WAYS TO REACH THE GOAL

AT THE REGIONAL LEVEL

- ➔ Develop an inter-municipally coordinated land management system with qualitative principles and quantitative benchmarks for the structural compactness of settlement areas, for the provision of green infrastructure (Objective 01) and for multi-modal and climate-neutral mobility offers moderated by the RVR

AT THE MUNICIPAL LEVEL

- ➔ Apply the principle of triple inner urban development in the search for residential areas to be developed as part of land use planning, as a search filter for potential areas, e.g. by prioritising the development of locations with good public transport links
- ➔ Plan new and develop existing urban districts according to the principles of triple inner urban development by developing integrated plans for urban planning, open space and climate adaptation as well as mobility on the basis of the regionally developed qualitative benchmarks:
 - ➔ Develop compact, space-saving and resource-conserving urban development
 - ➔ Integrate various elements of green infrastructure such as green squares, roadside trees or roof and façade greening to promote quality of stay and climate adaptation (see Objectives 01 and 02)
 - ➔ Provide infrastructure for cycling and walking that is safe, coherent, detour-free and accessible (see Objective 25)
 - ➔ For example, using qualified development plans or open space plans

- ➔ Develop and test a two-stage urban consolidation check which examines the need to use open spaces and contains qualitative and quantitative specifications for all construction projects with a certain amount of sealed surfaces (e.g. greater than 0.5 hectares):
 - ➔ Initially, the focus should be on avoiding the use of green infrastructure and an inventory check of existing areas should be carried out to meet the desired demand.
 - ➔ In the second stage, the urban consolidation check provides the municipalities with qualitative and quantitative specifications, e.g. on the provision of green spaces and play areas, climate-friendly green features, the provision of services for active mobility or services of general interest as an aid for internal discussions or as the foundation of an argument vis-à-vis private land developers and investors.
- ➔ Use software-based balancing programmes for climatically assessing plans or competition entries



OBJECTIVE 07

Green infrastructure as impetus for circularity in the building sector

With the turnaround in construction, urban regions such as the Ruhr metropolis are increasingly being viewed as an enormous storehouse of materials from which we can extract the building materials of the future. In contrast to waste management, the term ‘urban mining’ is increasingly being used to describe the reactivation of goods stored in cities (UBA, 2022c). The systematic use of these deposits for extracting secondary raw materials, such as recycled concrete, should reduce the need for primary building materials such as gravel and sand in the long term and conserve natural resources. This also applies to the profession of landscape architecture and the construction of open spaces, which form part of the green infrastructure.

The Ruhr region is a centre for raw materials. Coal and iron ore were mined in the Ruhr area more than in almost any other region and the surrounding rock was piled up to form, among other things, the slag heaps that can be seen from afar today. The explosive settlement development led to the large-scale extraction of building materials such as sandstone and clayey stone for the many brickworks (Wrede, 2010). Sand and gravel for the production of concrete are still mined in the Lower Rhine region today. The extraction of primary raw materials and the subsequent backfilling of extraction areas are often associated with sensitive interventions in nature and the landscape and therefore also in the green infrastructure.

The ‘urban mining’ approach can reduce the need to utilise these primary raw materials. At over 200 million tonnes, mineral construction waste including excavated soil is currently the most important waste group in Germany in terms of volume (UBA, 2021). To date, these materials have mainly been used to backfill surface excavations or disposed of in landfills. There is potential for reprocessing excavated soil as a raw material for the construction industry.

In future, it will be necessary to better record and utilise these material stocks as a means of generating secondary materials for the construction industry (BBSR, 2022). Plans should also consider the fact that the building materials used can later be dismantled and used for other purposes. Another aspect involves the promotion of the use of renewable and carbon-binding building materials such as wood, which can be generated from regional forests and therefore also represent an important topic of green infrastructure (see Objective 22).

Currently, the Substitute Building Materials Ordinance⁴ together with the new Soil Protection and Contaminated Sites Ordinance anchored in the NRW Circular Economy Act⁵ provide the important legal framework for this. The market for secondary building materials and therefore new value chains is still in its infancy. Climate change and CO₂ pricing will accelerate this development. The public sector has a pioneering role to play with its projects.

AGREEMENTS	Support planners and construction companies in constructing new buildings in a resource-conserving and climate-neutral manner by using a high proportion of recycled building materials and only using building materials that can be recycled again in the future. Promote new business models and networks for using substitute building materials. Design buildings that are planned and constructed today in such a way that they can be supplied with climate-neutral heat.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL ➔ Set up a regional working group to establish structures and networks for stakeholders (project developers and architects) when implementing the Substitute Building Materials Ordinance in the area of green infrastructure ➔ Start a regional material register and, in particular, record and forecast the materials bound in green infrastructure and possible transformation areas in accordance with the recommendations of the Federal Environment Agency (Schiller et al., 2022) ➔ Develop a study to record and forecast the substitution of regionally available primary raw materials such as sand and gravel with regionally available secondary raw materials in the medium term ➔ Develop a regional strategy for soil management for all stakeholders who are directly or indirectly involved in the creation of excavated soil (administration, planners, construction industry)⁶ AT THE MUNICIPAL LEVEL ➔ Develop pilot procedures for using substitute building materials in the context of open space planning/landscape architecture competitions and public-sector construction projects and documentation ➔ Develop pilot processes for the construction of major green infrastructure projects to conserve resources through circular planning, reducing disposal to the minimum required, reusing materials on site and increasing the use of secondary building materials and renewable raw materials
PRACTICE	Recommendations for developing regional material registers were developed in 2022 on behalf of the UBA. These registers can be used to collate information on material stocks in the city and influence the way in which raw materials are used and managed. Material inventories and registers: Circular economy in the construction industry ➔ www.umweltbundesamt.de/themen/materialinventare-kataster-kreislaufwirtschaft-im

AT THE MUNICIPAL LEVEL

➔

Develop pilot procedures for using substitute building materials in the context of open space planning/landscape architecture competitions and public-sector construction projects and documentation

➔

Develop pilot processes for the construction of major green infrastructure projects to conserve resources through circular planning, reducing disposal to the minimum required, reusing materials on site and increasing the use of secondary building materials and renewable raw materials

⁴ The ‘Ordinance on the Introduction of a Substitute Building Materials Ordinance, on the Amendment to the Federal Soil Protection and Contaminated Sites Ordinance and on the Amendment to the Landfill Ordinance and the Commercial Waste Ordinance’ dated 9 July 2021 came into force on 1 August 2023 <https://www.bmuv.de/gesetz/verordnung-zur-einfuehrung-einer-ersatzbaustoffverordnung-zur-neufassung-der-bundes-bodenschutz-und-altlastenverordnung-und-zur-aenderung-der-deponieverordnung-und-der-gewerbeabfallverordnung>

⁵ Circular Economy Act for the State of North Rhine-Westphalia (Landeskreislaufwirtschaftsgesetz – LKrWG) 2/2022

⁶ Reference is made to the Rhineland-Palatinate State Soil Management Strategy https://kreislaufwirtschaft-bau.rlp.de/fileadmin/kreislaufwirtschaft_bau/pdf_s/20230127_Landesstrategie_Bodenmanagement.pdf



OBJECTIVE 08

Exploit the potential of brownfield sites and develop area pools

Structural change has meant that many urban and brownfield sites, railway lines and harbour areas that are no longer needed have been left behind. According to regional land use mapping, there are around 9,000 hectares of brownfield sites – a huge potential given the limited land reserves. Some of the brownfield sites with their spontaneously evolved bio-coenoses are of high ecological value (Pauleit, S., Hansen, R., 2016). Some of the former industrial areas have been transformed into outstanding parkland and valuable industrial nature areas, which are now a unique selling point of the Ruhr metropolis. At the same time, it makes sense to repurpose less valuable brownfield sites in terms of land recycling for ongoing urban growth.

What all brownfield sites have in common is that they are subject to change and require good future development plans. This gives rise to a field of tension: On the one hand, brownfield sites often represent a unique opportunity to gain space for the development of green infrastructure. On the other hand, there is still a lot of building work going on in the Ruhr metropolis. Structural change calls for commercial sites, while the influx into conurbations calls for the creation of housing and the energy transition calls for sites run on solar and wind energy. In terms of repurposing land, these building developments should be directed towards previously built-up, already sealed and derelict areas.

Well-founded consideration on a case-by-case basis and supra-local, strategic planning are therefore needed when deciding whether brownfield sites should be further developed

as green infrastructure or used for inner city urban development. In addition to the ecological value and biodiversity of the individual areas, location within the urban landscape also plays an important role. For example, brownfield sites that border on regional green corridors and can help to widen bottlenecks will be permanently protected as green infrastructure.

It makes sense to set up area pools and carbon accounts and flank them with compensation plans in order to control the future development of brownfield sites at a higher level (see also Carbon Account Regulation, section 32 of the State Nature Conservation Act). Pooled spaces can be used to record and manage areas that are suitable for redevelopment as well as areas that would benefit from being kept free and ecologically upgraded. Compensatory and replacement measures that become necessary in the event of brownfield development can be used as part of the carbon accounts to ecologically enhance specific areas, provided that the impact on nature and the landscape cannot be compensated for directly at the construction site. It is helpful to develop overarching compensation plans with flagship projects to strategically select suitable areas. The combination of pooled brownfield sites, carbon account and compensation concepts can be used to keep ecologically valuable brownfield sites free from development in the future of the Ruhr metropolis, and develop them in line with biotope network planning (see Objective 15), strengthen larger biotope networks and enrich cleared cultural landscapes in a targeted manner.

AGREEMENTS	Develop ecologically less valuable brownfield sites in the sense of repurposing land and compensate for any interventions in nature and landscape close to the site. Protect ecologically valuable brownfield sites as region-specific and identity-forming green infrastructure and use them as open spaces. Manage pooled spaces and carbon accounts and develop overarching compensation plans to identify lead projects for consolidating compensation funds.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL → Examine RVR's hosting of regional pooled spaces and carbon accounts → Advice on repurposing brownfield sites based on the site-specific nature conservation value identified by the biodiversity monitoring⁷ conducted as part of the regional biodiversity strategy → Consolidate regional carbon accounts such as the pooled space of the Rhenish Cultural Landscape Foundation and the ecological land fund of RVR Ruhr Grün AT THE MUNICIPAL AND INTER-MUNICIPAL LEVEL → Expand knowledge of species diversity on brownfield sites by systematically consolidating project-related species mapping and speaking to stakeholders such as nature conservation organisations, biological stations and citizen science projects (see Objective 10) → Establish inter-municipal carbon account solutions and define possible areas as inter-municipal joint projects with the help of municipal landscape planning and compensation plans
PRACTICE	The Leipzig Green Ring has two instruments at its disposal, the inter-municipal brownfield land register and the inter-municipal pool of compensation areas, for simultaneously improving brownfield sites and implementing compensation measures. The inter-municipal brownfield register serves as a potential area for compensation, while the inter-municipal pool of compensation areas primarily benefits the city of Leipzig in its search for compensation areas within the Green Ring. The advantage for Leipzig here is the realisation of compensation requirements resulting from urban developments, for example. The municipalities benefit in that their land undergoes improved floodplain development free of charge. Measures from the compensation pool are stockpiled and can be implemented according to demand, resulting in a win-win situation for landscape development and the project developers or municipalities. Grüner Ring Leipzig organises the processes, while the implementation is carried out by various organisations. → https://gruenerring-leipzig.de/wp-content/uploads/2017/06/ausgabe.pdf

⁷ See regional biodiversity strategy, subject area 11 Biodiversity monitoring



OBJECTIVE 09

Co-produce green infrastructure and promote social participation

Public spaces and green infrastructure are increasingly seen as a common good. At the same time, green infrastructure depends on the commitment of many different people and institutions. Responsibilities and areas of responsibility need to be reassessed in order to harness the potential of the many areas. Citizens, initiatives and associations are increasingly keen to get involved in decision-making processes relating to 'their' green spaces, meaning that the remit of the specialist administrations is currently expanding to include moderation and consultation processes. Identification with the neighbourhood and the utility value of green infrastructure increase when participation is successful. There are also new opportunities to spread the responsibility for caring for and maintaining green infrastructure across more shoulders.

The municipal green space, environmental and urban planning offices continue to play a key role in the development and maintenance of green infrastructure. They manage green and open spaces in the public interest and set technical development goals. Negotiation processes for green infrastructure are sensitive and require good communication.

Technical requirements must be well communicated and the various interests must be reconciled as well as possible. It is particularly important to keep the needs of children and young people, older people and people with disabilities in mind in terms of intergenerational and barrier-free design. Social organisations, associations and initiatives are important and helpful multipliers in this network.

A considerable proportion of green infrastructure is in private hands anyway. Citizens design and manage home gardens, allotment plots, balconies and windowsills. Companies and social infrastructures also have large areas of potential. The way in which these areas are designed largely contributes to the microclimate and habitat function of the city as a whole. In the public interest, these areas can be influenced by good environmental education programmes, funding incentives and building regulations for new construction.

AGREEMENTS	Understand green and open spaces as a common good and involve and promote civic engagement in planning and maintenance. Consider the increased need for participation and the new tasks of moderation and participation when allocating financial and human resources to green space, environmental and urban planning offices.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL ➔ Create exchange formats to strengthen civic engagement for green infrastructure and identifying funding opportunities, such as urban development funding AT THE MUNICIPAL LEVEL ➔ Consider the cost of moderation, participation and environmental education tasks when equipping the specialised planning offices ➔ Establish participatory budgeting, on the basis of which citizens can submit proposals for green infrastructure projects ➔ Provide space for civic projects such as urban gardening by local authorities ➔ Create model/show gardens with the help of municipal green space authorities to demonstrate ecological garden design options to citizens ➔ Establish co-operations for land sponsorships, for example with farmers for creating flowering strips, which are financed by citizens as sponsors
PRACTICE	The Gießkannenhelden project from Essen shows how the watering of urban trees can be managed by volunteers. → giesskannenheldinnen.de/ The Hugo Green Lab in Gelsenkirchen is a pioneering regional example of jointly developed green infrastructure. A biomass park with an information trail and community garden has been created on the former colliery site as a cooperation project between administration, science, educational organisations and citizens. → www.gelsenkirchen.de/de/bildung/auserschulische_bildung/umweltbildung/umwelt-info-pfad.aspx The IGA 2027 promotes participation and identification with the participatory level 'My Garden' by specifically involving local networks of clubs, associations and initiatives and inviting requests and suggestions. In this context, the city of Lünen is promoting the unsealing of front gardens with its 'Green Front Garden Campaign'. → www.iga2027.ruhr/die-iga-auf-drei-ebenen/mein-garten/ Farmers in Werne planted flowering strips at a total of 44 locations in 2022 as part of the flowering strip sponsorship project, which Werner citizens had sponsored. → eure-landwirte-in-werne.de/bluehstreifen-patenschaft/



OBJECTIVE 10

Promote co-habitation and nature experience in cities

The cities of the Ruhr metropolis are not just inhabited by people. As complex ecosystems, they provide a habitat for many different species. Instead of pure coexistence, i.e. living side by side, the aim is to enable co-habitation. In other words: people, animals and plants living together in a network of green infrastructure. Improving the habitat characteristics of open urban spaces strengthens biodiversity and enables people to experience nature ‘on their doorstep’.

