



Four Implemented LLs in Dortmund, Turin, Zagreb, Ningbo with running NBS

Deliverable 3.5

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Partner organizations

| No. | Name | Short name | Country |
|-----|--|------------|------------------------------|
| 1 | Rheinisch-Westfaelische Technische Hochschule Aachen | RWTH | Germany |
| 2 | Stadt Dortmund | DORTMUND | Germany |
| 3 | City of Turin | COTO | Italy |
| 4 | Grad Zagreb | ZAGREB | Croatia |
| 11 | ICLEI Europasekretariat GMBH | ICLEI | Germany |
| 21 | Università degli Studi di Torino | UNITO | Italy |
| | Fondazione della comunità di Mirafiori Onlus | MIRAFIORI | Italy |
| 23 | Politecnico di Torino | POLITO | Italy |
| 31 | Orti Alti | OA | Italy |
| 15 | Dual SRL | DUAL | Italy |
| 33 | Ningbo Municipal Center for Forestry Science & Technology Services | FBNC | China (People's Republic of) |

Abbreviations

EC: European Commission

ERDF: European Regional Development Fund

FC: Follower Cities

FRC: Front Runner Cities

GI: Green Infrastructure

GIS: Geographic Information System

IGA: International Garden Exhibition 2027

IP: Implementation Plan

LL: Living Lab

NBS: Nature-Based Solutions

NGO: non-governmental organization

proGireg: productive Green Infrastructure for post-industrial urban regeneration

SWUAS: South Westphalia University

URBA: Department of Urban renewal, City of Dortmund

WP: Work Package

Executive summary

ProGireg NBS implementations in Front Runner Cities

Productive Green Infrastructure for post-industrial urban regeneration (proGireg) is a 5-year project developing and testing nature-based solutions (NBS) co-creatively with public authorities, civil society, researchers, and businesses. Since 2019, eight nature-based solutions (NBS) supporting the regeneration of mostly post-industrial urban areas have been implemented in the Living Labs (LL) of Front-Runner-City (FRC) Dortmund (Germany), Turin (Italy), Zagreb (Croatia) and Ningbo (China). Implementing NBS within different real-life contexts has resulted to be a challenging but successful task. FRC and partners have spent considerable effort in pursuing the goal of testing the effectiveness of NBS as well as to strategically use NBS to promote sustainable urban regeneration and social inclusion.

NBS Implemented in FRC Living Labs

The FRCs implemented a total of 27 NBS covering all eight different NBS typologies pinpointed in proGireg. 14 NBS were implemented in Turin, six in Zagreb (two will be completed in spring 2023), five in Dortmund and two in Ningbo. Few NBS were cancelled (one in Ningbo and Dortmund) or merged (two in Turin and one in Zagreb). The prevailing NBS 3 typology - Community-based urban farming and gardening on post-industrial sites was implemented in all FRC. Despite the great diversity of the local contexts, all Living Labs have been successfully committed in developing sound synergies between partners and stakeholders to test innovative solutions and implement NBS as a concrete opportunity to regenerate post-industrial urban areas while generating multiple benefits and co-benefits.

Work Package 3

WP3 led by COTO has supported the NBS implementations in the four LL by designing and managing monitoring and reporting tools. A timeline describing each step within the implementation phase (from preliminary and admirative tasks, to physical interventions, maintenance, and handover activities) in each NBS has supported monitoring progress of works in the FRC. During this process, each FRC has generated an Implementation Plan, a document containing a set of information related to the Living Lab area. It is conceived to illustrate and update progress during implementation of each NBS. Each IP contains a detailed description of the Living Lab areas (context analysis and goals and challenges tackled by proGireg activities). Each NBS has been detailed by so-called “NBS table”, documenting all related information structured in sub-sections.

Deliverable D3.5 - Demonstrator

This deliverable is based on the above tools and presents progress and results in visually attractive summaries of NBS implementations. It consists of three different parts that will be separately available for download on the proGireg website www.progireg.eu. Hence, serving as valuable dissemination material for FRC to communicate its NBS implementation processes and results:

- FRC Living Lab summary
- NBS factsheet and table (attached is one example of proGireg NBS 1-8)
- Living Lab map

1 Introduction

1.1. Introduction to the project

Productive Green Infrastructure for post-industrial urban regeneration (proGInreg) is developing and testing nature-based solutions (NBS) co-creatively with public authorities, civil society, researchers and businesses. Eight nature-based solutions supporting the regeneration of urban areas affected by deindustrialisation have been implemented in Dortmund (Germany), Turin (Italy), Zagreb (Croatia) and Ningbo (China). The NBS implementations in the FRC are supporting Follower Cities (FC) Cascais (Portugal), Cluj-Napoca (Romania), Piraeus (Greece) and Zenica (Bosnia and Herzegovina) in developing local strategies for embedding nature-based solutions in urban transformation processes.



Figure 1 - The proGInreg partnership. Source: RWTH, proGInreg proposal

Through the implementation of green infrastructures (GI), proGInreg intends to promote self-sustaining business models that can boost and regenerate post-industrial areas. The cooperation of public actors, civil societies, academies and industry/SMEs (“quadruple helix approach”) is fundamental to build shared practices and ensure continuity over time.

ProGReg implemented the following NBS in the context of Living Labs (LL) in each FRC, working with local stakeholders to create ownership and locally rooted solutions:

- NBS 1 - Renaturing landfill sites for leisure use and energy production.
- NBS 2 - New regenerated soil thanks to biotic compounds for urban forestry and urban farming.
- NBS 3 - Community-based urban farming and gardening on post-industrial sites.
- NBS 4 - Aquaponics as soil-less agriculture for polluted sites.
- NBS 5 - Capillary GI on walls and roofs.
- NBS 6 - Making post-industrial sites and renatured river corridors accessible for residents.
- NBS 7 - Establishing protocols and procedures for environmental compensation at local level.
- NBS 8 - Pollinator biodiversity improvement activities and citizen science project.

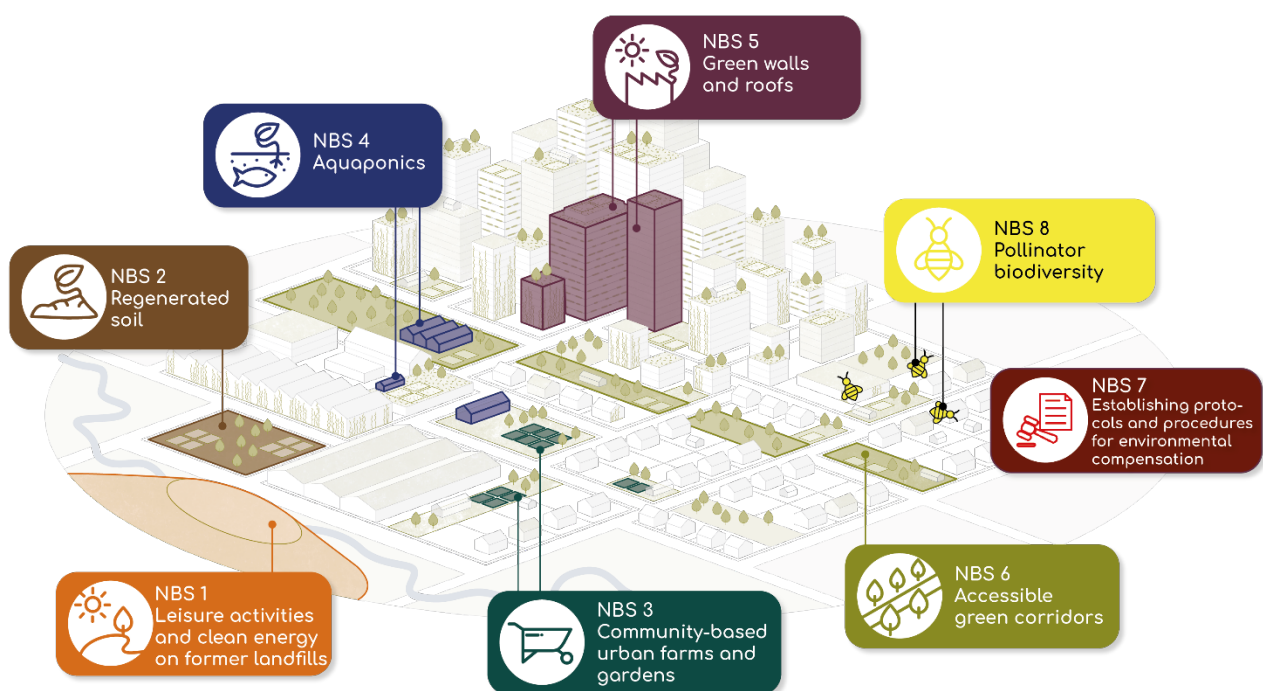


Figure 2 Spatial representation in the urban context of proGReg NBS (RWTH)

1.2. Introduction to Work Package 3

The Municipality of Torino (COTO) is the coordinating partner of WP3 NBS pilot implementation. This WP has been responsible for:

- the definition of a common methodology for implementation (Task 3.1);
- the maintenance and follow up of the implementation (Task 3.2);
- the production of a “Living Lab Implementation Plan” in each of the four FRCs (Tasks 3.3/4/5/6).

