EUROPEAN UNION

EU MISSIONS

ADAPTATION TO CLIMATE CHANGE

August 2025

Building a network of connected green infrastructure in Dortmund, Germany

Biodiversity corridors and sustainable farming in a German city

Due to its long history as a major industrial centre, Dortmund, Germany, faces environmental challenges, such as urban heat and extensive contaminated sites. Revitalising those areas with pollinator-friendly vegetation and sustainable, community-based farming supports environmental restoration, climate change adaptation, and social well-being.

Key Learnings

- **Connecting green spaces:** By planting regional grasses and pollinator-friendly flowers next to exercise parks and recreation areas, green spaces become better connected. This approach increases biodiversity while enhancing the physical and mental well-being of local communities.
- **Co-creation**: Involving residents in urban gardening or seeding projects is a simple yet powerful way to raise awareness about urban regeneration. It fosters a sense of ownership, strengthens social ties within the neighbourhood, and helps build long-term community support for local biodiversity initiatives.
- **Sustainable urban farming alternatives**: Collective farming in an urban food forest – with fruit trees and vegetable gardens – and aquaponics systems that grow fish and vegetables together in a closed-loop greenhouse environment, offer two innovative and sustainable alternatives to traditional farming methods.

About the region

Dortmund is a city in North Rhine-Westphalia, Germany, covering an area of about 281 km² with more than 600,000 inhabitants. The Huckarde district in the city of Dortmund, located in Western Germany, has partially transformed its formerly industrial areas into neighbourhoods featuring stable and good-quality housing, a balanced mix of retail options, and high recreational value. Highlights include the Emscher river trail and a 2 km park system connecting Huckarde with the surrounding forests to the north and west. However, limited access to green spaces, their poor connectivity, and the presence of contaminated soil remain ongoing challenges.

Climate Hazards

Extreme Heat

Sector

Agriculture, Biodiversity protection, Urban

Key system

Ecosystems and Nature Based Solutions, Health and Wellbeing,

Land-use and Food Systems

Climate Threats

The high building density in Dortmund's inner city limits air circulation, exacerbating the heat within the city compared to its surroundings. During summer nights, temperatures differ by more than 9°C between the cooler outskirts and the warmest zones in the city centre. These elevated temperatures can cause health issues such as circulation problems and headaches, making children and the elderly particularly vulnerable. Climate change is increasing the heat in the city, with hot days exceeding 30°C and tropical nights with temperatures above 20°C rising. Prolonged heatwaves, such as in 2018 when Dortmund experienced 23 consecutive hot days, are especially concerning from a public health perspective.

Improving Dortmund's green infrastructure

The five-year proGIreg project implemented various nature-based solutions to enhance the quality and connectivity of green spaces to reduce the temperatures in Dortmund's Huckarde district, while strengthening the local community through engagement in urban gardening and pollinator-friendly planting projects. The City of Dortmund, in collaboration with the South Westphalia University of Applied Science and the non-profit organisation die Urbanisten (the urbanists), led the greening project.

Community-based food forest

One project highlight is a community-based food forest developed on 3,000 m² of land owned by the Catholic Church. The self-sustaining woodland for food production includes herbs, berry bushes, wild fruit, vegetables, and fruit trees. Unlike conventional forests, which typically grow naturally and are not designed for harvesting food, this carefully planned woodland mimics natural ecosystems while growing plants that provide food throughout the year. It requires minimal maintenance once established, promotes

biodiversity, and serves both ecological and community needs by offering a sustainable source of fresh food. The local scouts co-created the food forest with St. Urbanus Church community members. In May 2019, the project started with a co-design workshop on a weekend, involving the scouts and the church community's executive board. During this project kickoff event, the participants built five raised beds and planted them with bee-friendly plants and vegetables under the guidance of the non-profit organisation die Urbanisten (the urbanists).

The initiative continued with a planting campaign and an information evening for interested residents, promoted through various project channels and social media. A "food forest garden group" ensures long-term care, enabling members to meet weekly and maintain the space with around 20 neighbourhood residents regularly tending the garden. In 2021, the food forest officially opened to all citizens of Huckarde. This community garden is a model for productive and environmentally sustainable urban green spaces, contributing to climate change adaptation by reducing heat through increased vegetation and shaded areas. It also functions as an educational space, offering local residents the opportunity to learn about sustainable gardening practices that they can apply in their own private gardens.

Figure 1: Local food forest in Huckarde, Dortmund: Image Credit: proGIreg.

Aquaponics for soilless farming

At the former Hansa Coking Plant, the project team tested the aquaponics (Figure 2) alternative farming method in two greenhouses. This circular system allows growing fish and vegetables, with fish droppings providing a natural fertiliser for the plants. This soilless method enables food production on otherwise unusable land, such as contaminated brownfields, contributing to urban regeneration. Aquaponics is resource-efficient and helps improve local food security by providing fresh, locally grown products. This reduces the need for long-distance food transport, lowers CO_2 emissions and the overall carbon footprint, contributing to climate change mitigation. At the same time, its efficient use of water and space also

supports adaptation to increasingly variable climate conditions. Unlike conventional commercial models, the aquaponic farmers don't sell their produce at the market. Instead, the non-profit organisation die Urbanisten (the urbanists) and the South Westphalia University of Applied Science jointly manage the facility and rent out the aquaponic growing beds to interested residents, encouraging community involvement in sustainable urban farming.

Figure 2: Aquaponic beds, Dortmund. Image Credit: Sebastian Schlecht.