A prerequisite for co-habitation in cities is diverse green infrastructure. This includes the industrial nature that characterises the Ruhr region, which has developed on the sites of former mines and on railway tracks. Historic parks and cemeteries, whose old tree populations and plant diversity offer refuges for species, some of which have become very rare, are also of great importance. Building façades with their crevices, ledges and gables can provide nesting cavities for certain bird species and roosts for bats. Urban spaces and, in particular, open urban fringe areas with their site diversity and simultaneous absence of agricultural practices such as fertilisation and pesticide use, are becoming increasingly important in this network.

In the Ruhr metropolis, many municipal green space authorities are already committed to designing and maintaining green spaces in more ecological ways. Because cemeteries, for example, are undergoing change due to a shift in burial culture, their development offers new opportunities to specifically promote biodiversity and the experience of nature in the city. Other large potential areas include the open spaces of housing associations and gardens at schools and day-care centres, which can often be improved in terms of nature experience and structural richness.

In addition to safeguarding valuable populations, biodiversity can also be actively promoted as part of urban and open space development processes using the ‘animal-aided design’ approach (Hauck & Weisser, 2015).

If the habitat requirements of certain target species in terms of food supply and nesting opportunities are incorporated into the design of open spaces and façades at an early stage, this will also promote quality of living. Possible building blocks include structurally rich green spaces, façade districts and biodiversity roofs.

AGREEMENTS	Make co-habitation with animals and plants in the city a cultural task of urban and open space development. Design and maintain green and open spaces in such a way that they provide a habitat for as many animals and plants as possible and enable people to experience nature.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL - Establish an advice centre for species protection for the benefit of project developers and develop proactive measures to promote biodiversity AT THE MUNICIPAL LEVEL - Launch exchange formats, campaigns and projects to encourage the various stakeholders in the city to become more involved in biodiversity – educational institutions such as schools and kindergartens, housing associations and tenants, private owners of home gardens, allotment associations, company gardens and outdoor areas in industrial estates - Existing housing stock: - Inventory analysis of the local species diversity with the help of project-related species mapping and a close exchange with nature conservation organisations - An examination of public green spaces with regard to their potential for structural enrichment and reorganising maintenance - The development of plans for the protection and the further development of biodiverse cemetery overhang areas - Urban development/new builds: - The development of plans for the promotion of target species (e.g. potential cultural successors such as building-dwelling species and species whose promotion could potentially also benefit other species) in new construction projects using the ‘animal-aided design’ planning approach - Anchoring urban greenery in urban planning by introducing stipulations to development plans (e.g. on roof and façade greenery), agreements in urban development contracts with investors (e.g. habitat-specific designs for open spaces) or using design specifications in tendering processes
PRACTICE	As a member of the ‘Kommunen für biologische Vielfalt e. V.’ alliance, the City of Dortmund is participating in the ‘urban green space - biodiverse and diverse’ project, which is subsidised by federal funds. The city of Dortmund wants to create more natural urban green spaces with a large number of pilot areas and is gradually re-organising maintenance. The many people involved need to be trained and the machinery adapted to achieve this goal. → https://www.dortmund.de/newsroom/pressemitteilungen/biodiversitaet-und-bienenfreundlichkeit-in-staedten-foerdern-deutschlandweites-netzwerk-trifft-sich-in-dortmund.html One example in which building-dwelling species have been promoted and protected is the project ‘A place for sparrows & co.’ organised by the Hagen Biological Station. It advises on renovation projects to preserve and create new breeding sites. → biostation-hagen.de/wp/projekte/ein-platz-fuer-spatz-co/



OBJECTIVE 11

Develop industrial nature in an integrated way and strengthen its identity-forming character

Industrial nature characterises the image of the Ruhr region and is unique in Germany. As the backbone of urban biodiversity, it creates unrivalled substitute habitats for many animal and plant species, some of which are endangered. It provides people with places to relax in the densely populated conurbation and provides the neighbouring residential areas with cold air. This natural and cultural heritage must be protected and developed in an integrated manner. It forms the basis for developing the Ruhr metropolis into the greenest industrial region in the world.

Where the coal and steel industry left fallow land and transport routes, spontaneous life has developed on the often dry and nutrient-poor sites. Young pioneer plants on raw soil sites and tall herbaceous meadows, as well as young pioneer forests, offer a wealth of structures and suitable living conditions for a wide range of species. Similarly, the mine subsidence waters created by coal mining now provide valuable habitats, especially for amphibians and waterfowl species.

The increasing surface pressure requires well-founded consideration of which brown-field sites should be redeveloped and which should be preserved and further developed as region-specific green infrastructure (see Objective 08). The careful integration of additional functions, for example in the form of green pathways and nature experience places, will give industrial nature additional significance and underpin the arguments in favour of its preservation. Integrated solutions that take biodiversity, experiencing nature, active mobility and other open space functions into consideration together are needed to reconcile the diverse interests in this type of green infrastructure. Good monitoring and process-orientated maintenance are needed to promote the special inherent dynamics of industrial nature.

AGREEMENTS	Protect ecologically valuable natural industrial areas and their connecting corridors. Develop integrated plans for more functional diversity with a special focus on biodiversity and recreation.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL ➔ The RVR will develop a technical basis for protecting and further developing the network of valuable industrial nature areas based on the regional biodiversity strategy (Keil et al., 2022) and the ongoing investigations and mapping for a large-scale nature conservation project ➔ Further profile industrial nature sites as a unique selling point of regional green infrastructure, building on the Route of Industrial Nature, in close cooperation between RVR, Ruhr Tourismus GmbH, the districts and municipalities ➔ Support for the expansion of the railway cycle path network ➔ Analyse the corridors of former railway lines with a view to developing new cycle path connections ➔ Develop blueprints that multi-code the routes by considering the development of cycle paths and footpaths in conjunction with the creation of green links as a minimum AT THE MUNICIPAL LEVEL ➔ Determine the nature conservation value of industrial nature conservation areas for consideration in urban development at an early stage ➔ Develop integrated open space plans as well as maintenance and development plans that focus on recreation, nature tourism, new green connections for active forms of mobility and renewable energies
PRACTICE	Since the 1990s, the 'Industrial Forest Project' has been based on the guiding principle that brownfield sites should quickly develop into forests that become valuable habitats and places of recreation. Wald und Holz NRW has now entered into co-operation agreements for 16 sites covering an area of over 220 hectares as part of the project. ➔ www.bdf-online.de/waldgebiet-des-jahres/2019/tipps-und-projekte/-industriewaldprojekt/



OBJECTIVE 12

Create more spaces for experiencing nature

Experiencing nature and playing freely in natural open spaces are important for the health and development of young people. It is also important that we educate and inspire children and young people to appreciate nature and the environment. After all, those who recognise the value of nature and the environment tend to be more willing to protect it. However, it is not always easy to access such open spaces where nature can be experienced, especially in urban districts. This situation is to be improved using the nature experience space approach.

Nature experience spaces have only enjoyed the status of a fixed category in the Federal Nature Conservation Act and the NRW State Nature Conservation Act for a few years. According to section 64 of the NRW State Nature Conservation Act, local authorities, in co-operation with landowners and authorities, can provide such nature experience space that invite unobserved, self-determined and free play.

On the one hand, places of ‘wilderness in the city’ such as derelict areas with spontaneously developed vegetation can be protected and valorised with the appropriate land designation. On the other hand, natural dynamics can be created in new areas by designating spaces for experiencing nature.

This creates synergies between the expansion of environmental education programmes, the strengthening of environmental justice in urban neighbourhoods and the protection and promotion of ecologically valuable areas.

Children and young people should be involved in the planning and implementation of valuable open space structures as early as possible, so that they recognise the nature experience areas as ‘their’ spaces. As a rule of thumb, at least half of the area should be left natural and extensively managed and a maximum of 10 % of the area should be intensively managed (BfN, 2020). The natural characteristics of the area should be enhanced and can be complemented by design, for example by creating mounds or muddy areas. The areas should preferably be larger than 1 hectare, but there are also successful projects in large cities on smaller areas.

AGREEMENTS

- Search for suitable existing and new areas for experiencing nature as part of a potential analysis.
- Protect suitable open spaces as areas for experiencing nature by designating them in formal planning instruments.
- Participatory, minimally invasive development with users to enable children and young people to play freely in a natural environment and therefore contribute to health promotion, local recreation and environmental education.

WAYS TO REACH THE GOAL

- AT THE REGIONAL LEVEL**
 - Further publicise the planning approach of nature experience spaces through discussions and exchanges
- AT THE MUNICIPAL LEVEL**
 - Create nature experience spaces in municipalities and cities with high building density in cooperation with nature conservation stakeholders, such as biological centres, educational centres, daycare centres and schools and work towards designation in urban land-use planning as green spaces with a special purpose and/or landscape plans
 - Anchor nature experience spaces to a greater extent in urban and open space development beyond traditional play and exercise facilities and link them to the objectives of green space provision (see Objective 01)
 - Examine the extent to which nature experience spaces can also be made available to day-care centres or schools in terms of environmental education (see Objective 27)

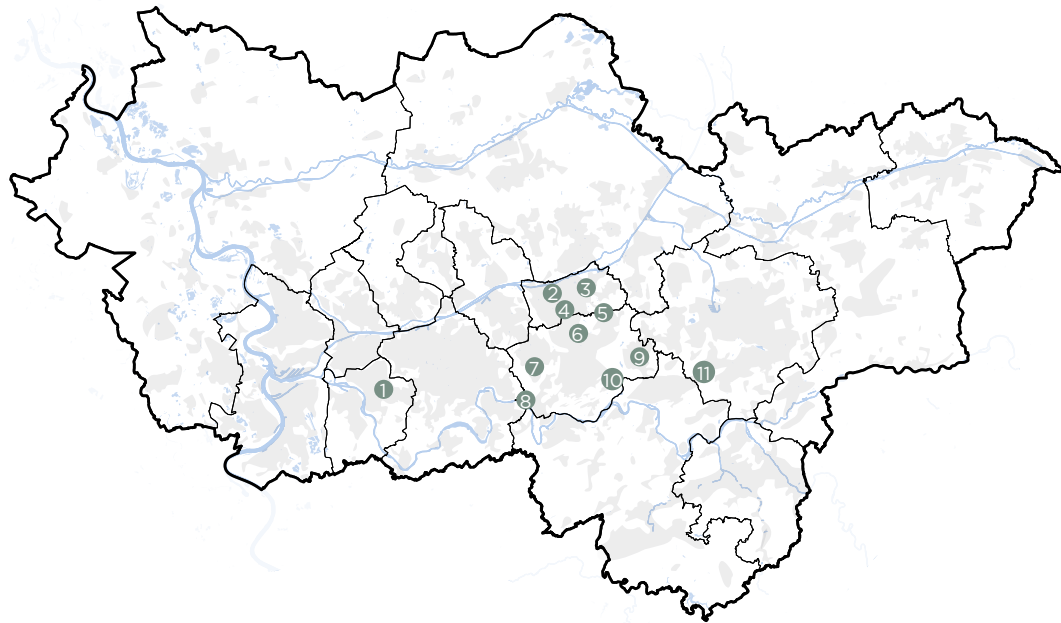
PRACTICE

There are currently eleven designated locations for nature experience spaces in the Ruhr metropolis, which are concentrated in the cities of Herne and Bochum and are mainly the result of the work done by the Eastern Ruhr Biological Station. Numerous other nature experience spaces are being created in the process of updating municipalities’ landscape plans. Currently, a brownfield site in a dense urban neighbourhood in Mülheim an der Ruhr and a green space in a new development area with a connecting function to the landscape in the town of Hagen are being developed as nature experience spaces.

→ www.wildnis-fuer-kinder.de/home.html

→ www.muelheim-ruhr.de/cms/naturerlebnisraum_peisberg_.html

- Overview of nature-experience spaces, own illustration
- Location in Mülheim an der Ruhr
 - 1 Peisberg
- Locations in Herne and Bochum/The Wilderness for Children Project
 - 2 Wanas
 - 3 Beien area
 - 4 Alte Dorstener Straße
 - 5 Hiltroper Landwehr
 - 6 Vierhausstraße Park
 - 7 Westenfeld
 - 8 Dahlhausen, am Ruhrort
 - 9 Ovelackerstraße, Langendreer
 - 10 Hustadt
- Location in Dortmund
 - 11 Kaiser Friedrich Mine





OBJECTIVE 13

Use and further develop regional green corridors as central elements of green infrastructure in the urban landscape of the Ruhr metropolis

The regional green corridors were established early on to safeguard open spaces and therefore counteract the increasing urban sprawl in the Ruhr region. The green corridors divide up the polycentric settlement structure as part of the regional open space network and play a key role in supplying fresh air, especially during hot spells. They are also of essential importance for recreation, particularly where urban and rural areas intersect. At the same time, these transitional areas on the outskirts of cities are often characterised by large commercial and traffic areas. It is important to strengthen the regional green corridors within this network as a supporting open space framework and to improve their accessibility, recreational qualities and usability.

Despite a long tradition and great efforts to develop the regional green corridors, land has been lost in the past due to construction activities. In some sections, this has led to fragmentation and therefore to a reduction in the special quality as a continuous green link (RVR, 2023b). In order to secure the remaining areas, all municipalities need to make a joint commitment which sees them standing up to property developers. A central task involves further improving and widening bottlenecks and interruptions. The RVR's regional open space plan, which is currently being developed, will provide key ideas for this.