Implementing eight different types of NBS within different real-life contexts has turned out to be a challenging but successful task. FRC and partners have spent considerable effort in pursuing the goal of testing the effectiveness of NBS as well as to strategically use NBS to

promote sustainable urban regeneration and social inclusion. The implementation period had to be extended until December 2022 (instead of June 2021), mainly due to COVID-19 delays but also lengthy bureaucratic procedures precluding NBS implementations.

COTO has been responsible for coordinating all Living Lab implementations and other supporting activities for which different monitoring tools were designed. COTO provided FRC with a set of instructions and tools enabling the collection and reporting of detailed information of the implementation process: results achieved, and barriers encountered for each NBS, wider perspective on revitalizing post-industrial districts in urban context. Ultimately, the gathered information contributes to further NBS planning and replication based on the experiences gained in the FRC.

Each Implementation Plan (IP) for specific NBS contains a comprehensive set of information related to the different implementation stages and focuses on specific proGireg features: inclusiveness and citizen engagement, budgetary and economic issues (related to new green business models and market readiness), multiple benefits of NBS.

The IP is combined with the Living Lab Map providing an aggregated, easy to read layout of the NBS implementation at LL level. The map captures and illustrates the results of the co-implementation process and activities in each Living Lab.

1.3. Introduction Demonstrator D3.5

COTO and RWTH with support from ICLEI have cooperated to create demonstrators of the NBS implementation process in each Living Lab of the four FRC, summarising the information gathered during all implementation phases.

Structure of demonstrators

The final output in form of demonstrators illustrate LL implementation processes and NBS implementations. Three key tools of description, photos and maps have been developed as follows:

1. **Living Lab summary per FRC:** Describing the LL, management approach adopted to implement NBS, NBS benefits for each LL, results and outlook:
 - Section 1: Goals and management of Living Lab
 - Section 2: Pre-implementation and co-design activities, lessons-learnt
 - Section 3: Results and perspectives
2. **Living Lab Map:** Providing an aggregated, easy to read layout visualizing the achievements of the NBS implementation at LL level
3. **NBS factsheet and table** contain two parts:
 - NBS factsheet: one page/stand-alone description containing a summary of all relevant information of each implemented NBS

- NBS table: detailed description of aims and goals, co-design activities and implementation process of each NBS implemented in the FRCs.

Table 1 provides an overview of how the demonstrators are structured on two spatial scales:

Table 1 Structure of the demonstrators in each FRC

| FRC | Living Lab level | NBS level - factsheet and table |
|-----------------|-----------------------------|---|
| Dortmund | Dortmund Living Lab Summary | NBS 1: Exercise Park in Huckarde NBS 3: Food Forest and permaculture orchard in Huckarde NBS 4: Aquaponics NBS 6: Connection Huckarde with renatured Emscher river and Deussenberg sites NBS 8: Pollinator biodiversity |
| Ningbo | Ningbo Living Lab Summary | NBS 3: Planting aquatic plants along the shore of the lake NBS 7: Procedures for environmental compensation |
| Turin | Turin Living Lab Summary | NBS 2: New soil in Sangone Park NBS 3: Mirafiori Castle's ruins recovery and new planting NBS 3: Gardens in Cascina Piemonte (Orti Generali) NBS 3: Pollinator friendly gardens (WOW) NBS 3: Didactic gardens in schools NBS 3: Community Micro vegetable gardens (OrtoMobile) NBS 3: Gardens between houses NBS 4: Aquaponics test system NBS 5: Green indoor and outdoor walls NBS 5: New green roof at WOW NBS 6: Green corridor& Local natural heritage enhancement NBS 7: Tools for environmental compensation processes NBS 8: Butterfly gardens for disadvantaged people |
| Zagreb | Zagreb Living Lab Summary | NBS 3: Sesvete City Garden – upgrading and new garden NBS 3: Sesvete City Garden –Therapeutic Garden NBS 3: Info Point NBS 4/5: Green Roof/Photovoltaic cells/Green wall & Aquaponics testing installation NBS 6: New cycling path NBS 7: New protocols and make changes to its planning procedures and policy development processes |

Demonstrator dissemination platform

Key dissemination platform is the proGireg project website www.progireg.eu. FRC will feature each implemented NBS demonstrators on its websites (may be translated into the local language until project end). All demonstrators are available on website, to be viewed and downloaded. **Living Lab Summary** and **Living Lab** map can be found under each FRC on the www.proGireg.eu webpage (see fig. 3 screenshot):

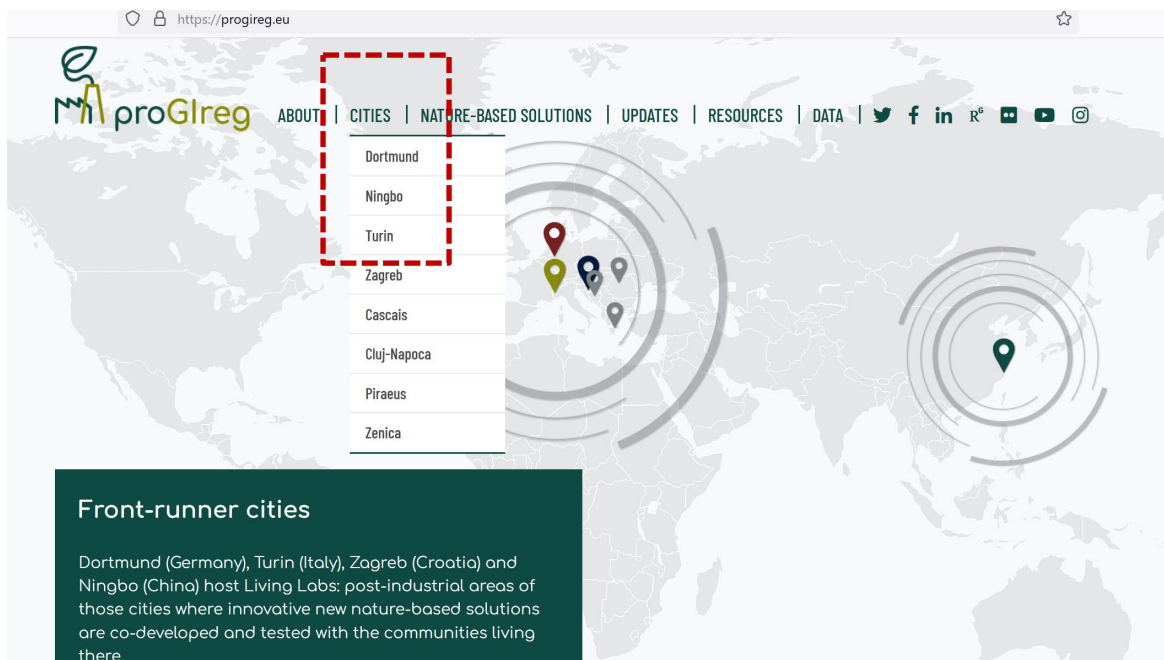


Figure 3 Screenshot progireg.eu website of where the Living Lab summary and map can be downloaded

NBS factsheets and NBS tables can be found under each city and Nature-based Solutions webpages (see fig. 4 screenshot).