Biodiversity corridors

Since 2020, the citizen-led environmental association Naturfelder Dortmund e.V. has transformed over 10 sites in and around the Huckarde district into biodiversity-friendly areas with regional grasses and wildflowers, most beneficial to increase pollinator biodiversity. These spaces form a biodiversity corridor, providing essential habitats for insects and enriching the community with colourful landscapes, while also contributing to more connected green infrastructure – a network of green spaces that strengthens climate resilience in urban areas. The project team also turned the bare spaces adjacent to a newly designed exercise park in Huckarde into flowering meadows. The park also includes exercise installations for all ages, promoting physical activity with equipment like trampolines, slacklines, and balancing bars. Additionally, three drought-resilient Sorbus trees and biodiversity-friendly seeds along the slopes of a newly barrier-free path connect Huckarde with the renatured Deusenberg landfill, providing better-connected green infrastructure for people and nature.

Citizen-centred approach for a long-lasting engagement

In Dortmund, citizens participated to jointly design (co-design) and implement nature-based solutions to varying degrees, depending on the complexity of each intervention. Engagement ranged from simply informing and consulting citizens to deeper involvement, collaboration, and empowerment.

Simple nature-based solutions, such as urban gardening or pollinator-friendly planting, proved especially effective for citizen engagement. These projects are easy to understand, require little technical knowledge or permitting, and are relatively low-cost and quick to implement. ProGIreg partner Aquaponik Manufaktur GmbH works together with the citizen-led association Naturfelder e.V. to convert plots into flower meadows in Issum, Germany. In 2020, this concept inspired the establishment of "Naturfelder Dortmund e.V.," a collaborative effort with die Urbanisten (the Urbanists) and South Westphalia University of Applied Sciences, aimed at strengthening ongoing community participation. Since then, the association has successfully engaged local residents to in its activities, catalysing more seeding projects.

The association members include activists and experts in agriculture, permaculture, and nature conservation. More complex solutions, such as aquaponics, require specialised expertise and face legal, technical, and administrative hurdles. The greenhouses needed building permits, the harvest required a food analysis due to the contaminated site, and time-consuming pre-construction preparations led to tight

schedules. In these cases, the project team mainly informed citizens and enabled them to give feedback during the planning phase.

Difficulties and success factors

Implementing nature-based solutions in Dortmund's Huckarde district offered important lessons and positive outcomes, while revealing significant challenges.

- Successful co-design also relies on early assessments of the local circumstances, like land ownership, building permissions, or site contamination, to understand who to talk to when planning adaptation measures. This approach helps avoid delays, builds trust and prevents unnecessary frustration. Throughout the process, flexibility and openness are essential to adapt to unforeseen challenges, requiring creativity and commitment from everyone involved.
- Project preparation took longer than expected, as all nature-based solutions started from scratch. Building partnerships, identifying suitable sites, and gaining permissions proved difficult, with property owners often hesitant to commit without clear plans.
- Contaminated sites required additional planning, expertise, and resources to meet legal and environmental standards. Soil quality directly influenced complexity and timelines.
- More complex solutions like aquaponics require a step-by-step approach. Regulatory challenges, such as permits for greenhouse construction, slowed development. These experiences became part of a broader interdisciplinary learning process, requiring creativity, patience, and strong stakeholder communication.

Despite these challenges, the project successfully engaged citizens, raised awareness about environmental issues, and helped create a more connected green infrastructure that enhances biodiversity and reduces urban heat. The nature-based solutions had a lasting impact in three key areas:

1. **Improved green infrastructure**: Involving citizens in gardening and biodiversity projects increased their understanding of environmentally friendly urban planning and inspired sustainable practices. The food forest helped cool down the area in summer, reducing heat stress for the local community.
2. **Stronger sense of community**: Collaborative efforts, such as those by the St. Urbanus parish and Naturfelder Dortmund e.V. association, strengthened community ties and a shared understanding of local identity.
3. **Improved liveability**: The nature-based solutions improved the residents' quality of life and reduced the temperatures in the city. However, they are too small in scale to significantly impact the local economy or address structural imbalances in Huckarde, such as higher unemployment rates in certain subdistricts.

Looking ahead, die Urbanisten and Naturfelder Dortmund e.V. associations continue their work in aquaponics, urban food forestry, and urban regeneration, building on networks and expertise developed during the project. Replication opportunities include expanding aquaponics to schools, creating green corridors on other contaminated sites, and preparing groundwork for a bridge connecting the Hansa Coking Plant with the renatured Deusenberg landfill.

Summary

Revitalising the Huckarde district in Dortmund with nature-based solutions supports climate resilience, biodiversity, and community well-being. Key initiatives included a co-designed community food forest; aquaponics that produce vegetables ; pollinator-friendly biodiversity meadows; and improved accessibility to green spaces , such as a barrier-free path to the Deusenberg. The climate change adaptation measures strengthen local biodiversity, reduce urban heat, raise public awareness, and foster a stronger sense of community, particularly through community-based efforts. The project laid strong foundations for future urban regeneration, and the partners continue to build on these efforts, with potential for expanding aquaponics to schools, developing new green corridors, and connecting key sites through infrastructure improvements.

Further information

The work presented in this adaptation story is part of the proGIreg project and written as part of the Invest4Nature project.

This project has received funding from the European Union's Horizon 2020 programme under grant agreement 776528.

The total project cost amounted to 11.6 million Euros for all cities.

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Funded by the European Union

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