AGREEMENTS

- Safeguard the regional green corridors in their current form and do not allow any more land to be lost.
- Widen the regional green corridors in the area of current bottlenecks and remove existing interruptions.
- Further strengthen and profile the various functions.
- Promote the links between the regional green corridors to the open countryside as well as municipal green links.

WAYS TO REACH THE GOAL

AT THE REGIONAL LEVEL

- Regional planning protection: In the Ruhr Regional Plan, the regional green corridors for the entire region are presented according to a standardised model and defined as priority areas in regional planning, which are to be preserved and developed for the purpose of structuring settlement areas, as open spaces close to settlements, biotope networks and due to their climatic functions
- In the short term, the RVR's regional open space plan for the Ruhr metropolis is to be adopted as an informal specialised plan and further developed in the future (RVR, 2023b). Key indicators should be defined as part of this process – for example, on the minimum width and quality of green corridors.

AT THE REGIONAL AND MUNICIPAL LEVEL

- Improve and further develop regional green corridors - with a focus on the west, east and south
- Improve all green corridors as part of inter-municipal open space plans, including the creation of blueprints based on the current further development of green corridor E
- Highlight the qualities, functions and unique selling points of regional green corridors, especially those

that border the open countryside, with a particular focus on the recreational landscapes identified in the recreation and tourism plan (RVR, 2023a)

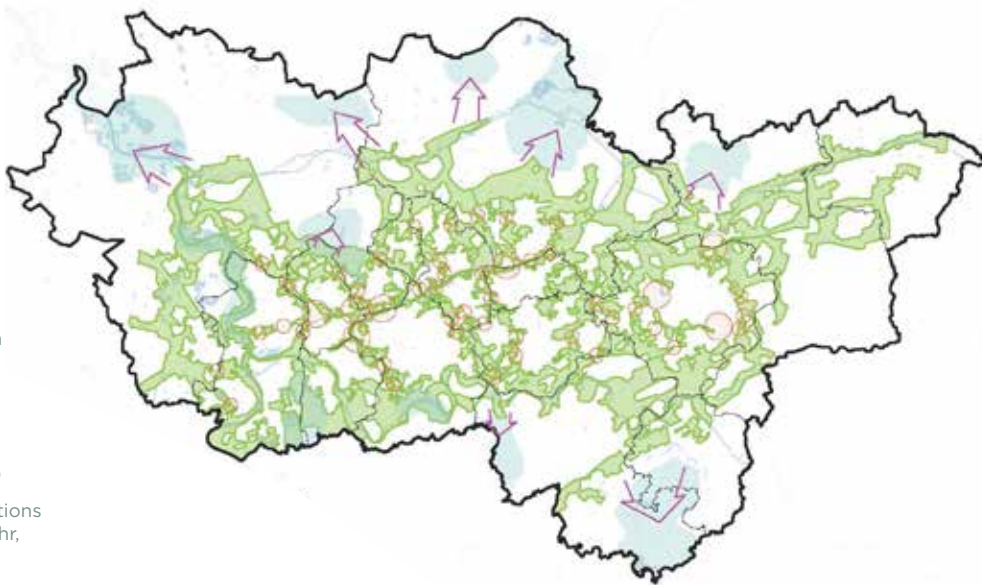
- Focus more strongly on the design of the 'city edges' as transition areas between the city and the countryside, emphasising the entrances to the town and views of the landscape
- Develop characterising proper names for green corridors in a suitable exchange format, as these are currently named from A to G

AT THE MUNICIPAL LEVEL

- Adopt the green corridors secured in regional planning into municipal land-use and urban land-use plans and targeted networking with the municipal green links in the cities
- By means of city-wide or inter-municipal open space plans:
 - Identify potential for unsealing and 'greening' in bottleneck areas
 - Focus more strongly on the design of the 'city edges' as transition areas between the city and the countryside, emphasising the entrances to the town and views of the landscape

Sketch of further development of the regional green corridors, own illustration

- Regional green corridors
- Landscape recreation areas (RVR, Freizeit- und Tourismuskonzept 2022)
- Spaces with bottlenecks and interruptions (RVR, Freiraumkonzept Metropole Ruhr, in progress)
- Improving/connecting regional green corridors





OBJECTIVE 14

Create additional regional parks in the Ruhr metropolis and further develop the Emscher Landschaftspark

Regional parks offer a common backdrop for cooperation; they serve as a framework for promotion and as a space in which special projects can be realised together. Joining together as a regional park creates a ‘sense of community’ among the municipalities. A regional park is an amalgamation of projects and places that can develop a great deal of appeal with common guidelines.

The Ruhr metropolis currently has one regional park – the Emscher Landschaftspark. This is an example of how the cooperation between the many towns, districts, the regional association and numerous other stakeholders has developed a previously fragmented landscape area into a coherent park system under a common umbrella brand. The Hohe Mark Nature Park and the WALDband project are further examples of supra-regional cooperation.

These role models are intended to enable other areas beyond the core zone to benefit from designation as a regional park. The aim is to strengthen both biodiversity and the recreation function in close interaction by structurally enriching the landscape, improving the path system and creating inspiring places to spend time.

The Ruhr metropolis still has great potential here. The urban landscape is embedded in very different landscape areas, which can be particularly well profiled and further developed by creating regional parks. Characteristic landscape areas include the Lower Rhine river terraces with their river valleys and floodplains, the flat landscape of the Westphalian Bay, the low mountain foothills of the Bergisches Land and the Sauerland and Siegerland regions in the south and the transverse lowlands of the Lippe floodplain and Ruhr valley. It is important to examine which of these landscape areas the Ruhr metropolis can focus its efforts on next.

AGREEMENTS	Draw up a regional park concept for the entire Ruhr metropolis by 2025. Create additional regional parks. Safeguard the qualities of the Emscher Landschaftspark and further develop the park.
WAYS TO REACH THE GOAL	AT THE REGIONAL AND INTER-MUNICIPAL LEVEL → Create additional regional parks → The RVR should develop a regional park plan in the short term to sound out conditions and potential areas for creating additional regional parks. In particular, potential areas include the scenic recreational areas identified in the regional recreation and tourism plan → Emscher Landschaftspark → Further develop the plan for and long-term maintenance of the Emscher Landschaftspark based on the thematic ‘Emscher Landschaftspark 2020+ Guidelines’. Previous developments are evaluated in the sponsorship report and should be used to learn from experience and transfer approaches to other regional parks
PRACTICE	The Emscher Landschaftspark covers 457 km² and 15 regionally significant sites, forming the new green centre of the Ruhr metropolis. Numerous landscape projects are being implemented and high-quality maintenance ensured on the basis of harmonised models and strategies. → www.rvr.ruhr/themen/oekologie-umwelt/startseite-emscher-landschaftspark/ The northern Ruhr metropolis forms part of the Hohe Mark Nature Park, under whose umbrella brand the RVR and its partners are involved in the WALDband project. Local recreation and tourism in the forests at the transition to the Münsterland and Lower Rhine regions are being strengthened on the basis of a regional tourism plan. → www.rvr.ruhr/themen/tourismus-freizeit/waldband/



OBJECTIVE 15

Protect and connect valuable habitats by planning biotope networks

Biotope network planning provides a technical basis for safeguarding the habitats of characteristic animal and plant species and creating interconnected green corridors. This is also an important strategic instrument for expanding the network of green infrastructure and promoting diverse functions such as cold air supply, water storage and carbon dioxide sequestration. Around 36% of the Ruhr metropolis has been designated as biotope network areas and depicted accordingly in the regional plan. They are subdivided into priorities to strengthen certain forests, alluvial zones and water bodies, swamp-heath-nutrient-poor grassland complexes, cultural landscape complexes with grassland, open land and arable land as well as certain fallow land (ruderal areas) and settlements.

Biotope network planning is informal and needs to be implemented by means of other plans. Biotope network areas are shown in the landscape plans and in the regional plan. Areas of outstanding importance are to be designated as nature conservation areas and areas of particular importance as landscape conservation areas. At present, just over 10 % of the biotope network areas are also designated as protected areas and protected under nature conservation law. The state's goal is to increase the overall proportion to 15 %.

The very different starting conditions of the cities must be taken into account when implementing the state target. In the district

of Recklinghausen, for example, over 10 % of the area is currently designated as a nature reserve. With further realisable designations, this proportion could be increased to around 13%. Nearly half of the city of Gelsenkirchen, on the other hand, is made up of built-up inner areas and only around 3% of the area is designated as a nature reserve. This area can be increased to a maximum of 5 %, even taking the new landscape plan into account. It is a special feature of the Ruhr area that smaller secondary habitats such as fallow land, slag heaps and mine subsidence waters of less than 10 hectares have also been included as valuable stepping stone biotopes in the conurbation zone. They harbour endangered animal and plant species on the 'NRW Red List' and have therefore become real survival areas. The colliery railway lines, which are migration routes for endangered species such as the natterjack toad, are also of particular importance (see Objective 11).

AGREEMENTS	Increase the proportion of legally protected areas within the biotope network to a total of 15 % on average across all municipalities.⁸ Give greater consideration to biotope network planning in urban development and open space planning. Protect areas of the biotope network to a special degree and upgrade them ecologically on the basis of municipal target values. Improve the routes of technical infrastructure and transport infrastructure in such a way that they contribute to the biotope network (see Objective 15).
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL → Develop technical recommendations to minimise barriers in the biotope network system and for further connectivity by introducing additional corridors and stepping stones (see also Regional Biodiversity Strategy (Keil et al., 2022)) AT THE MUNICIPAL LEVEL → Consider biotope network planning as an important technical basis and its integration into the various sectoral plans: → Especially in the future development of natural industrial areas (see Objective 11) → In the further development of green corridors (see Objective 13) → Green links for active mobility (see Objective 25) → In the implementation of agri-environmental measures and production-integrated compensation measures (see Objective 23) → And in the upkeep of technical and transport infrastructure (see Objective 18)
PRACTICE	Biotope network planning can be implemented in inner city areas using green structure plans or the new format of environmental master plans, such as those in Moers and Dinslaken. In future, the importance of the green corridors running alongside technical and transport infrastructure for biotope connectivity should also be considered and maintenance should be designed accordingly (see Objective 18). → https://www.moers.de/rathaus-politik/stadtentwicklung-und-umwelt/klima-umwelt-und-naturschutz/umweltleitplan

⁸ This is in line with the State Nature Conservation Act (Section 35, LNatSchG NRW) and the Regional Biodiversity Strategy



OBJECTIVE 16

Develop slag heaps as figureheads of green transformation in the Ruhr metropolis

The slag heap landscape in the Ruhr metropolis is living testimony to the region's transformation process. Once inaccessible and dangerous places, they are now vibrant hotspots in the Ruhr metropolis for people, animals, plants as well as for renewable energy. More than 100 slag heaps have been transformed into places of high biodiversity and provide habitats for endangered species. With heights of up to 200 metres, they enrich the otherwise rather flat topography of the Ruhr region as landmarks. They represent new open spaces for recreation and sport, and attract tourists from all over the world. They are an identifying feature for the region's 5.1 million inhabitants. The slag heaps embody the hallmark of the green transformation in the Ruhr metropolis and epitomise 'from grey to green'.

Of the more than 100 slag heaps, some are over 100 hectares in size, which represents a large area of potential for testing a wide range of design and development options. The RVR already owns 45 slag heaps today, and twelve more will be added by 2035. Some slag heaps have already been transformed from prohibited areas into new figureheads for the region. They form part of the 'Route of Industrial Heritage' and the 'Halden.TRAIL.Ruhr' cycle tourism project.

In the future, more slag heaps will be functionally reintegrated into the cities, made tangible as identity-forming local recreation areas and marketed as tourist highlights. As the urban-industrial biodiversity characterises these sites, their preservation is an important premise. At the same time, the slag heaps must be protected as sites for the generation of renewable energies. There are currently around 15 wind turbines on eight slag heaps and numerous slag heaps are suitable for photovoltaic power plants (RVR, 2022). This requires the development of innovative design and environmental education approaches so that the production of renewable energies is also interesting in terms of tourism. Possible synergies involving the promotion of biodiversity must also be explored.

AGREEMENTS	Further develop slag heaps using innovative design ideas and broad-based planning processes to continue to balance the diverse land-use requirements with a model character in the future – from local recreation and tourism to nature conservation and the generation of renewable energies. Make further slag heaps usable and accessible as nodes in the green infrastructure network.
WAYS TO REACH THE GOAL	AT THE REGIONAL AND MUNICIPAL LEVEL → The RVR should draw up a slag heap plan for the overall region, which keeps an eye on future development (and non-development) priorities → Special efforts to acquire funding for the future development of these spaces for the green transformation → Develop and implement key plans, including: → The development of tourist slag heaps → Local recreation → Renewable energy → Biodiversity
PRACTICE	The Großes Holz slag heap is multifunctional. Art, recreation, species conservation and renewable energies will take place with, next to and for each other. There are already landmarks and art installations to marvel at today, the natterjack toad has adopted its biotope in coexistence with visitors and in future, electricity will also be produced on the slag heap. Slag heaps in the Ruhr metropolis, own illustration/ Green infrastructure catalogue ■ Slag heap recultivated (FNK 502) Classify slag heaps and landmarks, RVR slag heap plan ■ Slag heaps that are of particular importance for recreation ■ Slag heaps that are of particular importance for tourism



OBJECTIVE 17

Strengthen urban food production

In the urban landscape of the Ruhr metropolis, urban agriculture is an elementary component of the green infrastructure. Urban agriculture can be found in a wide variety of formats – from highly productive commercial fields on the outskirts of cities to urban gardening projects in districts. What is intrinsic to these elements of green infrastructure is that they thrive on the commitment of a large number of stakeholders and contribute to supplying the region with fresh food.

Urban agriculture has a long tradition in the Ruhr metropolis. Over 3,700 hectares of allotments and grey land were created in connection with the colliery housing estates. The Emscher Landschaftspark with its urban agricultural areas was deliberately developed as a ‘productive park’. Typical formats of urban agriculture include the large number of community gardens in public green spaces, courtyards and outdoor areas of apartment blocks as well as gardens with edible produce at schools and day care centres. Even in very urban environments, raised beds can be used for gardening in locations with unsuitable soil or sealed surfaces. For example, nut and fruit trees that are publicly accessible and may be harvested are considered common land. There are also many locations for commercial horticulture that supply the region with fresh food, as well as solidarity farming projects in which fixed purchase agreements are made or plots are leased on a seasonal basis.