<https://progireg.eu/nature-based-solutions/background/>

<https://progireg.eu/nature-based-solutions/aquaponics/>

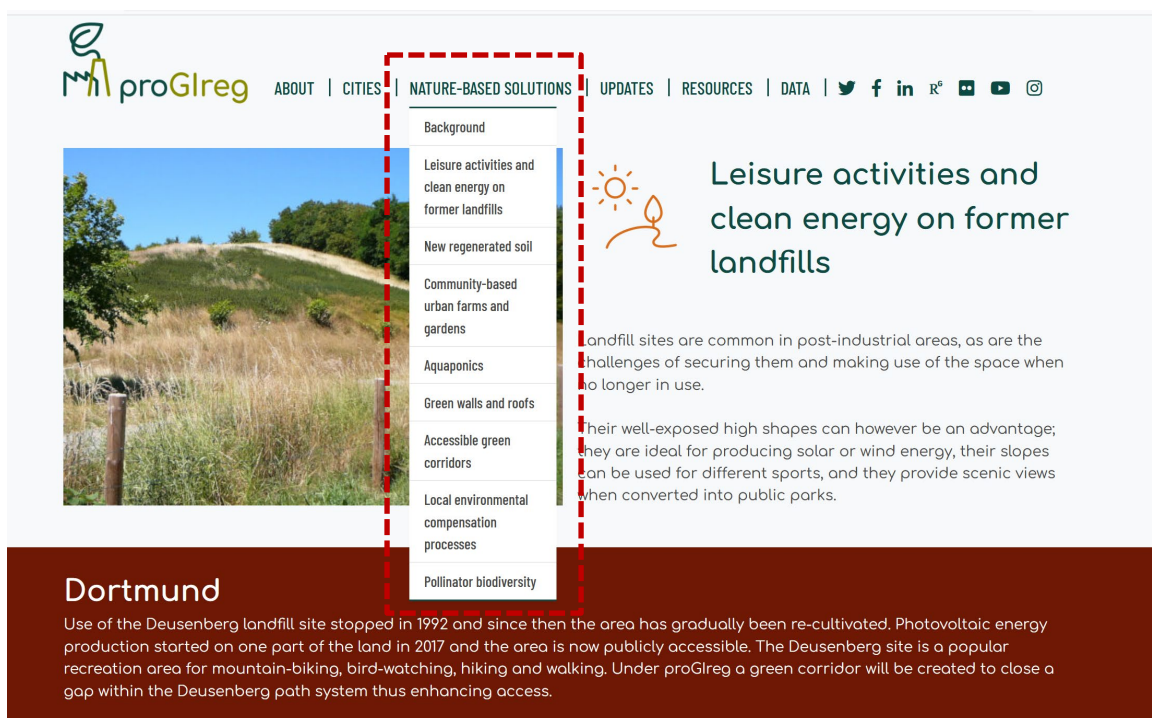


Figure 4 Screenshot progireg.eu website of where each NBS factsheet and NBS table can be downloaded

2 FRC implemented Living Labs and NBS

This chapter contains tables summarizing the NBS implemented in each Living Lab and the Living Lab Map of each FRC.

2.1 Dortmund-Huckarde, Germany

Dortmund has implemented five NBS, and one, NBS 3 Gardening in a school yard and Kindergartens in Huckarde has been cancelled due to COVID 19 relate restrictions.

Table 2 Overview of implemented NBS in Dortmund Living Lab

| NBS typology | NBS title | Description | Main Partner |
|--|--|---|---|
| NBS 1 Leisure activities and clean energy on former landfills | Sports infrastructure within Gustav-Heinemann-Park | Publicly accessible movement elements which invite citizens of different age groups to playfully try out and which offer a health-promoting balance to predominantly | City of Dortmund, Department of Urban Renewal |
| NBS 3 Community-based urban farms and gardens | Food Forest in St. Urbanus | The food forest of St. Urbanus has been built during workshops with the community and serves as an example of how gardens in the city can be designed in a productive and environmentally friendly way. | South Westphalia University of Applied Science, die Urbanisten e.V |
| NBS 4 Aquaponics | Aquaponics | On a site of the old Hansa coking plant two greenhouses are built for scientific purposes in which fish and vegetables will be produced in a circular system (aquaponics). | Die Urbanisten e.V., South Westphalia University of Applied Science, Aquaponik Manufaktur GmbH, Citybotanicals GmbH |
| NBS 6 Accessible green corridors | Accessible green corridors | The former Deussenberg landfill site has developed into a popular local recreation destination. A barrier-free path connection has been built at the south-eastern foot of the slope | City of Dortmund, Department of Urban Renewal |
| NBS 8 Pollinator biodiversity | Pollinator biodiversity | At the sites of the Food Forest and Aquaponic implementations and pollinator-friendly plants have been seeded at several locations in Huckarde, | South Westphalia University of Applied Science, die Urbanisten e.V. |

2.2 Ningbo, China

One of three NBS planned in Ningbo, NBS 2 New regenerated soil for urban forestry and farming had to be cancelled due to high contamination level in the water sediments of the Living Lab area of the Moon Lake. Thus, Ningbo has implemented two NBS.

Table 3 Overview of implemented NBS in Ningbo Living Lab

| NBS typology | NBS title | Description | Main Partner |
|---|--|--|---|
| NBS 3 Community-based urban farms and gardens | Planting aquatic plants along the shore of Moon Lake | Planting aquatic plants along the lake have been successfully implemented and contributed to beautifying the environment while purifying the water quality | Forestry Bureau of Ningbo City, |
| NBS 7 Local environmental compensation processes | Procedures for environmental compensation | The city of Ningbo has completed environmental compensation according to the assessment methods for improving water quality and the assessment methods for maintaining and cleaning Moon Lake. | Institute of Urban Environment, Chinese Academy of Sciences, Ningbo |

2.3 Turin, Italy

In total, 17 different NBS have been implemented in the Living Lab in Mirafiori Sud district, Turin.

Table 4 Overview of implemented NBS in Turin Living Lab

| NBS typology | NBS title | Description | Main Partner |
|---------------------------------------|--|---|------------------|
| NBS 2 New regenerated soil | New soil production in Sangone Park | Creation of an area of “urban forest” along the banks of the Sangone using regenerated soil (New Soil), based on aggregates and compost from FORSU and innovative bio stimulants. | Environment Park |
| NBS 3 | Mirafiori Castle’s ruins recovery and new planting | Landscape transformation for enhancement of an area of historical and environmental interest. | Orti Generali |

| | | | |
|---|--|---|---|
| Community-based urban farms and gardens | Garden in Cascina Piemonte (Orti Generali) | Collective gardens rented to individual citizens, common educational area for training and community activities. | Orti Generali |
| | Pollinator friendly gardens (WOW) | Box gardens and beehives co-designed and implemented with stakeholders as a part of the revitalization process of an abandoned building. | OtiAlti |
| | Community Micro vegetable gardens (OrtoMobile) | Supply of a stock of wood cassettes for the realization of “micro-garden” and composters for schools and practical course for teachers. | City of Turin, Educational Department |
| | Didactic box garden | Realization or integration of educational gardens and scientific laboratories aimed at primary and high schools on the topics of proGireg. | Fondazione di Comunità Mirafiori |
| | Gardens between housing | Placing of fixed containers for urban horticulture. | Fondazione di Comunità Mirafiori |
| NBS 4 Aquaponics | Aquaponics test system | Small and medium scale community - designed aquaponics system, to be set up on two local buildings. | City of Torino, EU Funds and Innovation Department, private company |
| NBS 5 Green walls and roofs | Green Wall at School (indoor) | Green indoor wall with removable tray system. Participatory processes and co-management for the maintenance of the green walls with the students and the school staff. | City of Torino, EU Funds and Innovation Department, private company |
| | Green Wall at Homeless shelter (outdoor) | Outdoor self-supporting green wall, with removable trays and felt pockets. Participatory design process/co-management for the maintenance together with the users. | City of Torino, EU Funds and Innovation Department, private company |
| | New green roof at WOW | Implementation of an extensive green roof WOW building. | OrtiAlti |
| NBS 6 Accessible green corridors | Green Corridors & Local natural heritage enhancement | Creation of a green and pollinator friendly course. Enhancement of the naturalistic green corridor and promotion of the cycling path through the creation of vertical signage and street furniture. | City of Torino, Urbanism Department, Fondazione di Comunità Mirafiori |
| NBS 7 Local environmental compensation processes | Strategic public-private partnership for greening the city | Identify, collect and display tools and concrete opportunities in order to allow the Administration to improve the green assets of the city through public private collaboration. | City of Torino, EU Funds and Innovation Department, private company |

| | | | |
|--|--|--|---------------------|
| NBS 8 Pollinator biodiversity | Butterfly gardens for schools and disadvantaged people | Implementation of training activities on the life of butterflies. Supporting the creation of the butterfly garden. Biomonitoring with the transect method. | University of Turin |
|--|--|--|---------------------|

2.4 Zagreb, Croatia

In the Living Lab of Sesvete, Zagreb NBS 4 and 5 were merged into a single NBS unit. By December 2022, NBS 3 Modernisation of the urban garden and NBS 6 are not completed. Completion is foreseen for spring 2023.

Table 5 Overview of implemented NBS in Zagreb Living Lab

| NBS typology | NBS title | Description | Main Partner |
|---|--|--|---|
| NBS 3 Community-based urban farms and gardens | The Sesvete City Garden –Therapeutic Garden | Construction of a new therapeutic garden, modernization of existing city garden using innovative groundwater treatment. | City of Zagreb, Economy, Environmental Sustainability and Strategic Planning, Offices |
| | Infopoint | The Info point provides a venue for the proGireg project activities and their dissemination, as well for promotion of similar and complementary activities | |
| NBS 4 Aquaponics NBS 5 Green walls and roofs | Modular urban farm | The farm provides a showcase for the application and practical use of the three technologies applied in the farm. | |
| NBS 6 Accessible green corridors | New pedestrian and cycling corridor | The corridor connects the fragmented space of former industry, commercial space and commercial areas. | |
| NBS 7 Local environmental compensation processes | New protocols and make changes to its planning procedures and policy development processes | New guidelines for low carbon development planning to be adopted in urban planning processes | |

Annexes

- 1. Living Lab summary by FRC**
- 2. Examples of NBS factsheets and NBS tables**
- 3. Living Lab map**



Living Lab Dortmund



NBS 3 - St. Urbanus Food Forest in the Living Lab Huckarde



Deliverable 3.5 Implemented Living Lab in Dortmund-Huckarde



Dortmund Living Lab Huckarde view from Hansa Coking Plant

Vision, goals and management of the Living Lab



View of Huckarde from the Deusenberg

Vision for the Living Lab Huckarde

Huckarde interconnected by nature! ProGInreg implements green infrastructure and urban farming activities to improve the social situation and to foster identity within Huckarde district. The goal of experimenting with nature-based solutions (NBS) is to achieve sustainability that integrates urban vitality, ecological responsibility, economic prosperity and social justice by involving local communities in the design and management of these projects.

Living Lab Dortmund overview

Dortmund is located in Germany's former key coal mining and steel industry center, counting over 600 000 inhabitants (2022); the largest city by area and population of the Ruhr Metropolitan area. Just like other cities of the Ruhr region, deindustrialization has forced Dortmund to transform in economic, social and environmental terms. Large-scale contaminated brownfields, former industrial and transport sites need redeveloping.

The Dortmund Living Lab is located in the post-industrial Huckarde district (c. 9.000 inhabitants in 2021), about 4 km Northwest of the city center. The Hansa Coal Mine founded in 1855 and the Hansa Coking Plant in 1928 dominated the settlement, being the most visible and largest local workplace until closedowns in 1980. Deindustrialization (over 10.000 workers lost their jobs within few years) has driven Huckarde into structural change with tremendous economical, social and environmental effects. In response, regeneration programs kick-started in 1992 to strengthen the district as a livable place

and enhance the district center. Over the past three decades, Huckarde has developed into an area with solid housing conditions, a good mixture of retail supply and a high recreational value as it is located close to the recultivated Deusenberg landfill, Emscher river path, Dortmund-Ems-Canal and forests to the North and West. Characteristic features are the Emscher river, Hansa Coking Plant (now an industrial heritage monument) and the Deusenberg. A nearly 2 km long park system connects Huckarde with forests North and West including Gustav-Heinemann-Park and two publicly accessible allotment gardens.

Challenges and Goals

Huckarde suffers from weaknesses such as:

- environmental degradation including large-scale contaminated sites,
- former industrial and transport sites,
- lack of high quality green open spaces
- socio-economic disparities: higher share of foreigners and unemployment rates, notably in Mailoh subdistrict.

Significant regeneration projects at regional and district level are ongoing to harness the district's opportunities, making it attractive to a wide range of mixed socio-economic backgrounds. These opportunities play a vital role in transforming the area through successful development projects and the implementation of innovative solutions using nature to transform brownfields and underused spaces.

The proGReg research project has turned some of the weaknesses into opportunities as strategic starting points for several NBS implementations in the Living Lab Huckarde, addressing social, economic and urban problems. The Living Lab approach entails testing NBS in real life condition by involving stakeholders and citizens at an early stage in co-design and co-implementation processes. The overall aim is boosting collaborative and long-lasting engagement including vulnerable and marginalized groups. ProGReg NBS use nature for renewal in regenerating pathways and improve land accessibility, e.g. (fig. 2):

- Creating green corridors by connecting already existing paths,
- Transforming privately owned spaces into community gardens,
- Experimenting with collective farming practices as a tool for urban regeneration and social inclusion in several NBS 3 interventions,
- Involving local citizens and scouts to experiment with horticultural activities,
- Developing and testing aquaponics as a sustainable alternative to conventional agriculture by applying social and

- technological innovation solutions,
- Converting potential urban areas into attractive habitats for pollinators to improve biodiversity.
- Designing, managing and maintaining green infrastructure shared with local businesses, associations and citizens

While the overarching goal of the Dortmund Living Lab is developing a systemic green infrastructure network by improving connectivity and thus enhancing the living and environmental conditions in Huckarde, the long-term goal is to disseminate and replicate these solutions and practices at other locations in Dortmund and national and international cities. Additionally, developing new business models based on sustainable and circular economy solutions and transversal planning tools with the added value of NBS co-creation.

Living Lab Management

The complex organizational, administrative and legal aspects and overcoming financial and implementation constraints required intensive communication with all stakeholders. Establishing a strategic stakeholder network with Huckarde multipliers from civil society, administration, politics and the private sector proved effective for NBS implementation (fig. 1). A steering committee mediated internal cooperation issues. Any works had to comply with resolutions of the local Huckarde parliament, i.e. movement park (NBS 1) and Deussenberg foot path (NBS 6) by mandating the Department of Urban Renewal.