All these forms of urban agriculture have many social and ecological benefits. Growing your own fruit and vegetables and having fresh food from the region available are incentives for healthy eating. Gardening strengthens environmental awareness and social interaction. Promoting gardening initiatives is also an effective way of making cities greener and more diverse (see Objective 09).

The cities of Bochum, Essen and Dortmund have already set up food policy councils as a means of taking a more conscious approach to the provision of healthy food, sustainable production methods and regional potential, and initial initiatives have also been launched in Unna and Hamm.

AGREEMENTS	Understand urban agriculture formats as building blocks in open space design.	Create public common areas such as orchards and promote community gardens in housing and social infrastructure areas.	Provide spaces for urban agriculture projects.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL ➞ Promote the exchange of knowledge and strength networks based on the findings of the COProGrün project (RVR, 2020) ➞ Support the establishment of communication structures between the garden initiatives and land owners ➞ Support the establishment of a pooled space for urban agriculture projects in conjunction with other land uses, such as sports areas and educational facilities AT THE MUNICIPAL LEVEL ➞ Create contact points at municipal level to bring initiatives and potential landowners together and to advise on organisation ➞ Provide spaces for urban agriculture projects		
PRACTICE	Raised beds, for example, are promoted in the city of Bochum by the ‘Bochum’s roofs, façades and front gardens - ecological and climate-adapted’ programme . ➞ www.bochum.de/Pressemeldungen/8-Juli-2022/Foerderprogramm-fuer-gruene-Daecher-Fassaden-und-Vor-gaerten-stark-nachgefragt Examples of communal common land include the recently planted nut trees at the Gelsenkirchen Science Park or the publicly accessible permaculture garden with a meadow orchard in Dortmund-Eichlinghofen. ➞ www.umweltkulturpark.de/sites/park.html One example of a strategic approach is the ‘Schlaraffenband’ project, which aims to create edible plants along the Emscher Cycle Route, the Ruhr Valley Cycle Route and the future RS1 and increase the attractiveness of these routes. ➞ ernaehrungsrat-bochum.de/schlaraffenband/		



OBJECTIVE 18

Develop green corridors of traffic routes and technical infrastructure in a multifunctional way

In the tightly woven urban landscape, the fringes along the traffic arteries and technical infrastructure form a green network of their own that has received little attention to date and extends into the densely populated urban districts. This network, which covers almost 8,000 hectares⁹ still has potential when it comes to creating green pathways, connecting habitats and expanding the scope of renewable energy.

Around 5,500 hectares of the green network run along roads. The fact that even central reservations on motorways are important for urban biodiversity is demonstrated, for example, by mapping along the A40 motorway, which was first made possible by the 'Still-Leben Ruhrschnellweg' project (Keil et al., 2010). In terms of maintenance, verges and dividing strips close to roads can be maintained intensively for the sake of road safety, while neighbouring areas can be maintained more extensively. The width of the green corridors varies depending on the type of road; for example, 40 m must be kept free along motorways and 20 m along main roads (section 9 of the Federal Highway Act (FStrG)).

The approximately 1,800 hectares of green corridors along railway lines offer further potential. The immediate track area is still partly managed using chemical methods, but the railway is increasingly switching to mechanical-manual methods. DB's mainline railway lines generally include a 6-10 m wide, intensively maintained pruning zone and an adjacent stabilisation zone with a width of at least one tree length. The corridors along the urban railway lines are narrower, especially in the conurbations. Maintenance should not only be geared towards maximising economic efficiency, but also towards basic standards of ecological maintenance, for example by mowing after the first flowering and in sections (staggered mowing) to promote the characteristics of these areas as habitats and connecting corridors.

Many of the large infrastructures are due for regular renovation. Overhanging motorway junctions, for example, can be rebuilt with space-saving carriage-ways, creating additional areas for new green links and biotopes.

A further 600 hectares of the green network run along the Wesel-Datteln Canal, Rhine-Herne Canal and Dortmund-Ems Canal waterways. A new dynamic is currently emerging as a result of the transfer of responsibility for implementing the EU Water Framework Directive (EU WFD) from the federal states to the Federal Waterways and Shipping Administration (WSV) in 2021 to achieve good ecological potential even in heavily modified and artificial bodies of water. Waterways provide opportunities to create new open spaces and recreational qualities, especially in urban locations. Water management, transport and ecological aspects need to be considered in conjunction with use as recreational and leisure spaces if we are to achieve this.

There is also a dense network of above-ground power lines in the Ruhr metropolis, which can be significantly upgraded, especially in forest areas, with the help of so-called 'ecological route management' (NABU, 2019). Currently, young forest stands under the power lines have to be cut back completely on a regular basis. 'Ecological route management', on the other hand, is intended to permanently establish low-growing plant communities, while the area continues to be legally recognised as forest.

AGREEMENTS	Strengthen the accompanying greenery along roads and railway lines as a multifunctional green link and introduce maintenance under minimum ecological standards. Maximise the ecological potential of waterways and strengthen their utility value for recreation and active mobility. Functionally upgrade green infrastructure along power lines using 'ecological line management'.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL → Road space: → Develop a blueprint for uniformly implementing minimum ecological maintenance standards along roads and identifying potential areas for green routes that meet the requirements for the expansion of photovoltaic systems – in close cooperation between the RVR, Autobahn GmbH, the North Rhine-Westphalia road construction authority, the municipalities and local road maintenance depots → Railway lines: → Develop a blueprint for managing ecological vegetation, as has been done in Lower Saxony, for example (Deutsche Bahn, 2019) – in close cooperation between the RVR, Deutsche Bahn, the Rhine-Ruhr Transport Association, the Westphalia-Lippe Local Transport Association and the municipalities → Green corridors along waterways: → Develop a blueprint for how the waterways can be developed as green-blue infrastructure by combining the aspects of water management and implementing the Water Framework Directive and open space development – in close cooperation between the RVR, the waterway authorities, the State Administrative Office for Nature, Environmental and Consumer Protection (LANUV) and the municipalities → Power lines: → Develop a blueprint for comprehensively managing ecological routes, building on the activities of RVR Ruhr Grün with various stakeholders AT THE MUNICIPAL LEVEL → Upgrade roadside green spaces
PRACTICE	An example from the city of Essen shows that roadside green spaces in urban areas can be upgraded using urban development funding. The 'Ecological revitalisation of roadside greenery' contributory measure was used to create herbaceous and flowering strips in the assisted areas of the Socially Integrated City. → www.essen.de/dasistessen/leben_im_gruenen/_aktuelle_gruenprojekte/oekologische_revitalisierung_des_strassenbegleitgruens.de.html



OBJECTIVE 19

Re-naturalise watercourses and restore floodplains

Watercourses represent the blue counterpart to green infrastructure. As continuous ribbons, they are of outstanding importance for biotope networking. River landscapes that have undergone little modification are considered to be particularly diverse and highly dynamic habitats, characterised by alternating wet floodplains, sand and gravel banks. Many river courses have been straightened and the riverbed narrowed as a result of settlement development. This not only reduces their function as a habitat. This narrowing leads to a high flow velocity, overflowing of the rivers and potential flooding during heavy rainfall and flood events.

Near-natural, dynamic river landscapes are not only valuable habitats and attractive recreational landscapes. When rivers are given more space, the flow slows down and natural buffers are created for flood protection, thereby reducing flood damage in urban areas.

According to state-wide mapping between 2011 and 2016, the majority of watercourses in the Ruhr metropolis still had a poor water quality (GSG) of classes 5-7, at just under 73%. This means that these water bodies were classified as heavily, very heavily or completely modified (LANUV survey 9/2023). The latest assessment from 2020 also classifies the Emscher as fully modified in the sections that have not yet been converted (GSG7), but as

a result of the extensive floodplain development measures, a significant improvement in the GSG has already been observed compared to the 2016 status of the map, and typical animal and plant species are recolonising very dynamically (LANUV, 2020). The Rhine floodplain, Lippe floodplain and Ruhräue are still very dynamic in proportion and are considered a focus of the biotope network (LANUV, 2017).

The watercourses are managed by the region's water companies (Emscher-Genossenschaft Lippeverband (EGLV) and Ruhrverband), which are already making great efforts to improve the ecological status in accordance with the EU Water Framework Directive. The development plans for transforming other stretches of water have essentially been finalised. New large-scale projects as well as many individual measures are to be implemented. This requires good coordination and the involvement of many stakeholders – the water companies, the lower and upper water authorities, the lower and higher nature conservation authorities and the owners and users of the land and floodplain areas bordering the river.

AGREEMENTS

- Develop further projects for the improved floodplain development of watercourses and floodplains in close cooperation with the major water associations EGLV, Ruhrverband, LINEG and the district governments.
- Significantly reduce the proportion of watercourse stretches with poor water quality (GSG 5-7) from the current 73 % by 2030 – to less than 45 % in the Ruhr metropolitan area and less than 25 % outside.¹⁰
- Not to allow any further structural developments in floodplain areas.

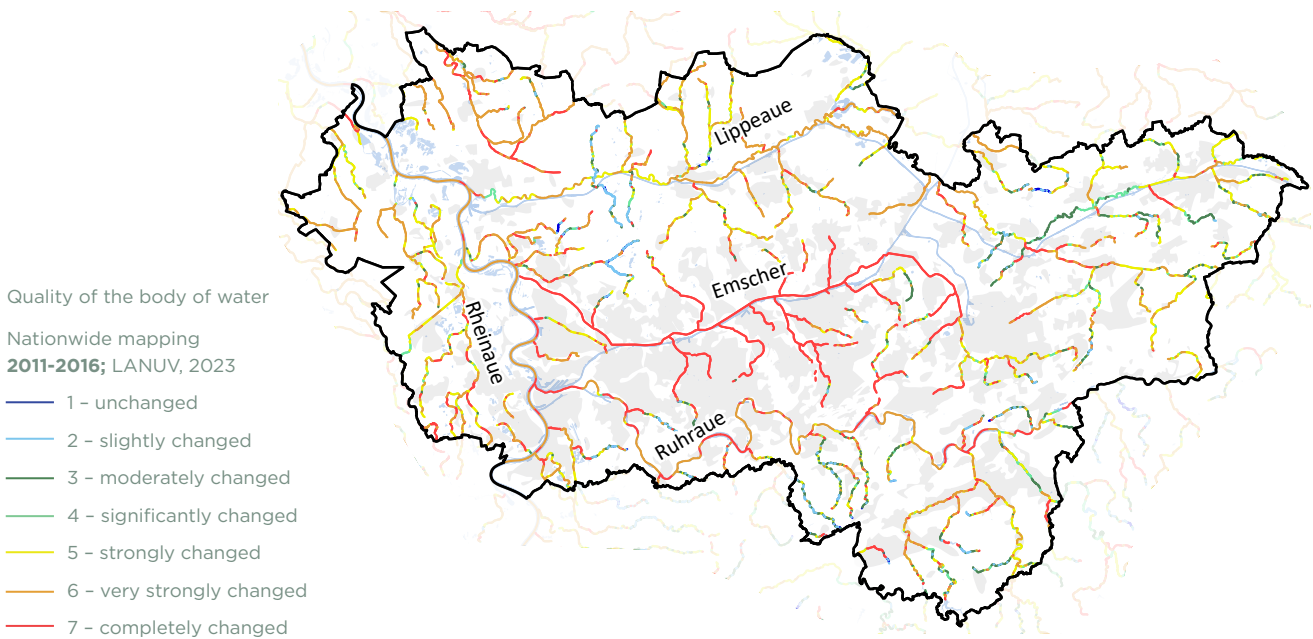
WAYS TO REACH THE GOAL

- AT THE INTER-MUNICIPAL LEVEL**
- The EU Water Framework Directive specifies the objectives and measures for the improved floodplain development of watercourses and is underpinned by the regional biodiversity strategy (Keil et al., 2022). The management plans and the landscape plans are formal instruments for achieving the objectives. It is helpful to draw up informal river basin plans as a means of coordinating the various technical development goals between the water management and nature conservation departments and, particularly in urban areas, with open space and urban development, and as a means of defining common goals (BBSR, 2023). The key measures include:
 - Giving rivers and streams more space from their source to their mouths by preserving retention areas and renaturalising sealed, former floodplain areas
 - Renaturalising the beds and banks of watercourses and increasing the self-dynamic development space
 - Improving floodplain dynamics and make neighbouring land use more extensive, for example by converting arable land into grassland (see Objective 21)

PRACTICE

The Emscher-Genossenschaft has set new standards in the Ruhr metropolis in terms of reorganising the Emscher and its tributaries. The construction of the parallel underground sewer has freed the Emscher from sewage and re-naturalised 170 km of waterways to date. The flooding of the new Emscher estuary in November 2022 marked the end of the Decade Project for the time being, meaning that the forces can be pooled in favour of further waterscapes.

For example, the Ruhrverband has been able to implement improved floodplain development projects in the Oefte, Ruhrinsel Rellinghausen and Deilbach regions. Another major improved floodplain development project in the Ruhr between Wetter and Witten was implemented by the Arnsberg District Government. The municipalities are committed to the improved floodplain development for smaller bodies of water that do not fall under this river basin management on the basis of landscape plans. For example, the Wienbach stream in Recklinghausen has been re-naturalised.



¹⁰ see also the Regional Biodiversity Strategy – see subject area 9



OBJECTIVE 20

Revitalise soils and strengthen their diverse functions

Careful management of the region’s soils is a prerequisite for the performance of green infrastructure and is essential for climate adaptation and climate protection (Federal Environment Agency, 2022a). Vital soils have a high water storage capacity, supply plants with nutrients and water and contribute to cooling the environment through evaporation. They ensure good crop yields and therefore agricultural uses. Intact soils are resistant to erosion and can also contribute to flood protection by retaining water.