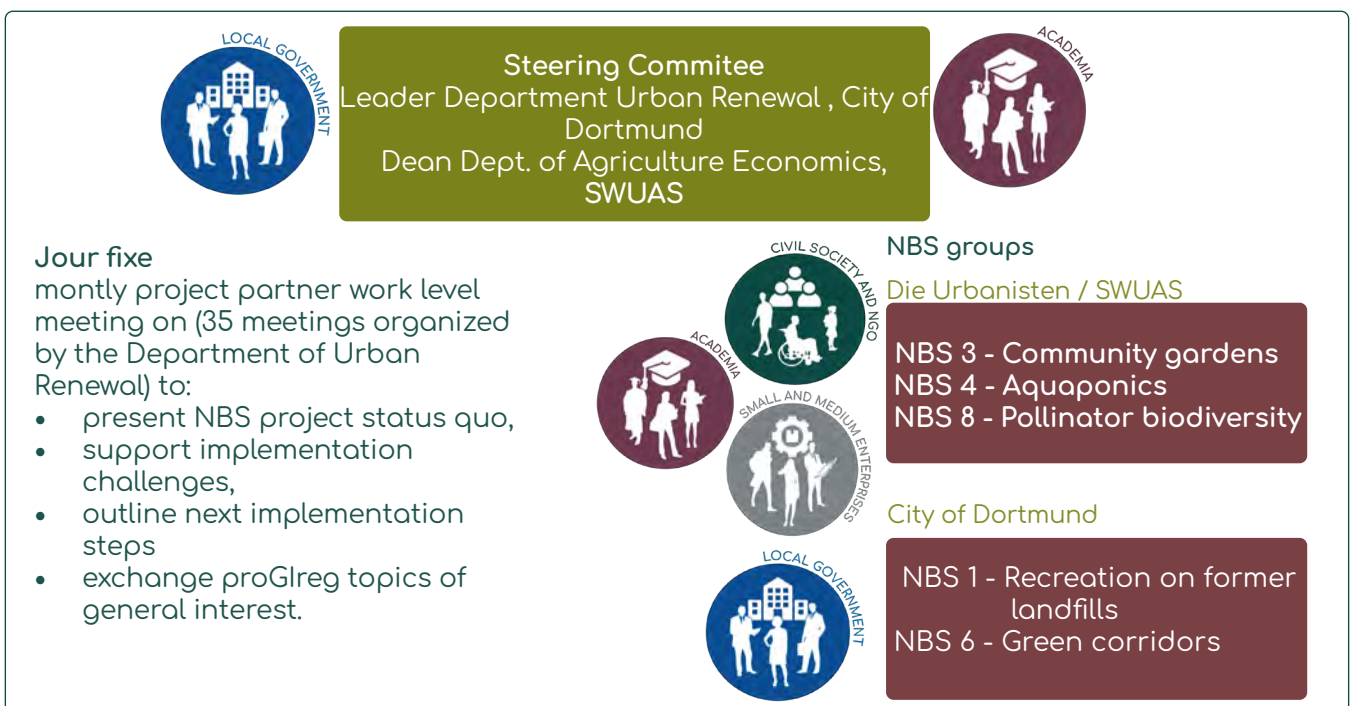


Figure 1: Living Lab management structure

Co-design activities to implement proGReg NBS

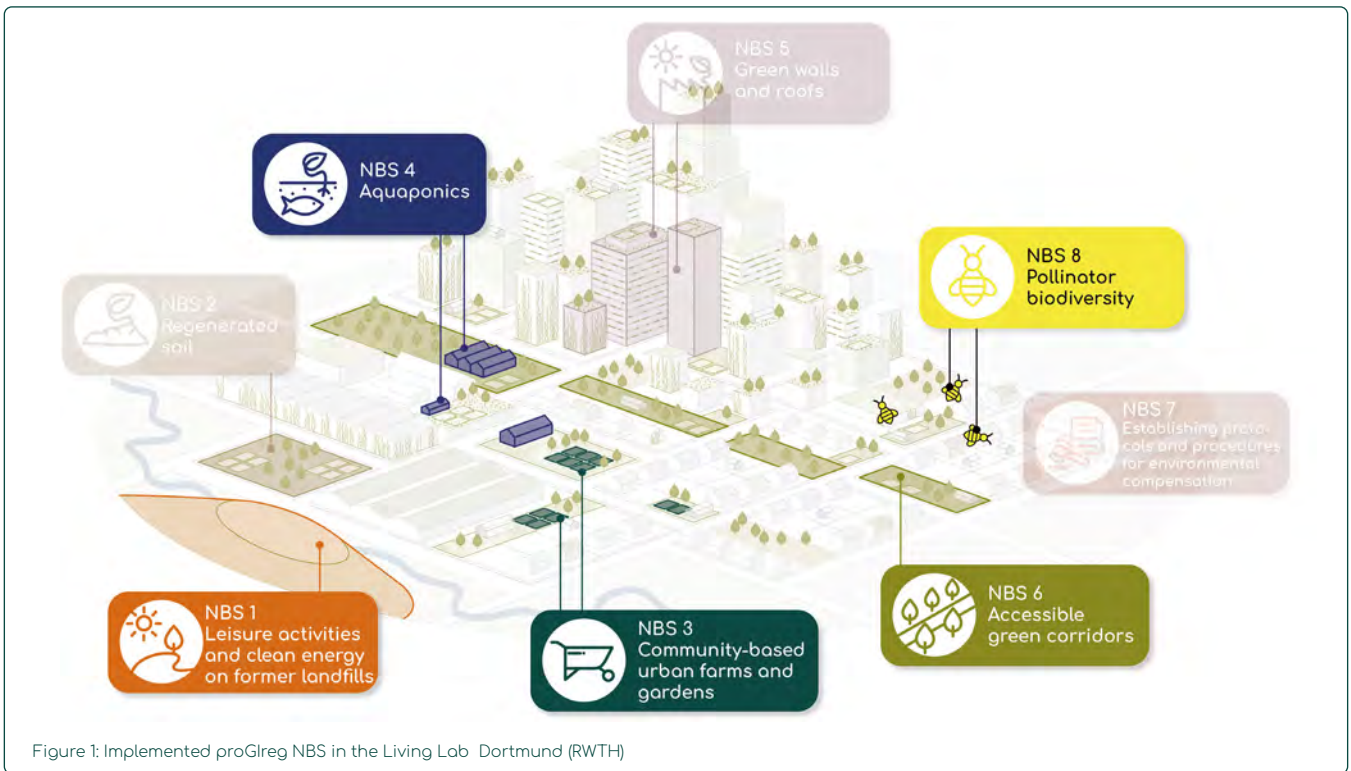


Figure 1: Implemented proGReg NBS in the Living Lab Dortmund (RWTH)

Co-design activities take place in varying intensities. In Dortmund, co-design and co-implementation intensities with citizens depended on type of NBS, ranging from informing, consulting, involving to collaborating and empowering in line with the public participation spectrum (International Association for Public Participation).

Involving citizens in low-threshold NBS has been comparatively easy, e.g. urban gardening projects (NBS 3) or improving pollinator diversity (NBS 8). These NBS are easy to communicate and realize, need limited specific knowledge, planning or building permissions, and are more reliable regarding timing and financing. Hence, interested citizens can take part in co-creating single NBS interventions.

NBS requiring hired experts for complex technical, legal, and administrative procedures and construction, (e.g. liability) have proved less prone to active citizen engagement. In these cases, citizens were informed about design plans, providing useful feed-back, i.e. NBS 1.

Project settings require investigation prior to co-design with citizens, e.g. ownership, building permits):

may support a strategic approach, build trust and support, avoid unnecessary effort and potential frustration. In case of contaminated sites it is advisable to check reliable implementation options e.g., project design, degree of contamination and relied restrictions like finances or time frame.

Co-design and co-implementation benefit from openness and flexibility during process phases, not always easy but necessary to master unforeseen situations. This requires creativity and energy from all persons involved.

Table 1 shows the five implemented NBS in the Living Lab Dortmund according to the participation planner matrix:

Table 1: Level of citizen engagement intensity by implemented NBS

| NBS | NBS title | Co-design | Co-implementation |
|-------|---------------------------|-------------|-------------------|
| NBS 1 | Movement Park | Consult | Inform |
| NBS 3 | Food Forest St. Urbanus | Empower | Empower |
| NBS 4 | Aquaponics | Inform | Inform |
| NBS 6 | Deusenberg Foot Path | Inform | Inform |
| NBS 8 | Pollinator Biodiversity | Inform | Inform |
| NBS 8 | Naturfelder Dortmund e.V. | Collaborate | Empower |

It is noteworthy to highlight significant results and lessons learnt of co-design, citizen engagement and activities for the implemented NBS:



NBS 1
Leisure activities and clean energy on former landfills

Movement park

Covid restrictions allowed only selected stakeholders representing future users of Huckarde residents to take part in two co-design meetings. Stakeholders discussed plans and provided valuable improvement suggestions that were incorporated. Overall, stakeholders felt the smaller size of the co-design group did not affect the quality of results. Since

its opening, the movement park has been intensely used, demonstrating the concept meets citizens' desires.

St. Urbanus Food Forest and Permaculture Orchard

The community engagement of creating the food forest has led to strong co-ownership, partly because it belongs to the parish garden. The church community garden and the food forest have gained wide interest among Huckarde residents, it is open to the public while its hidden location lowers the risk of vandalism.

Specific campaigns attract active engagement works: During the annual scout event "72-hour-action" in May 2019, the first five high-raise growing beds were constructed and planted. Covid-19 lockdowns and official social distancing rules led to inventive ideas when the scouts wished to be active during spring 2020: The Urbanisten created a learning youtube video showing how to prepare the ground and organized mini groups of 2 persons working in the garden.



NBS 3
Community-based urban farms and gardens



NBS 4
Aquaponics

Community managed aquaponics system Hansaponik

With a growing number of stakeholders involved, harmonization processes become more intense. Co-design with many stakeholders to sign the lease contract, design the aquaponics system, work out a licensable building approval plan and finally to construct the system. Each working step engaged a different set of stakeholders. Citizens

have been informed about the project via press, internet and during a Verti-Farm trade fair.

Deusenberg Foot Path

Citizens had asked local politics for an additional pedestrian connection to the Deusenberg. Experts supported the planning and implementation due to legal standards, thus limiting citizens co-designing/co-implementing. Soil excavations revealed high contamination levels, requiring intense expert exchanges. These experiences with soil quality will be relevant for the International Garden Exhibition Ruhr 2027, which will also realize projects near the Deusenberg.



NBS 6
Accessible green corridors



NBS 8
Pollinator biodiversity

Naturfelder Dortmund e.V.

Founding the citizen association coincided with Covid-19 lockdown in 2020. Therefore, first contacts took place online, hampering getting to know and build team spirit more difficult. Nevertheless, the group members from all over Dortmund sowed the first area just couple weeks after their first meeting. In May 2022, the group presented itself at a Dortmund public garden festival. Interested citizens were contacted via press, social media and the internet to found the association Naturfelder Dortmund e.V.

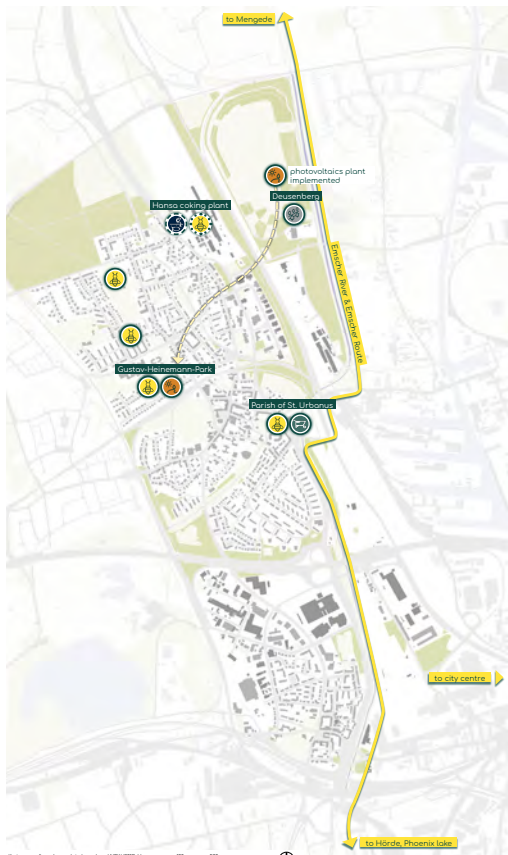
Living Lab results and outlook

Lage und Umsetzungsstand Huckarde Living Lab, Dortmund
 Status quo of Huckarde Living Lab, Dortmund
 Living Lab Plan | Living Lab Vision map