Complex metabolic and transformation processes take place in soils: Soils can release carbon or act as a carbon sink depending on its type and management. In peatland soils, carbon is conserved as peat as long as the nutrient content is low and water saturation is high (see Objective 21). In arable soils, on the other hand, the carbon storage capacity increases if plant residues such as roots, stubble and leaves remain on the field after harvesting and humus is built up in a targeted manner (BMEL, 2019). It is therefore an essential field of action for climate protection to align cultivation and care with the respective soil properties and their vitality (UBA, 2022a).

Soil protection and the remediation of degraded soils are already the subject of planning practice. Soils are considered worthy of protection if they have certain fertilities, are important for biotope development or have a special archival function (LANUV, 2007). Climate change, the ongoing use of soils for construction purposes, high levels of sealing and the loss of biodiversity and vitality in soils require an even more comprehensive and progressive approach to soil care. The functions and development potential of soils should be focussed on more systematically across different forms of land use and sectoral responsibilities. In light of the interactions between vegetation, climate, water and nutrient content, soil management should not only focus on plant growth, but also on soil organisms and structure. The vitality of the soil and its ability to store water and carbon can therefore be protected in the long term (see Objective 21).

AGREEMENTS	Use soil according to its properties and functions, particularly with regard to carbon storage capacity and climate protection. Focus soil management not just on plant production, but also on the long-term preservation of the vitality of soil structure and organisms, both through appropriate cultivation systems and techniques in agriculture and using appropriate care and maintenance plans for urban green spaces. Revitalise degraded soils, unseal them where possible and restore functions such as carbon and water storage capacity.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL - Establish climate change-related soil monitoring with meaningful information on soils, land use and regional climate changes to assess climate impacts on soil functions - Promote the exchange of knowledge and testing pilot projects for soil protection and soil revitalisation - Develop plans for preventing soil from being polluted by substances such as phosphorus or microplastics - The new generation of soil revitalising cultivation systems is being tested on the basis of the EU SoilCare project and knowledge transfer: reducing the use of soil-damaging machinery, fertilisers and pesticides to promote more stable soil structures and better conditions for soil organisms (SoilCare, 2023) AT THE MUNICIPAL LEVEL - Give greater consideration to the soil component in urban green space maintenance by developing plans for upgrading impoverished soils (e.g. building rubble soils) and targeted humus build-up - Examine the extent to which green waste and organic waste from households and the food industry can be collected and recovered to produce high-quality compost - Support stakeholders and networks that practise regenerative soil care in urban green spaces (e.g. allotment gardens, community gardens or open spaces in residential areas), by forming humus and improving the soil structure, for example
PRACTICE	The city of Mülheim an der Ruhr’s ‘Planwerk Boden’ (Soil Plan) brings together expertise about soil properties in the city area as a means of specifically operating a closed-loop land management system and incorporating it into urban development planning. → www.muelheim-ruhr.de/cms/planwerk_boden.html One example of the systematic promotion of nutrient cycles is the Dortmund-Wambel composting plant. Here, the organic waste collected throughout the city of Dortmund is processed into high-quality compost, which is used in agriculture and viticulture. → www.kompost.de/uploads/media/Anlagenbeschr_3026.pdf



OBJECTIVE 21

Use carbon reservoirs such as permanent grassland and moors for targeted natural climate protection

Certain green infrastructures are particularly adept at storing CO₂ as carbon in the soil and vegetation. The targeted promotion of this process is referred to as 'natural climate protection'. In addition to forests, moors and so-called 'permanent grassland', i.e. permanently green meadows and pastures, are considered to be particularly suitable as a natural carbon store. When managed and maintained sustainably, these green infrastructures contribute not only to climate protection, but also to nature conservation and increasing biodiversity. As the Ruhr metropolis has large areas of permanent grassland, peaty fenland soils and a few remaining intact moors, these should be strengthened and further developed.

Large contiguous areas of grassland can be found primarily in the periodically flooded Rhine floodplain and along the Lippe floodplain. Both areas are important for the biotope network due to their rich structure and diverse habitats. In addition to these two key areas, almost all open landscapes in the Ruhr metropolis are also characterised by grassland. In addition to its importance for biodiversity and as a carbon sink, permanent grassland can help to protect soils from erosion (see Objective 20). The conversion of grassland into arable land is prohibited according to section 4 (1) 1 of the LNatSchG. The aim is to further develop nature conservation and climate protection in the region's open spaces in an integrated manner by converting arable land into preferably extensively used grassland and converting grassland from intensively to extensively used wherever possible. However, permanent management in the form of mowing or grazing is absolutely essential to maintain and develop grassland.

There are only a few remaining intact moorland sites in the Ruhr metropolis, such as the Deutener Moor in the district of Recklinghausen, which are mainly located in the north and west and cover around 100 hectares¹¹. Their preservation, maintenance and revitalisation should continue to play a major role in the development of green infrastructure. The aim is to develop intact and sufficiently (re)wettered moors and therefore make a contribution to achieving climate protection targets. At the same time, moors provide a habitat for numerous species and, as such, they have a positive impact on biodiversity. Efforts must be made to rewet peatlands that have dried up and, in particular, to develop new water resources in order to harness this potential. The necessary measures will vary depending on the different types of peatland.

A large area with potential lies in the sustainable management of around 3,500 hectares of peaty fenland soils in the Ruhr metropolis, which are used for agriculture and forestry. Even though these soils no longer function as active peatlands, they contain large amounts of peat and therefore sequestered carbon. Drainage measures bring this peat into contact with oxygen, which releases the bound carbon into the atmosphere. This soil information should therefore be given much greater consideration and the cultivation of fenland soils should be extended where possible. Any existing drainage systems should be removed, the landscape water balance stabilised as far as possible and the development of extensive wet grassland promoted.

Efforts in these areas are currently also being promoted by the German government's 'Natural Climate Protection' action programme¹³ and the 'National Peatland Protection Strategy'¹⁴.

AGREEMENTS	Maintain permanent grassland, rewet it and, where possible, expand it. Restore the water balance typically found in fen soils, cultivate them as extensively as possible and develop them into wet grassland of high nature conservation value. Conserve, revitalise and maintain intact moors and rewet moors that have dried out.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL ➔ Expert advice in the debate on the promotion of ecologically orientated, extensive grassland use, e.g. by the Chamber of Agriculture, agricultural association, science and RVR ➔ Develop new suitable water resources for the rewetting of peatlands, such as rainwater, clear water from sewage treatment plants or previously pumped out polder water or by closing drains (differentiation by type of peatland); to this end, start a joint process between RVR, EGLV, LINEG (Linksrheinische Entwässerungs-Genossenschaft) and RAG (formerly Ruhrkohle AG), municipalities and stakeholders from agriculture and forestry ➔ Identify the soil type of low-moor soils in the Ruhr metropolis with a resolution of 1:50,000 (BK50) to identify potential areas more precisely AT THE MUNICIPAL AND INTER-MUNICIPAL LEVEL ➔ Grassland, meadows and pastures: ➔ Rewet former grassland, meadows and pastures by restoring the near-natural water balance on selected wet grassland sites (through purchase or a long-term lease), for example by closing drainage ditches and drainage channels, as part of compensatory measures under nature conservation law, for example ➔ Convert arable land into (extensively used) organically managed grassland on wetland sites, especially in floodplain areas on the Lower Lower Rhine (VSG Unterer Niederrhein) ➔ Implement species protection measures for meadow birds, especially in wet meadows, for example by creating water holes as part of production-integrated measures by farmers ➔ Low land soils and moorland: ➔ Change how around 3,500 hectares of peaty fenland soils are managed by extending the use, removal of drainage and drainage ditches and even rewetting the soil ➔ Promote the preservation and maintenance of all remaining moors by consistently protecting the area and developing plans for the rewetting of dried-up moors ➔ Where possible, establish new forms of supportive management, such as paludiculture (peatland management with peat mosses, for example) and develop a market for the products
PRACTICE	In Sprockhövel in the Ennepe-Ruhr district, the local biological station is currently endeavouring to rewet the former Gangelshausener Wald high moor. Special carbon stores in the Ruhr metropolis, own illustration - Permanent grassland, meadows and pastures (Field blocks, North Rhine-Westphalia) - Woodland - Moorland - Marshland - Countryside (Landscape Model 50) - Low moor soil type (soil map NRW 50) - Geological lowlands (simplified from nature conservation report)

¹¹ Landscape Model 50 (DLM50), State of North Rhine-Westphalia
¹² Evaluation based on the soil map of North Rhine-Westphalia 1 : 50,000 (BK50)
¹³ <https://www.bmuv.de/natuerlicher-klimaschutz>
¹⁴ https://www.bmuv.de/fileadmin/Daten_BMU/Download_PDF/Naturschutz/nationale_moorschutzstrategie_bf.pdf



OBJECTIVE 22

Conserve, increase, and sustainably manage forests with a strong climate impact and a rich structure

The forests in the Ruhr metropolis are a habitat for many rare species, have a balancing effect on the climate, store carbon, provide sought-after and sustainable raw materials and are important recreational areas. However, at 23% (Keil et al., 2022), the proportion of forest in the region is rather low compared to the state and national average. A special feature of the Ruhr metropolis, on the other hand, is that there are large, relatively young industrial forests and a high proportion of deciduous trees. Firstly, the existing forests need to be preserved, secondly, the forest area needs to be increased and thirdly, more measures need to be implemented that contribute to the climatic adaptation and ecological improvement of forests to expand and improve the many functions and added values of the forest for the Ruhr metropolis.

If such measures are sensibly combined, a win-win situation is created for the biodiversity of the forests and adaptation to climate change. For example, it is important to increase structural diversity using multi-layered mixed stands, preserve biotope trees and allow natural processes to take place in more areas to increase biodiversity in the forests of the Ruhr metropolis. This applies in particular to forest areas in protected areas. Adapting to climate change, and in particular to heat and drought, can be achieved by creating a diversified, robust mix of species in forests or by improving the water supply to forest areas in the sense of spongy landscapes (see Objective 24).

Forest owners in particular have a major role to play in maintaining and establishing vital, resistant and functional forests. The RVR is one of the largest municipal forest owners in Germany and, with 16,300 hectares of forest, holds more than 20 % of all forest areas in the Ruhr metropolis (RVR Ruhr Grün, 2023) and is responsible for the preservation, management and maintenance of these areas via the RVR's own company Ruhr Grün.

Solutions specific to the Ruhr region must be developed to prevent conflicts of interest, for example with agriculture, when it comes to expanding forests. Forest propagation in the Ruhr metropolis should focus on protecting (post-industrial) succession forests and looking for 'hidden' potential for reforestation, such as areas that have been given over to agriculture and cannot be cultivated or can only be cultivated with difficulty due to the relief. 'Tiny forests' (mini forests), which have already been created in some cities in the Ruhr metropolis, also offer a perspective that combines forest propagation on a small scale with aspects of environmental education (see Objective 27).

AGREEMENTS

- Preserve large contiguous forests, but also small forest areas due to their unique character and diverse functions, adapt them to the climate and improve their ecological quality.
- Increase the proportion of forest areas from 23 % to 25 % by 2030 using various forest augmentation instruments (Keil et al., 2022).
- Take a more restrictive approach to forest conversions for construction purposes.
- Develop all existing FFH forest habitat types in the Ruhr metropolis to A-B status.

WAYS TO REACH THE GOAL

AT THE REGIONAL, INTER-MUNICIPAL AND MUNICIPAL LEVEL

- Maintenance and upkeep of:
 - Large contiguous forest areas, e.g. those designated as nature parks, landscape or nature conservation areas (e.g. Haard/Borkenberge, Weißes Venn/Geisheide, Hohe Mark/Dämmerwald/Kirchheller Heide/Hünxer Wald, Hiesfelder Wald)
 - Small, partly urban forest areas and their interconnectedness as a result of their diverse significance for biodiversity, climate adaptation, cold air formation, recreation and for natural climate protection as carbon stores
- Increase the forest area:
 - By protecting parts of the mainly post-industrial succession forests, e.g. by designating areas relevant to nature conservation as nature or landscape conservation areas, or developing them as compensatory measures for interventions in nature and the landscape
 - By searching for further potential for reforestation, e.g. reforestation of agricultural land that is not economically viable due to the terrain in cooperation with agricultural and forestry stakeholders or the creation of urban 'Tiny Forests' according to a standardised definition (max. 5 plants/m² on max. 1,000 m² ; City of Essen, 2023) by municipalities

AT THE MUNICIPAL LEVEL

- Climatic adaptation and ecological qualification:
 - Preserve biotope trees, at least ten trees per hectare in the early age and decay phases (approx. 80-120 years) (Keil et al., 2022)
 - Use the amplitude of native and habitat-typical tree and shrub species, but also openness to non-native, climate-adapted species outside protected areas
 - Promote special species protection measures in the forest, such as the maintenance of juniper heaths, nutrient-poor grasslands, sparse forests or the creation of raw soil sites
 - Promote (inner) forest edges and stepped forest edges with a flower-rich herb layer
 - Expand near-natural forest management with corresponding soil-conserving methods in accordance with the NRW silvicultural plan
 - Increase legally protected forests with natural development (process protection areas) in the long term from 0.5 %¹⁵ to an average of at least 5 % of private and 10 % of all public forest areas in the Ruhr metropolis (Keil et al., 2022), including those forest areas of the RVR, which allow a maximum of 6.5 % process protection area. The development of forests not owned by the RVR can also be realised using its process protection plan.

PRACTICE

The region's existing commitment can be seen, for example, in the Haard, one of the largest closed forest areas in the region in the district of Recklinghausen. In recent years, the RVR has begun to restore the original oak and beech forests here, which have been converted into sparse pine forests, to increase the proportion of deciduous forests suitable for the location. These improvements were accompanied by new paths, viewing towers and a playground to enhance the recreational appeal of the area. Municipalities can also implement strategic developments, such as Dortmund with its current forest plan.
→ www.rvr.ruhr/themen/orte/filter-orte-detailseite/news/die-haard-kreis-recklinghausen/

¹⁵ GIS evaluation based on FNK and NRW process protection areas



OBJECTIVE 23

Strengthen the multifunctional character of agricultural land

The urban landscape of the Ruhr metropolis is embedded in and criss-crossed by farmland, grassland, meadows and pastures, which form important components of the green infrastructure. The demands on agricultural land are becoming ever more extensive and require integrated design and management approaches. Regional agriculture should make an important contribution to nutrition, but at the same time provide a habitat for species of the cultural landscape and also be recreational and aesthetic. In view of increasing droughts and heavy rainfall, agriculture also faces the major task of adapting to climate change. Furthermore, the production of agricultural products and maintenance for the cultivated landscape must be sufficient for farmers and the profession must remain attractive. At the same time, agricultural land will continue to be lost due to construction developments and the need for compensatory and replacement measures under nature conservation law.

There are various interlinked approaches to meet these challenges. According to the EU Biodiversity Strategy, a total of 10% of agricultural land should be designed as landscape elements with great diversity. These include, for example, hedges, dry stone walls, ponds, wildflower strips or so-called skylark windows – seed gaps that offer approach and breeding opportunities for birds (Stiftung Rheinische Kulturlandschaft, 2023). The European Union’s cross-compliance scheme incentivises compliance with ecological standards in exchange for payment of EU agricultural subsidies. The EU, the Federal Government and the State of North Rhine-Westphalia fund

agri-environmental measures, such as the creation of wildflower strips or riparian buffers. Instead of completely withdrawing agricultural land for compensation and replacement measures, enhancement measures in the cultivated landscape can also be implemented using production-integrated compensation measures (PIK). Another approach is a stronger focus on regional marketing in conjunction with an increase in the proportion of organic farming. Converting to organic farming enables more sustainable management of the soil and water by aiming to close the local nutrient cycle as far as possible and avoiding the use of soluble mineral fertilisers. Food that is certified accordingly can be marketed at a higher price.

A specific challenge in the region is that over 70% of the approximately 160,000 hectares of agricultural land is owned by large corporations or municipalities that only conclude short-term leases (Osbelt, 2023). This makes it very difficult for farmers to plan for the longer term and to implement and promote ecological measures. This is one reason why the proportion of organically farmed land is only 3.7%, well below the state and national average. Another reason is that the soils of the metropolis are predominantly very productive and the subsidisation of ecologically oriented cultivation has so far been financially attractive, especially for so-called marginal soils. In future, it will be increasingly important to examine the options for strengthening the multifunctional character of agriculture and creating corresponding incentives, depending on the location.

AGREEMENTS	Work together to manage valuable agri-cultural land in a caring and sustainable manner so that it is both productive and diverse, vibrant, attractive and resilient. Honour and promote ecological forms of cultivation and structural enrichment in the cultural landscape; as a benchmark, 10% of the cultural landscape should be designed as landscape elements with great diversity in accordance with the EU Biodiversity Strategy 2030. Grant leases of at least ten years to farms that convert to organic farming. Further strengthen the marketing of regional foods.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL → Strengthen local marketing structures for certified organic food in accordance with the ‘fresh from the region’ principle, for example by expanding the Route of Agriculture AT THE MUNICIPAL AND INTER-MUNICIPAL LEVEL → Create ‘landscape spatial laboratories’ for sub-areas with particular biodiversity deficits or high development potential, e.g. municipal sectoral planning or as a cooperation project across several municipalities in the case of cross-border landscape areas → Design landscapes that bring together and promote biodiversity, landscape experience and nutrition/direct marketing → Implement proactive measures to promote certain target species → Manage compensation funds using appropriate agreements in lease contracts (strengthening the marketing of regional, certified organic food) → Examine funding opportunities arising from cross-cutting issues, such as the Natural Climate Protection Action Programme
PRACTICE	As part of the ‘Bochum blossoms and hums’ project, all leases of municipal farmland are subject to the condition that wildflowers are sown at the edges, thereby developing a network of colourful ribbons (around 5% of the area). Bochum has also commissioned Bochum farmers to implement compensation measures that integrate production in cooperation with the Westphalian Cultural Landscape Foundation. These enhancement measures are credited as being biotope value points in the city’s carbon account, which in turn can be used to compensate for interventions in the ecosystem caused by construction projects in the city, inter alia. → www.bochum.de/Umwelt--und-Gruenflaechenamt/Bochum-blueht-und-summt → www.bochum.de/Umwelt--und-Gruenflaechenamt/Produktionsintegrierte-Kompensation



OBJECTIVE 24

Develop climate-adapted sponge cities and sponge landscapes as an interconnected system

Designing the cities and landscapes of the Ruhr metropolis in a climate-adapted way is essential if we are to counter the negative effects of climate change. Damage caused by extreme weather events can be mitigated with the help of green infrastructure and a new approach to the valuable resource of water. In line with the sponge city principle, rainwater will be collected and stored in green areas in future and only drained into the sewer system in exceptional cases. This makes green infrastructure fundamental for heat and heavy rainfall prevention in the cities of the Ruhr metropolis.

The devastating heavy rainfall in summer of 2021 showed the damage that heavy rainfall can do in the Ruhr metropolis. Critical infrastructures that ensure that people are supplied with technical and healthcare services are also jeopardised by such events. Green infrastructure makes an effective contribution to protecting them and improving their general quality of life. Rainwater can be retained and stored in a decentralised manner by unsealing surfaces and decoupling rainwater drainage from the sewer networks. New residential areas should be planned without drainage in the future, while existing residential areas should be gradually disconnected from the rainwater drainage system – also using small-scale measures. A system of emergency waterways also needs to be established. The landscapes in the upper reaches of cities must also be able to absorb more water in order to prevent flooding in the cities. Accordingly, sponge cities and landscapes are to be understood and developed as a coherent system that also serves the exchange of air by ensuring air conduits into the cities.

Periods of heat and drought with too little water represent the other extreme as an effect of climate change. Rainwater is to be specifically retained, stored and evaporated to cool overheated city centres to overcome ever more frequent hot spells, especially in urban areas. The water is also to be used to irrigate urban vegetation such as city trees. However, forests and open landscapes are also affected by water shortages. Here, too, it is important to keep the existing green infrastructure full of life by ensuring that there is a sufficient supply of water so that it becomes more resistant to extreme weather conditions.

One resource that has not yet been utilised for heat prevention is the purified clear water from sewage treatment plants and sump water from mining. This water is also available in extreme hot spells and should be utilised to a greater extent. Another special feature of the Ruhr metropolis are the polders resulting from subsidence. The water that is urgently needed in the countryside is currently drained off here using a lot of energy. Developing plans for the conversion of drainage and pumping systems is likely to be a task for the future, particularly in the polder area.

The EGLV's future agreement on rainwater has laid an important foundation stone for realising sponge cities and landscapes in the region, which we must continue to build on together (Emscher Genossenschaft, 2005). This objective is highly urgent and socially relevant, and we will need to work together across different scales, disciplines, responsibilities and institutions to achieve it.

AGREEMENTS

- Start developing a Ruhr sponge metropolis, from regional objectives to district-specific measures, by bringing together regional associations, municipalities and large land owners.
- Recognise rainwater as a valuable resource and make its drainage an exception rather than the rule.
- Use green infrastructure to store and release surplus rainwater in times of drought.

WAYS TO REACH THE GOAL

- AT THE REGIONAL LEVEL
 - Develop a common objective, develop implementation-orientated blueprints and model structures for municipal plans as well as provide advisory services for the Ruhr sponge region. Regional stakeholders include: EGLV, Ruhrverband, LINEG, RAG and RVR
 - Organise a specialist conference and ideas workshop based on a 'polder' dossier for the region
 - Develop a strategy for sustainably managing the polders with broad stakeholder participation, building on the regional conference and ideas workshop
- AT THE MUNICIPAL AND INTER-MUNICIPAL LEVEL, WITH REGARD TO LARGE SURFACE HOLDERS
 - Create sponge city/landscape plans for heat and flood prevention: The municipalities and land owners (housing companies, transport companies, etc.) create sponge city/landscape plans for the entire city and/or districts or landscapes within five years with reference to the regionally agreed objectives and assistance on the following aspects:
 - Promote water retention in the landscape by dismantling drainage systems, drainage ditches, creating alternating wetlands, for example – target value: natural water balance
 - Optimise the landscape water balance by using a proportion of the clear water from sewage treatment plants and sump water in coordination with the water requirements of the rivers/drinking water extraction
- Create as many unsealed green areas as possible for the evaporation and infiltration of rainwater by unsealing and drought-adapted 'greening' in existing areas
- Use more rainwater for the irrigation of trees and areas of vegetation
- Promote cooling through rainwater evaporation (the natural water balance is used as the target value, i.e. high evaporation, partial infiltration, low run-off)
- Plan new settlement areas and densify existing buildings as areas without run-off, using water as a resource: Implementing the cascade of retention, storage, evaporation and irrigation, and infiltration
- Relieve the drainage system by continuously disconnecting connected areas in the existing areas, initially in pursuit of the KRIS (Climate Resilient Region with International Appeal) guideline's goal of disconnecting around 25 % of the paved areas in designated observation municipal areas by 2030 in cooperation with the EGLV
- Examine and create areas for multiple use to prevent heavy rainfall (e.g. sports fields, green spaces, car parks, roads, roofs) in areas with high sewer levels at risk of heavy rainfall.
- Develop emergency waterway systems through which water masses can be channelled after heavy rainfall events to prevent damage

PRACTICE

Bochum is committed to the sponge city plan with its Climate Plan 2035 and is a pioneer when it comes to using rainwater in the city. So-called sponge roads with water-storing tree islands enable heat-resistant planting and relieve the burden on the sewage system. The redesigned leisure centre in Am Hausacker allows rainwater from the covered sports area to flow above ground into the adjacent vegetation with an integrated infiltration trench, slowly releasing the collected water into the surrounding area. The planned Haus des Wissens is also dedicated to using and slowing down rainwater. A park on the roof contributes to improving the microclimate and creates a new, future-orientated open space.
→ www.bochum.de/Klimaplan → hausacker-bochum.de → www.bochum.de/Haus-des-Wissens



OBJECTIVE 25

Promote active mobility with green infrastructure

Over 50% of journeys are still made by car in the Ruhr metropolis (RVR, 2021). Greater efforts must be made to achieve a transition to sustainable transport in favour of active mobility, i.e. cycling and walking, to promote climate protection and save CO₂. Green infrastructure can make a significant contribution to active mobility and promoting healthy lifestyles if green infrastructure is consistently considered in conjunction with the infrastructure of climate-friendly forms of mobility (public transport, cycling and walking). Future action will therefore focus on promoting pedestrian friendliness ('walkability'), developing inviting cycle path infrastructure to increase the number of cyclists using the modal split and making transfer points to public transport more attractive by means of greening measures.

Green infrastructure can contribute to active mobility in two ways. On the one hand, areas of green infrastructure, in particular the regional green corridors but also forests and parks, can provide an attractive setting for footpaths and cycle paths at both the local and regional level. To this end, integrated planning between active mobility, open space development, local recreation and nature conservation should be sought. On the other hand, we should encourage the use of existing (and to be expanded) cycle and footpath infrastructure. Supplementary green structures, such as trees that provide shade, should be implemented to make use attractive even in adverse conditions such as heat. Places for waiting and changing to other modes of transport should also be upgraded using elements

of green infrastructure to increase acceptance and intensity of use. Green infrastructure should therefore develop an inviting character: 'invite to bike', 'invite to walk', 'invite to wait'.

The creation of new paths can also explicitly contribute to improving new green infrastructure if it takes place under the premise of land redistribution. The opportunity should be taken to simultaneously implement accompanying greenery for rainwater retention or roadside trees when creating new cycle paths, for example on existing sealed surfaces such as roads or car parks (see Objective 03). Promoting green infrastructure along linear infrastructures such as roads and paths also offers added value for the biotope network (see Objective 15).

By closely interlinking attractive footpaths and cycle paths with green infrastructure, the Ruhr metropolis has the potential to bring together active mobility and climate comfort, thereby contributing to increasing the attractiveness of climate-friendly mobility and healthy living.

The two successful 'cycling decisions' that have already been launched in Marl and Essen are clear indicators of the topic's high social relevance. The citizens' petitions for safe and comfortable cycling formed part of the "Aufbruch Fahrrad" campaign alliance, which had a significant influence on the creation of the NRW Cycling Act.

AGREEMENTS	Strengthen the regional cycling network and increase the share of cycling in the modal split to 25 % by 2030.	Understand existing traffic areas such as roads or car parks as areas with potential for climate-friendly forms of mobility and examine the benefits of redistribution in favour of public transport, cycling and walking.
WAYS TO REACH THE GOAL	AT THE REGIONAL LEVEL ➔ Combine the RVR plans for the 'Regional Leisure Route Network' and the 'Regional Everyday Cycle Route Network' into a 'Regional Cycle Route Network' and propose that the Ruhr Parliament adopt a resolution on the 'Regional Cycle Route Network' as part of an updated requirements plan ➔ Develop blueprints for balancing the interests of transport planning and nature conservation (e.g. asphalted cycle paths with smart, insect-friendly lighting) under the moderation of the RVR	AT THE MUNICIPAL AND INTER-MUNICIPAL LEVEL ➔ Developing existing open spaces such as urban parks, forests or open landscapes and active mobility infrastructures in an integrated manner on the basis of regionally agreed blueprints, including across municipal boundaries ➔ Implement greenery along cycle paths and footpaths for shadowing, aesthetic enhancement, as a compensation measure and for rainwater management infrastructure ➔ Improve the quality of the design and quality of stay along the paths, e.g. by using the lightest possible path surfaces (high albedo), interesting and sufficiently wide paths, attractively designed sequences of spaces, sensibly chosen and easily walkable surfaces, comfortable seating and rest areas, picnic areas, rubbish bins, lighting, signposting, information boards, cycle parking facilities or bike sharing stations ➔ Create cooler urban oases for a high quality of stay at public transport stops during transfer and waiting times. For example, this could be done if the municipalities, the respective transport companies and Deutsche Bahn worked together to use unsealing measures and plant trees that provide shade ➔ Promote pedestrian traffic from the point of view of 'walkability', for example by appointing pedestrian traffic officers for the municipalities
PRACTICE	In 2022, the RVR and the 53 municipalities drew up the implementation plan for the regional cycle path network. It presents the route sections with the urgency for implementation and is a guide for the municipalities and other public authorities. The network covers a total of around 1,800 kilometres and distinguishes between fast cycle connections, main cycle connections and cycle connections. ➔ https://www.rvr.ruhr/themen/mobilitaet/bedarfspan-radwegenetz/	



OBJECTIVE 26

Actively shape the relationship between green infrastructure and renewable energies

The energy transition must be accelerated by expanding renewable energies if we are to save CO₂ and achieve the climate targets. Renewable energy is currently generated primarily from photovoltaics and biomass in the Ruhr metropolis. Electricity is also generated from landfill, sewage and mine gases. In contrast, wind and hydropower have been less developed to date. Recent studies show that the potential in the region has not yet been fully harnessed for all forms of renewable energy generation (Grudzielanek et al., 2022). We must ensure that the many interfaces to green infrastructure are sufficiently considered despite the necessary speed in the expansion of renewable energies. On the one hand, open spaces provide a backdrop for expansion, while on the other, elements of green infrastructure can also benefit from interaction with certain facilities. It is therefore necessary to take an active approach to design, not to consider the expansion of renewable energies separately from the development of green infrastructure and to translate this into ambitious plans.