Update: 11/2022

- Ziel 1** Zur Stärkung des sozialen Zusammenhalts und der Identifizierung mit dem Stadtteil sollen in Huckarde neue Grüne Infrastrukturen entstehen und die Angebote an die Bevölkerung sich fürthenerisch zu betätigen, verbessert werden.
 Goal1: Strengthening social cohesion and local identity within Huckarde
- Ziel 2** Beteiligung der Bürgerinnen und Bürger bei der Planung und Unterhaltung von „grünen Projekten“.
 Goal2: Involving citizens in the design and management of projects with nature-based solutions
- Ziel 3** Beförderung von neuen Geschäftsmodellen, die auf der Idee einer natürlichen Kreislaufwirtschaft beruhen.
 Goal3: Promoting new professional and business models based on natural solutions of circular economy

| | |
|--|--|
| <p>NBS 1 - Sportanlage im Gustav-Heinemann-Park Ort: Gustav-Heinemann-Park, Dortmund-Huckarde Beschreibung: Öffentlich zugängliche Sportanlage, die Bürger sportliche Aktivitäten ermöglichen und die Umwelt durch Regenwasserbewirtschaftung verbessern soll. Partner: Stadt Dortmund, Amt für Stadtentwicklung Weitere Akteure: Grünflächenamt der Stadt Dortmund, Gustav-Heinemann-Gemeinschaft Huckarde e.V.</p> | <p>NBS 1 - Sports infrastructure within Gustav-Heinemann Park Location: Gustav-Heinemann-Park, Dortmund-Huckarde Description: Publicly accessible recreation element which offers citizens of different age groups to (re)discover nature and establish a health-promoting balance to predominantly sedentary activities in everyday life. Partners: City of Dortmund, Department of Urban Services Other stakeholders: City of Dortmund, Department of Green Spaces, Gustav-Heinemann-Schule, Huckarde Association</p> |
| <p>NBS 3 - Waldgarten in St. Urbanus Ort: Garten der St. Urbanus-Gemeinde, Dortmund-Huckarde Beschreibung: Auf einer Fläche von 2000m² ein Waldgarten in Huckarde entsteht, um die Biodiversität zu erhöhen und die Luftqualität zu verbessern. Partner: Fachhochschule Südwestfalen, die Urbanisten e.V. Weitere Akteure: Kath. Kirchengemeinde St. Urbanus</p> | <p>NBS 3 - Food Forest in St. Urbanus Location: Garden of St. Urbanus parish, Dortmund-Huckarde Description: A 1000m² food forest is well-sustained according to experts designed for food production in the St. Urbanus parish. The food forest of St. Urbanus has been built during consultation with the community and serves as an example of how gardens in the city can be designed in a sustainable and environmentally friendly way. Partners: South Westphalia University of Applied Sciences, die Urbanisten e.V. Other stakeholders: the parish of St. Urbanus (parish)</p> |
| <p>NBS 4 - Aquaponik Ort: Industriegebiet Huckarde Beschreibung: Auf einer Fläche des Industrieareals Kollent Hönig entsteht eine aquaponische Versuchsanlage, in der perennierende Fisch- und Pflanzenkultur in einem geschlossenen Kreislauf integriert sind. Partner: die Urbanisten e.V., Fachhochschule Südwestfalen, Aquaponik Hausdorf GmbH, CityGreenLab GmbH Weitere Akteure: Stiftung Industriemuseumsfrage und Geschichtskultur</p> | <p>NBS 4 - Aquaponics Location: Industrial area of Dortmund-Huckarde Description: On-site of the old Hönig building plant two greenhouses are built for scientific purposes (fish and vegetables) that will be produced in a circular system (aquaponics). The concept of aquaponics will be advanced technically in the ground to demonstrate sustainable production measures and address collaboration with local farmer groups of horticultural businesses that are engaged in the production food. Partners: die Urbanisten e.V., South Westphalia University of Applied Sciences, Aquaponik Hausdorf GmbH, CityGreenLab GmbH Other stakeholders: The Foundation for the Preservation of Industrial Monuments and Historical Culture (parish)</p> |
| <p>NBS 6 - Verbesserte Zugänglichkeit von Freizeitspuren Ort: Halle Düsseldorf, Dortmund-Huckarde Beschreibung: Seit der Erstellung des Barrierefrei 192 und der anschließenden Realisierung hat sich die ehemalige Kolonnenstraße in einem leichten Höhenunterschied entwickelt. Die Zugänglichkeit auf die Halle besteht aus mehreren kleinen Höhenunterschieden, die durch die Halle überbrückt werden können. Dieser neue Zugang soll die Halle für alle zugänglich machen und die Nutzung der Halle zu verbessern. Daher werden neue Wege und Wegeverbindungen im öffentlichen Hand geplant. Partner: Stadt Dortmund, Amt für Stadtentwicklung Weitere Akteure: Stadtplanung Dortmund GmbH (SDG GmbH, Sachverständigen, Umweltschutzamt)</p> | <p>NBS 6 - Accessible green corridors Location: Halle Düsseldorf, Dortmund-Huckarde Description: Since the closure of the site in 192 and its subsequent reclamation, the former Düsseldorf hall site has developed into a local recreation destination. The site is almost exclusively accessible from the east, which means that it is not well connected to the nearby residential area. For this reason, the city of Dortmund has decided to improve access to the Düsseldorf. Thereby, a barrier-free path connection has been built at the southern end of the site. Partners: City of Dortmund, Department of Urban Services Other stakeholders: Dortmund waste management company (SDG), Umweltschutzamt</p> |
| <p>NBS 8 - Biodiversität für Bestäubernekten Ort: an verschiedenen Orten in Dortmund-Huckarde Beschreibung: An drei Standorten der NBS 3 und NBS 4 sowie an mehreren Orten in Huckarde werden Flächen für Bestäubernekten eingerichtet. Die Standorte sind miteinander verbunden, so dass die Insekten von einem Standort zum nächsten fliegen können. Darüber hinaus profitieren auch die Menschen von der visuellen und ökologischen Aufwertung. Partner: Fachhochschule Südwestfalen, die Urbanisten e.V. Weitere Akteure: Stadt Dortmund, Grünflächenamt, NABU, Kirchengemeinden (St. Urbanus)</p> | <p>NBS 8 - Pollinator biodiversity Location: at several locations in Dortmund-Huckarde Description: At the sites of the NBS 3 and NBS 4 implementations and at several locations in Huckarde, pollinator-friendly plant beds are created. The sites are well connected to each other to naturally form a biodiversity pathway. This benefits both nature and people, as the insects can move easily between the different patches. Partners: South Westphalia University of Applied Sciences, die Urbanisten e.V. Other stakeholders: City of Dortmund, Department of Green Spaces, NABU environmental center (NABU), citizen association „Glockenhaus“</p> |



Naturbasierte Lösungen Nature-based solutions

- NBS 1** Freizeitaktivitäten und Produktion regenerativer Energien auf ehemaligen Hallen
Leisure activities and clean energy on former landfills
- NBS 3** Gemeinschaftsgärten und urbane Landwirtschaft
Community-based urban farms and gardens
- NBS 4** Aquaponik
Aquaponics
- NBS 6** Verbesserte Zugänglichkeit von Freizeitspuren
Accessible green corridors
- NBS 8** Biodiversität für Bestäubernekten
Pollinator biodiversity

Umsetzungsstand Implementation status

- umgesetzt / in Nutzung (solid circle)
- in Umsetzung (dashed circle)
- in Planung (dotted circle)

Legende legend

- Gebäude Wohngebiet Residential buildings
- Industrie / Gewerbebau Industrial or commercial use
- Grünflächen green spaces
- Wald forests
- Emscher Emscher River
- Emscherweg Emscher Route

Productive Green Infrastructure for post industrial urban regeneration (proGReg)
 Email: proGReg@stadt.de
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Figure 2: Living Lab map outlining NBS locations, implementation status and description

Achievements and lessons learnt

All five planned NBS could be implemented in the Dortmund Living Lab (fig. 2) despite financial constraints or political support in the preparation phase. Planning and implementing the NBS has been an inter- and transdisciplinary learning process during the five-year project, involving a large number of stakeholders. Open communication, creative support, patience and endurance helped to proceed. ProGReg activities in the Living Lab helped to create awareness about green issues and raise interest to get engaged. The NBS have considerable effect on active stakeholders. Achievements can be grouped as follows:

Improving the green infrastructure in Huckarde

- Inviting citizens to take part in gardening and biodiversity projects provides valuable information about the importance of green infrastructure. Engaged stakeholders in proGReg projects gain deeper insights

into green urban regeneration and transformation potential.

Social cohesion within NBS project groups

- Being part of a group following the same goal has strengthened social cohesion among the local community in Huckarde, e.g., St. Urbanus parish or actors meeting for the first time at the association Naturfelder Dortmund e.V. to create pollinator-friendly flower meadows. This may help to create stronger emotional bonds to the Huckarde district and enhances local identity.

ProGReg – a project with local vibrancy

- Huckarde citizens are key beneficiaries of proGReg activities. The implemented NBS improved the quality of living on the implementation sites and explored new green concepts. However, the proGReg NBS tend to be too small-scale to have notable effects on the local economy or being able to solve structural imbalances in Huckarde.