It is important to combine building blocks of renewable energy generation intelligently and sensibly with existing land uses and green infrastructure to drive expansion forward. Small-scale and diversified energy generation plants and grids also make important contributions to the energy transition. This requires site-specific approaches for the various sub-regions of the Ruhr metropolis, which also address the spatial suitability of certain locations, such as slag heaps.

The ‘roofscape’ of the densely populated Ruhr metropolis represents a large potential area for solar energy. The coalition agreement of the state government of North Rhine-Westphalia from 2022 provides for a solar requirement for new public buildings and gradually for all new commercial

buildings (such as supermarkets and DIY stores, car and furniture stores, etc.). In the medium term, the solar requirement should also apply to the renovation of municipal properties as well as new private buildings and roof renovations. It is important to take advantage of the push towards transformation to expand photovoltaic systems for the production of combined solar green roofs so as to ‘piggyback’ on the goals of climate adaptation (see Objective 02). According to current studies, this combination also optimises energy efficiency as the vegetation counteracts the photovoltaic modules becoming excessively hot (BuGG, 2022). The many slag heaps in the region offer region-specific potential for solar and, to some extent, wind energy (RVR, 2022b). Studies on ‘agri-photovoltaics’ also show that it makes sense to combine photovoltaics with different agricultural practices. Elevated photovoltaic systems in combination with horticulture and fruit growing can not only generate additional energy, but also mitigate damage caused by hail, frost and drought and reduce the need for irrigation (Fraunhofer Institute for Solar Energy Systems ISE, 2023). Solar energy systems can also be used in public spaces to provide shade.

The expansion of wind power in forests has been facilitated by a corresponding decree since the end of 2022 and the area available for ground-mounted solar energy systems has been moderately expanded. Integrating renewable energy plants into the landscape for these areas must be tackled in a more proactive way than in the past when designing the aesthetic aspects of the landscape.

AGREEMENTS	Identify the potential for renewable energies in and together with green infrastructure and actively realise it in a meaningful and innovative way. Use model projects and integrated approaches to significantly increase the share of renewable energies in combination with green infrastructures.
WAYS TO REACH THE GOAL	AT THE REGIONAL AND INTER-MUNICIPAL LEVEL → Consolidate scientific findings and site-specific knowledge on the regional potential for expanding renewable energies and developing blueprints → Develop a synergy map for green infrastructure coupled with building blocks for renewable energy generation → Link the RVR’s green roof and solar roof registers to promote the combined expansion of solar green roofs → Municipalities should survey and designate priority areas for wind power and ground-mounted photovoltaics → Launch pilot projects and competitions for: → The aesthetic and, where possible, multifunctional integration of wind energy and ground-mounted solar installations (based on priority areas designated in the municipal land use planning) into the landscape to develop solutions that are attractive in terms of design and compatible with the natural environment; one component may involve the realisation of agri-voltaic installations → Develop model districts for the coupling of green infrastructure and energy production (e.g. development of solar green roofs) in existing and new buildings, for example in cooperation with housing cooperatives → Check the feasibility of potential renewable energies on slag heaps in consultation with local authorities and arrange for third parties to generate renewable sources of energy (see Objective 16)
PRACTICE	When the floating PV system (floating photovoltaic system) was completed on Silbersee III in Haltern am See in 2022, it demonstrated the innovative use of renewable energies in the Ruhr metropolis. As the owner of the lake, the RVR has made parts of its land available to the operator of the plant, Quarzwerke GmbH, for implementing the project and is therefore actively supporting the expansion of renewable energies in the region. With an installed capacity of three megawatts, 5,800 photovoltaic modules produce around 2.9 million kilowatt hours of electricity per year. Extremely translucent glass-glass modules were also used to reduce glare and prevent the water from being shaded. → https://www.rvr.ruhr/news/startseite-news/news/quarzwerke-eroeffnen-auf-dem-silbersee-iii-die-groesste-schwimmende-photovoltaikanlage-deutschlands/ An accelerated expansion of ground-mounted photovoltaic systems (ground-mounted PV) is required to achieve the expansion targets for renewable energies. One of the main reasons for the low expansion of ground-mounted PV in the Ruhr region to date is the search for suitable open spaces. The RVR has developed EnergyFIS, an information system for identifying suitable areas for the construction of ground-mounted photovoltaic systems, to accelerate expansion in the Ruhr metropolis, while also being environmentally friendly and respectful of agricultural food production. The tool calculates suitable areas for ground-mounted photovoltaic systems based on the eligible areas according to the Renewable Energy Sources Act 2023 (EEG23), minus a number of taboo areas that are unsuitable for solar production for nature conservation reasons. The area map is intended to serve as a guide for stakeholders in the region and provide a recommendation for initial considerations during planning stages. Please see the link below for more information on the tool and on registration: → https://www.rvr.ruhr/fileadmin/user_upload/01_RVR_Home/02_Themen/Umwelt_Oekologie/Newsletter/08_2023/EnergyFIS_GI_Newsletter.pdf



OBJECTIVE 27

Expand environmental education programmes, making them diverse and inclusive

Experiencing and better understanding nature is an essential prerequisite for people in the Ruhr metropolis to get involved in their environment. A key factor here is that the network of green infrastructure extends into the districts and nature can be experienced ‘on the doorstep’. Region-specific environmental education programmes can stimulate people’s curiosity to discover nature and knowledge about environmental issues and the characteristics of nature can be imparted.

Opportunities to experience nature and take part in outdoor exercise and environmental education are important for improving equal opportunities for children and young people. They must be varied, age-appropriate and as inclusive as possible.

A large number of institutions offer opportunities to learn about the environment at various locations in the Ruhr region. These include the Biological Stations, the visitor centres of the RVR and RVR Ruhr Grün and other organisations, some of which are designated as Centres for Education for Sustainable Development (ESD). There are also

outreach programmes, such as those offered by certified nature and landscape guides from the Nature and Environmental Protection Academy NRW (NUA) or rangers. The Ruhr metropolis Environmental Portal managed by the RVR provides information on adventure and learning programmes on nature and environmental topics in the region.

In the future, the ‘Deep Time’ approach will be used to sharpen the focus on the spatial constants typically found in the Ruhr to make the identity-forming elements even more visible and tangible (bgmr, 2022). This strengthens the understanding of the peculiarities of the Ruhr metropolis and teaches people about the temporal dimensions of landscape development and cultural history.

AGREEMENTS

Provide people in the region with interesting and varied environmental education programmes that inspire their curiosity about nature in the region and strengthen their sense of responsibility.

Develop a broad, cross-generational repertoire of programmes that are inclusive and accessible.

WAYS TO REACH THE GOAL

AT THE REGIONAL LEVEL

- ➔ Expand regional and support for local environmental education programmes by:
 - ➔ Harmonise and profile central environmental education programmes
 - ➔ Create additional centres for education on sustainable development
 - ➔ Expand decentralised environmental education programmes to strengthen network structures and create outreach programmes, such as excursions, in close cooperation with regional education providers and environmental education centres
 - ➔ Continue the Ranger Project at RVR Ruhr Grün
 - ➔ Cooperate more with the Ruhr metropolis and the Hohe Mark Nature Park
 - ➔ Develop and provide learning materials on Ruhr-specific green infrastructure
 - ➔ Further specialisation of certified nature and landscape guides in the field of urban nature

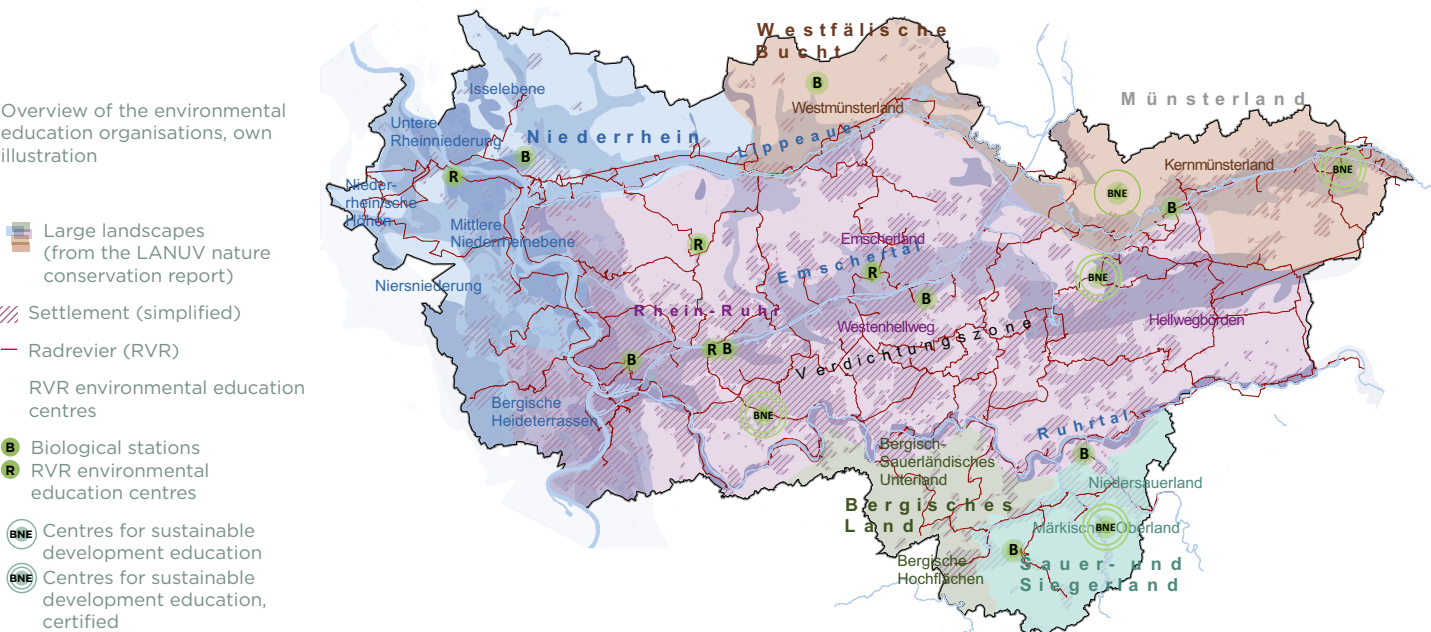
AT THE MUNICIPAL LEVEL

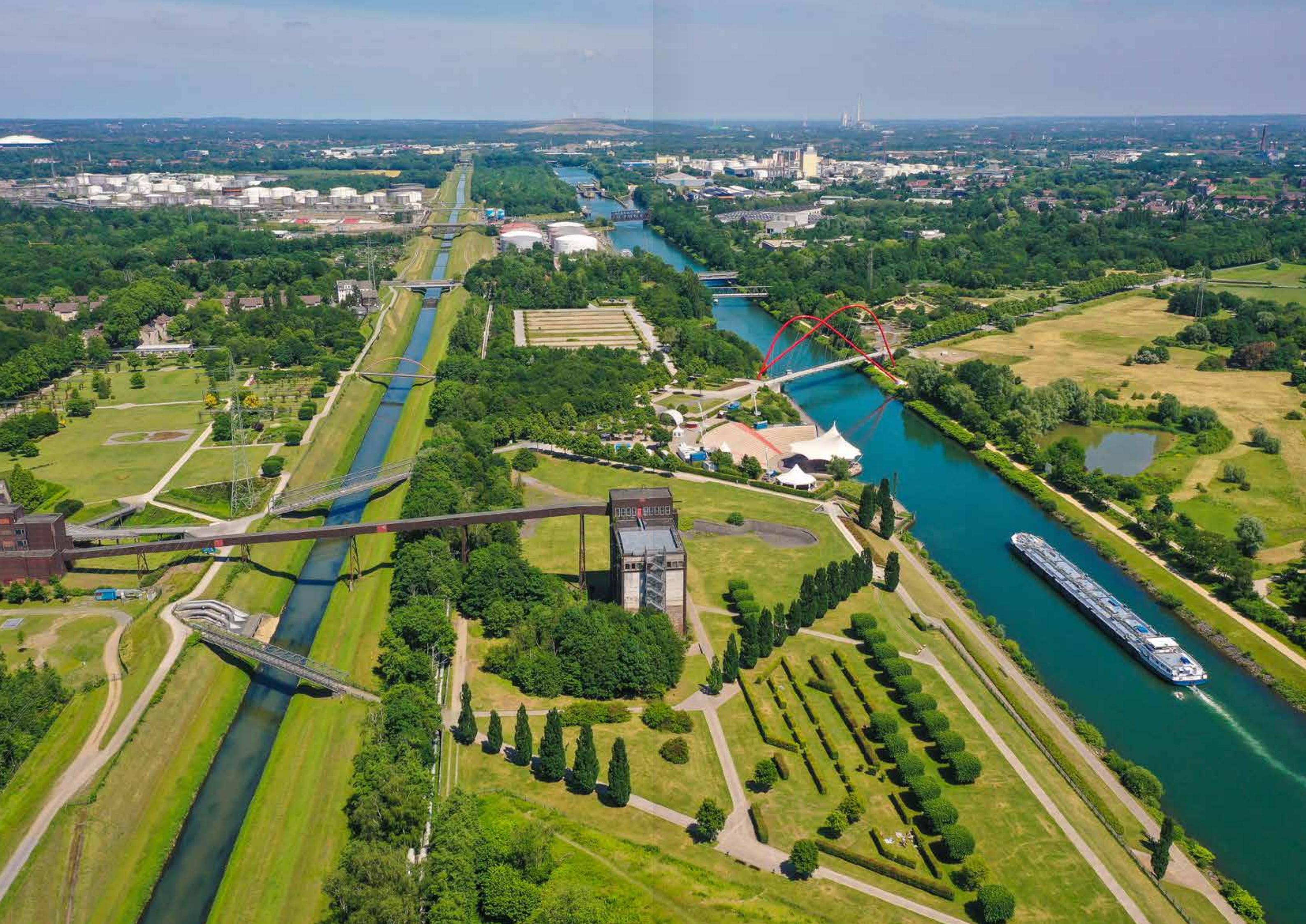
- ➔ Develop plans for disseminating information and guiding visitors on site, for example using information boards and formats such as ‘city maps of biodiversity’
- ➔ Establish extracurricular learning centres, e.g. green and blue classrooms
- ➔ Create low-threshold hands-on projects, e.g. Gardens of the Future (Deutsche Umwelthilfe)/ integration gardens:
 - ➔ Workshops are held with the participants to plan and design the gardens with sustainability in mind. By planting and using the garden together, children, young people and adults learn about the connections and cycles in nature and our biodiversity in a practical and playful way (see Objective 09)

PRACTICE

The LEADER region ‘Lower Rhine: Naturally alive!’ has established new networks as part of the cooperation project ‘Environmental education for all - Inclusive inclusion! (Alpen, Rheinsberg, Sonsbeck, Xanten) and implemented various campaigns and events. Low-threshold programmes focusing on old vegetable and fruit varieties as well as experiencing gardens and parks have been developed to encourage people with and without disabilities to meet and work together.