Maintenance of all implemented NBS is secured in the Living Lab Dortmund

beyond proGReg allowing for continuity a sustainability has been a major goal.

Lessons learnt can be grouped as follows:

Project preparation is time consuming

- All NBS started from scratch. Project partners underestimated the time for creating networks and finding suitable areas for NBS.
- Time consuming planning and approval procedures for construction projects (NBS 1,4,6). The construction projects finally started in 2022, delayed by around two years.
- Finding areas and then work out a biodiversity or urban gardening project with citizens in an open process was not successful. Several housing companies refused to provide land.
- Owners hesitate to offer sites for projects without concrete plans.

Projects on contaminated sites require extra time and finances

- additional planning and implementation actions to comply with legal requirements.
- The level of soil quality determines the amount of expertise required.

Incremental approach

- Aquaponics systems typically grow and distribute plants and fish. Due to the complicated approval process of building two greenhouses during the project time, the NBS will be developed step-by-step: 1) obtaining approval to grow plants tested for harmful substances, 2) applying to distribute plants, 3) applying to rear and sell fish.

Outlook

Project partners continue to work in the fields of aquaponics, urban gardening and urban renewal and can build on networks and knowledge gained during proGReg. Replication potential has been identified to extend networks regarding aquaponics systems at schools, new green corridors on contaminated sites in the South of the Living Lab (Hoesch Spundwand area), ground preparations to build a bridge between Hansa Coking Plant and the Deuseberg landfill.

Some NBS will gain national and international attention within future contexts and projects:

• **INCiTiS-Food (2023-2026) - international research project**

The aquaponics system will be further developed and operated through INCiTiS-Food. SWUAS and international partners will explore the potential of aquaponics as an alternative for small scale farmers to produce food in third world countries.

• **International Garden Exhibition Ruhr 2027 (IGA 2027): “How do we want to live tomorrow?”**

Hansa Coking Plant and Deuseberg will be key sites of the IGA 2027, thus integrating the aquaponics system. The footpath (NBS 6) will be part of the barrier-free access to Deuseberg. Also planned are several urban regeneration projects in Huckarde, Hansa coking plant and Deuseberg: upgrading green infrastructure in the urban structure, extending the path system around Deuseberg and creating new sports offers.



NBS 6 Green corridor connecting Huckarde with the Deuseberg



NBS 1 Movement park in Gustav-Heineman-Park in Huckarde



NBS 4 Aquaponics greenhouses on the former Hansa Coking Plant (c) M. Olbertz

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Living Lab Dortmund-Huckarde

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Partners



CITYBOTANICALS
URBAN GREEN INFRASTRUCTURE

Stadt Dortmund



die urbanisten

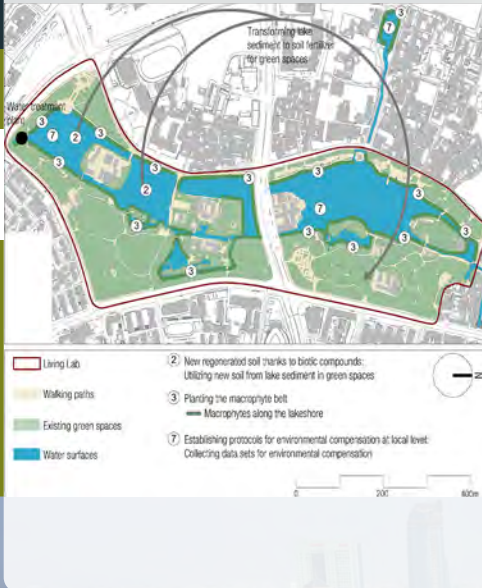
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Living Lab Ningbo



Deliverable 3.5 Implemented Living Lab in Ningbo, China



Vision, goals and management of the Living Lab



Moon Lake urban structure and aquatic plants

Vision for the Living Lab Moon Lake, Ningbo

Ningbo aims at high quality recreation areas and popular science/education base with increased sense of citizen and stakeholder co-ownership. To achieve environmental fairness by creating a multifunctional complex ecosystem, an ecological wetland purification system with continuous water circulation

Living Lab Ningbo overview

Ningbo is a sub-provincial city in the northeast Zhejiang Province, People's Republic of China, with prefecture-level city status. The city is a typical case of rapid urbanisation in the eastern coastal region of China, facing multiple challenges concerning green and blue areas, e.g. contamination, low quality and lack of green spaces due to construction and spread of grey infrastructure.

The Living Lab in Ningbo is located around Moon Lake and Moon Lake Street in the downtown area of Ningbo City, with an area of only 2.07 km². It has jurisdiction over seven communities, with a population of 25,750 people and a density of 12,440 inhabitants/km². In 2017, Ningbo City's overall green area amounted to 11.89 m²/inh., and the green area of Moon Lake Street about 11.5 m²/inh., which was lower than China's per capita park green area of 14.01 m²/inh. Therefore, Ningbo's green infrastructure system needs to be continuously strengthened.

Moon Lake is an urban lake located in a central urban tourist area with many hotels and

restaurants nearby. However, the lake water is polluted, requiring water quality purification urgently. Overall, the Moon Lake area offers many opportunities that may play a key role in transforming the area with successful NBS implementations. Key features of the Living Lab Moon Lake can be summarized as follows:

- Economy, population and buildings are concentrated in the eastern part of the urban Haishu District, while the west of Haishu District has lower economic activities;
- High population density and excessive tourism, entertainment and hotel facilities affect the living environment of local residents;
- Large population, resulting in insufficient capacity to provide specific medical services. A large number of migrant workers may cause social instability and security problems;
- Unevenly distributed green space: Western area with low population density has large green spaces;
- Noise and dust pollution caused by renovation of old buildings;
- Risk of typhoons, causing casualties, crops

- and large vegetation lodging.
- Poor air quality affects residents' health,
- Severe water pollution in some rivers and lakes and hot weather conditions due to climate change exacerbate blooms.

Challenges and Goals

Given the Moon Lake Street's challenges as mentioned above, some of the weaknesses and necessities have been turned into opportunities and used as strategic starting points for several NBS implementations. Planned NBS 2, which would have converted the lake sediment into soil fertilizer was cancelled due compounds of soil heavy metals and soil degradation.

The NBS implementations in the proGReg research project's Living Lab Moon Lake pursue the goal of addressing social, economic and urban problems. The Living Lab approach entails testing specific NBS in real life settings by involving stakeholders and citizens at an early stage in co-design and co-implementation processes (based on the quadruple helix approach). Aimed at boosting collaborative and long-lasting engagement including vulnerable and marginalised groups. Key beneficiaries are residents living around Moon Lake Park, disabled people, visitors and tourists.

Key challenge is to improve the water quality of Moon Lake. Therefore, the main water quality indicators are key factors to release the ecological comprehensive control project on the lake, seeking to reach IV class, and reaching

III class in the near future. During the project's duration, improving the self-purification ability of water bodies through ecological technology proved to be difficult. The project combines systematic and comprehensive ways to deal with the issue. The continuing technical output will require sufficient funds to support the official financial plan.

Severe Covid-19 pandemic restrictions in China and stakeholders' financial condition are critical factors that may hamper the benefit for the target groups.

Living Lab Management

Given the implemented NBS interventions in the Ningbo Living Lab (two of proGReg NBS) and the complexity and necessary expertise for specific NBS required the involvement of local stakeholders beyond the official proGReg local partners.

Following an initial plenary meeting involving all relevant stakeholders, Ningbo created three "boards" with the purpose of managing the planning activities within proGReg (fig. 1). Each group designated a specific proGReg partner as coordinator of each board's activities. To guarantee a shared planning process among the Living Lab local partners, the City of Ningbo (Forestry Bureau of Ningbo City) acted as coordinator. The core team managed the coordination and exchange activities across the project's phases. Three working groups took over different tasks. Enterprises were also introduced to the project cooperation.