➔ www.leader-niederrhein.de/projekte/umweltbildung-fuer-alle-inklusion-inklusive!





Tools to support implementation

The objectives for action provide an overview of the common direction of travel for green infrastructure in the region. They have been fleshed out to varying degrees, and their content needs to be refined and applied across different areas. Further tools and handouts were developed during the process of creating the Green infrastructure strategy Ruhr metropolis to take the next step towards implementation: a Ruhr metropolis green infrastructure catalogue, an overview of the current funding landscape and a planning toolbox. These supporting tools are intended to systematically answer the question of who can implement which elements of green infrastructure at which level and with which financial resources and planning instruments.

Basis for understanding and analysis: Green infrastructure catalogue Ruhr metropolis



Implementing objectives goes hand in hand with the targeted expansion of green infrastructure. This calls for a basic spatial analysis that can be used to categorise and localise existing green spaces in the Ruhr metropolis.

That is why the Ruhr metropolis Green infrastructure catalogue contains an inventory of the different green elements – from green roofs to regional corridors – that are necessary for achieving the objectives of the Green infrastructure strategy Ruhr metropolis. Each element is explained in terms of its special features and mode of action. At the same time, areas are identified that offer particularly high potential for the creation of new green infrastructure.

The catalogue serves as an everyday tool and reference work for practitioners who are responsible for bringing the concept of green infrastructure to life and managing the corresponding projects and measures. You will find the responsible stakeholders for each element and initial suggestions for specific management options.

In conjunction with the RVR's State of the Environment Report, the catalogue is also intended to serve as a basis for regional monitoring that tracks how green structures in the region develop over time. The area covered by each element of green infrastructure in the Ruhr metropolis was surveyed and mapped where data was already available.

The catalogue is available as an https://www.rvr.ruhr/fileadmin/user_upload/01_RVR_Home/02_Themen/Umwelt_Oekologie/Offensive_GI/Dokumente/Katalog_Gruene_Infrastruktur.pdf:



Overview of funding programmes: Funding access and financial instruments for green infrastructure in the Ruhr metropolis

Translating objectives into concrete projects and measures involves human and financial resources that practitioners are often unable to mobilise on their own. As the objectives are aligned with the challenges of urban and open space development and cover topics such as climate protection and climate adaptation, these are closely linked to current funding policy. Against this background, the overview of current funding programmes and other financing instruments is intended to support the practical further development of green infrastructure in the Ruhr metropolis.

The overview is of interest both to practitioners who are looking for a source of funding for specific measures and to those who want to use the framework conditions of a funding programme to develop projects tailored to it.

This compilation of access to current funding is based on a screening of public calls and ongoing programmes. There is a summary of the core content and funding conditions for each programme, so that projects can be checked for suitability without much effort.

Relevant funding access and financial instruments are compiled and regularly updated on the RVR website. Stakeholders can also obtain advice and support from the RVR with regard to the application process.

<https://www.rvr.ruhr/themen/oekologie-umwelt/gruene-infrastruktur/foerderfinder-gruene-infrastruktur/>



Planning instrument toolbox for implementing the objectives

Specific planning instruments are needed to realise the objectives of the Green infrastructure strategy Ruhr metropolis, with various instruments being made available at the different planning levels.

The regional level is to be equated with the area of the Ruhr metropolis. Responsibility therefore lies predominantly with the RVR as the regional planning authority and regional developer, as well as with other stakeholders operating either in the region or at the level of the state of North Rhine-Westphalia. Examples include environmental organisations, regional economic development agencies and state agencies such as LANUV. It is mainly the districts and municipal associations that realise cross-city projects at the inter-municipal level. This also includes clubs, associations and initiatives such as the IGA 2027. At the municipal level, responsibility for planning and developing green infrastructure lies with the cities and municipalities.

The instruments need to be selected and combined in a targeted manner as the transition between the planning levels is sometimes fluid and several levels must be considered simultaneously depending on the project or green infrastructure development programme. Nor can the instruments be separated by specialist disciplines, as the instruments of open space, urban and other specialised planning must be interlinked to implement green infrastructure.

The objectives are assigned to a selection of the especially relevant planning instruments in the following overview, and sorted by their geographic level and binding nature. The list serves as a reference work and a toolbox for green infrastructure stakeholders to use as a guide. Despite extensive research, the list does not claim to be exhaustive.

Planning instrument toolbox for implementing the objectives

	PLANNING INSTRUMENT	OBJECTIVE
REGIONAL LEVEL	Regional plan A formal, interdisciplinary instrument that fleshes out state development plans and serves as the basis for drawing up municipal land development plans	13 15
	Biotope network planning Binding protection of areas in a biotope network system to protect populations of wild animal and plant species	15 19
	Land law in accordance with the Land Consolidation Act Formal instrument for reorganising rural land ownership, which pursues the interests of agricultural structure, environmental and nature conservation and landscape management	15 17 23
	Regional park plan Informal guiding plan to define the development and adaptation of existing regional parks or to create new ones	14
	Transport and mobility planning instruments Informal, integrated mobility plans promote climate-friendly mobility and the transformation of 'grey' infrastructure into green infrastructure, provided that regional transport, settlement and open space planning are involved at an early stage	03 11 25
	Specialised water law planning Management plans and programmes of measures for river basins or sub-areas offer starting points for integrating water management issues such as flood protection and flood prevention with open space planning	01 02 03 18 19 20 21 24
	Pooled space for compensation and replacement measures Informal instrument for bundling nature and landscape development in strategically important areas	08 15 22
	Landscape plan Formal, politically legitimised, city-wide plan with municipal objectives for open space planning and nature conservation	08 15
	Green organisation plan Fleshes out the objectives of landscape planning at the development planning level and makes binding statements on the green structure and quality of a specific area	01 04 06 13 15 16
	Preparatory and binding urban land-use plan The various instruments of urban land-use planning (land-use and development plans) are the most important formal instruments for municipal urban development; environmental, nature conservation and landscape conservation concerns must be taken into account and integrated at the earliest possible opportunity	06 12 13
INTER-MUNICIPAL LEVEL	Urban development contract Formal instrument for making regulations to safeguard and develop green infrastructure in urban development projects; fleshing out the development plan	01 02 07 10
	Open space regulation Formal instrument that specifies regulations for protecting and developing green infrastructure in urban development projects, fleshing out the development plan	01 04 05 13 15 16 19 24
MUNICIPAL LEVEL		

	PLANNING INSTRUMENT	OBJECTIVE
MUNICIPAL LEVEL	Green roof regulation Formal instrument for increasing the proportion of green roof areas in a municipality	01 02 06
	Qualified open space design plan Specific open space design plan with binding statements on recreational areas close to residential areas, climate adaptation and biodiversity at the property level as part of the planning permission process	01 04 06 16
	Intervention regulation in accordance with the Building Code and the Federal Nature Conservation Act Formal instrument for appropriately compensating structural interventions and protecting green infrastructure	08 13 22 23
	Municipal biodiversity strategy Informal municipal strategies and plans with specific measures to promote local biodiversity	10 11 12 15 18 27
	Climate adaptation and climate protection plan Informal plans for the entire city or sub-areas with statements on climate adaptation and climate protection with a strong focus on green infrastructure and its ecosystem services	01 02 06 21 22
	Open space development plan Informal instrument for developing a long-term perspective and strategy for developing open spaces in urban settings and linking them to urban development	01 13
	Integrated urban development plan Informal plans relating to the city as a whole or sub-areas, which make statements on the joint development of urban development and open spaces, for example	01 02 03 04 06 24
	Maintenance and development plan Informal instrument of green space management with statements on how to manage various elements of green infrastructure such as protected areas, but also urban open spaces	04 09 10
	Tree management planning Informal municipal, mostly district-based plans for improving public spaces using roadside and park trees and selecting tree species appropriate to climate change	03 06 18
	Play and sports masterplan Informal municipal plans for the needs-based planning of play and sports areas	05
	Municipal urban consolidation check Informal instrument for defining qualitative and quantitative specifications in the municipalities, for example for negotiating urban development contracts with developers and investors	06
	Visitor guidance plans Informal plans for better distribution and guidance for visitors and tourists in sensitive or heavily utilised natural and countryside areas	27

Drafting process and stakeholders

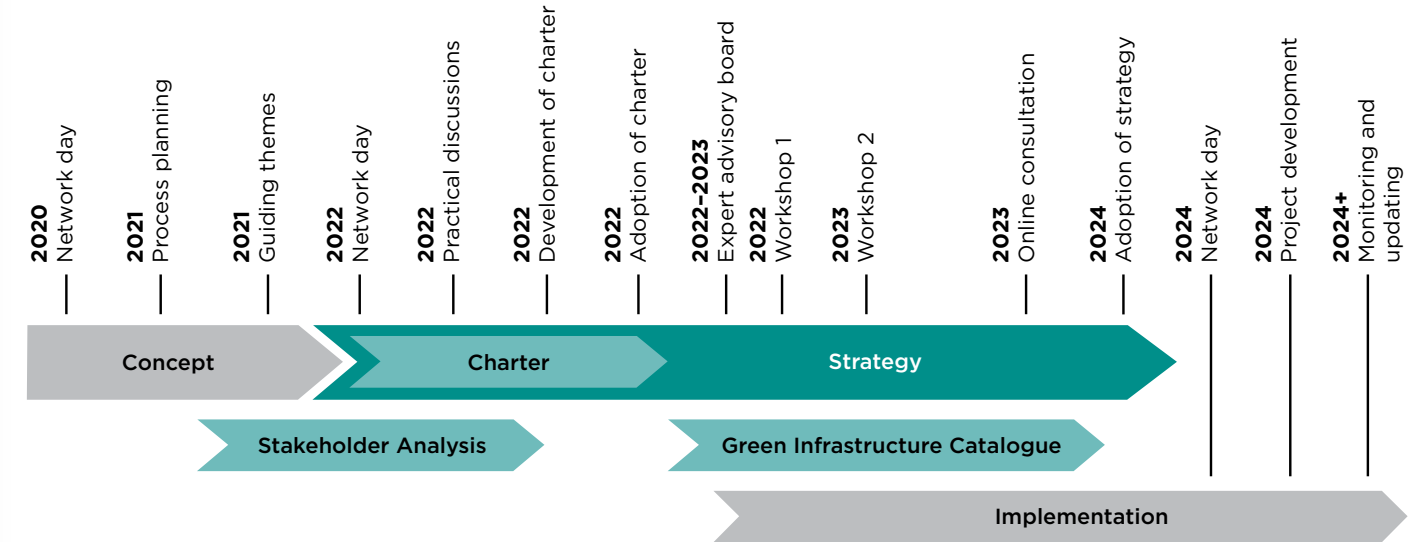
This strategy is a joint product and the result of a collaboration between a wide range of stakeholders from planning, administration, science and practice. The charter and the Green infrastructure strategy Ruhr metropolis were developed and written as part of a process lasting almost three years (2021-2023): evolving from a script-like concept which was subject to numerous consultations and events before becoming the finished product.

We would like to take this opportunity to express our sincere thanks to the representatives of the cities, districts and municipalities of the Ruhr metropolis: for their active participation in two network days, for their active involvement in several meetings for drafting objectives and for their honest feedback at all times regarding the requirements for the strategy and for the RVR as an institution. It is only thanks to your many years of practical experience, thanks to all the knowledge that has long existed in the municipalities and is implemented on a daily basis, and thanks to the region-specific perspective that the objectives and implementation paths have become relevant for our region.

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Looking back on this successful process 'from the region - for the region', we are confident that implementing the regional objectives will be equally successful.

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Prospects

In order for the Green infrastructure strategy Ruhr metropolis to be fully relevant, it must be put into practice. We are therefore using the green infrastructure strategy to invite all stakeholders in the region and further afield to work together to realise the objectives and further advance the development of green infrastructure.

This strategy does not claim to be fully comprehensive or even conclusive. On the contrary: This document is intended to provide a basis and show a common state of work that will provide food for thought and ideas as well as ways and means of achieving the goals that have been set. However, we continue to shape this by working together to develop projects, by planting and unsealing, by fleshing out the different objectives and transforming them into specialist strategies, and by the work we do on a day-to-day basis in the office, on the building site or in the field.

This document is also a promise to update the Green infrastructure strategy Ruhr metropolis, to refine targets in line with current developments and to add further instruments and options for action to the 'Ways to reach the goal' section. It is a sincere call to action aimed at the region's stakeholders for expanding the strategy with their own ideas, approaches and implementation methods and to share them with like-minded people in the region.

Showcase your successful projects, proven plans and effective measures so that we can learn from each other and grow together as a unique region.

Because green infrastructure is more than the sum of its parts. It is essential for our survival. And it takes many people to develop it further so that it will continue to make our region liveable in the future.

Your Green infrastructure team
at Ruhr regional association

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