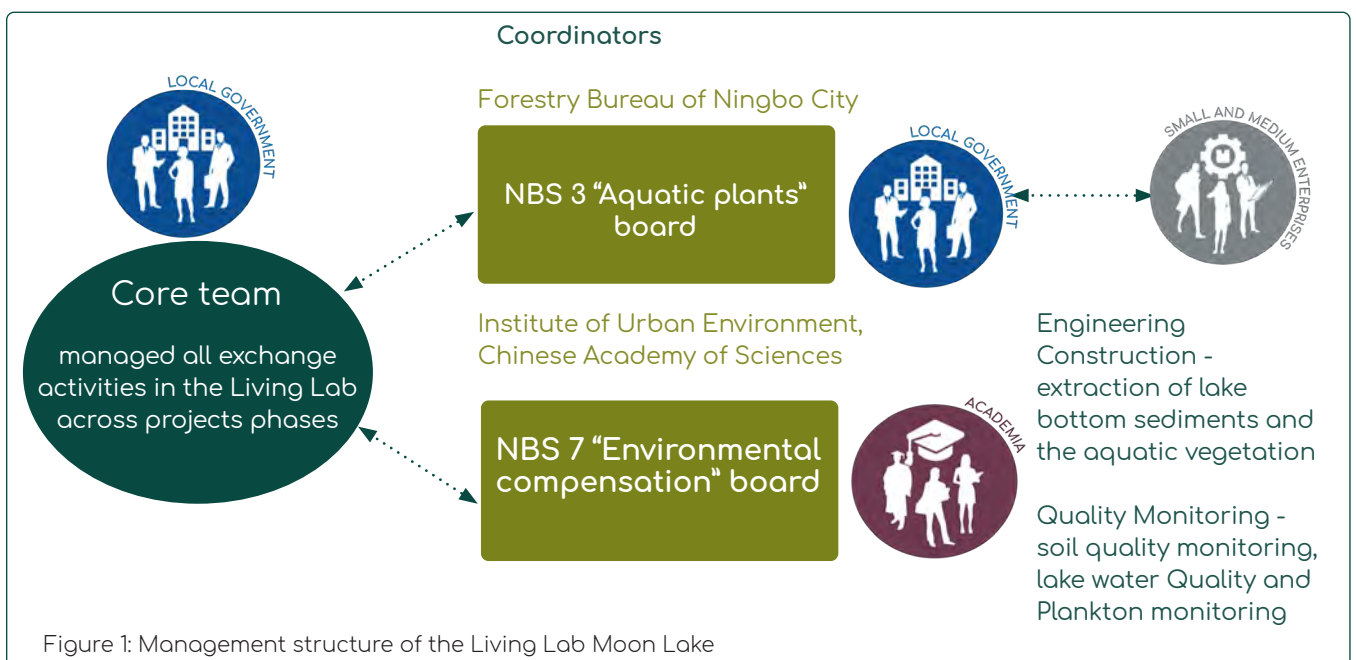


Figure 1: Management structure of the Living Lab Moon Lake

Co-design activities

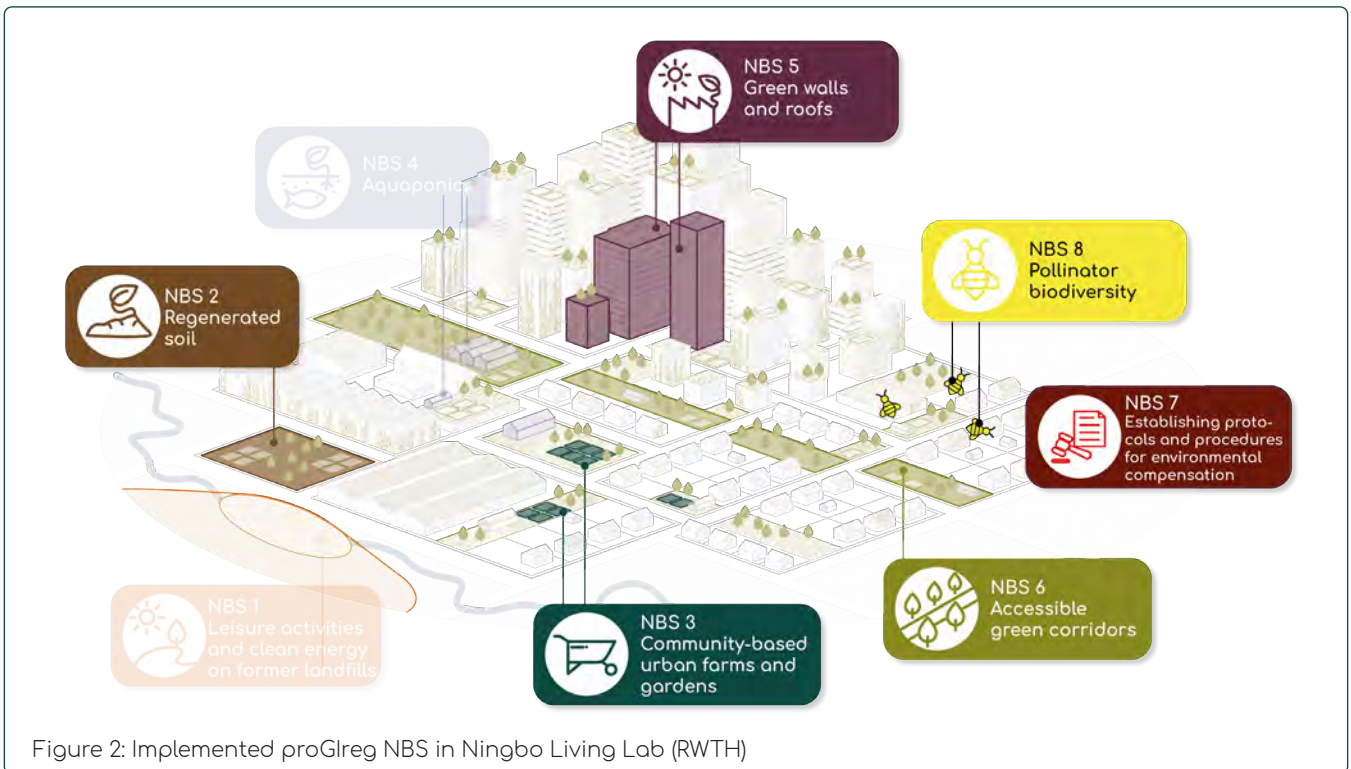


Figure 2: Implemented proGReg NBS in Ningbo Living Lab (RWTH)

The co-design activities together with the pre-implementation activities represented first and crucial steps in the Living Lab allowing to:

- Inform and involve stakeholders and citizens
- Resolve administrative barriers to start working operatively in the field

In most cases, the aim of the co-design process is to achieve the participants' buy-in of NBS to create identification and foster the development of finding ways to safeguard the NBS, social awareness and citizen ownership. Given each NBS implemented is context-specific, a flexible approach to matching context-based and technical issues is required. This is also reflected in the degree of engagement, varying from simple information to active participation in implementation and maintenance activities. Some common methodological features to describe the co-design approach are outlined in the following:

- Carrying out stakeholder mapping together with a social analysis of beneficiaries in order to better understand the social composition of the area and identify the residents living around Moon Lake Park and people who come to the park for tourism and disabled groups.
- Design and implementation of engagement

activities were carried out by field experts, stakeholder with sound experience and deep knowledge of the territory

- Producing documentation, i.e. guidelines, dissemination materials, event documentation to support and communicate the engagement process

Outcomes, challenges and lessons learnt

The Living Lab Ningbo initially envisaged to co-design and implement three different NBS. However, during the co-design process, it emerged that NBS 2 (Regenerating new soil from lake sediment) had to be cancelled due to the high content of heavy metals in the sediment, hence not allowing to be converted into new soil.

Ningbo implemented two NBS (fig. 2). NBS 3 addresses water pollution and enhance the Moon Lake as a recreational area. NBS 7 addresses new ways of continuing to improve green infrastructure management. The NBS implementation can serve as pilots to guide other projects and plans. During the project timeline, the Covid-19 pandemic hampered co-design activities greatly, goals changed due to partner and stakeholders' personal issues. Moreover, financial conditions also had critical effect.

Given the Chinese context, governance and cultural differences impacted co-design processes in particular. In addition, the Living Lab is not affected by post-industrial challenges but the central location exerts pressure on improving the urban environment for residents and tourists.



NBS 3
Community-based urban farms and gardens

It is necessary as a city to monitor and manage the urban greening with the joint government, residents and stakeholders. The purpose of co-design is to obtain environmental effects through long-term supervision and monitoring of the pilot area in the Living Lab Moon Lake, drawing the following conclusions:

Obtain basic information about the pilot area:

- The location of the Living Lab and the introduction of communities, green area, population and density.

Weaknesses and challenges in this area:

- Crowded streets around Moon Lake with many old residential quarters, old buildings, old streets, and old markets behind the high-rise buildings, with aging equipment and facilities and many remaining problems. With aging infrastructure, insufficient modern facilities, and difficulties in coordinating group interests. Some polluted water bodies with seasonal stench have appeared

Main obstacle in this area:

- Ecological and environmental restoration is difficult and costly. Since Moon Lake is located in the city centre, it is difficult to construct green foundations, thus restricting further development of Moon Lake's green infrastructure.

The NBS focused on collaboration between institutional stakeholders and private sector actors to address administrative procedures and protocols.



Establishing protocols and procedures for environmental compensation

NBS 7 stems from the Moon Lake Water Ecological Comprehensive Improvement Project.

Moon Lake forms the centre and heart of Ningbo city, being a landmark with a strong local identity attached to it. In order to cooperate with Tianyi Pavilion and Moon Lake to create a national tourism 5A-level scenic spot, there is urgent need to improve the water quality of Moon Lake and beautify Moon Lake Park to adapt it to the requirements of a 5A-level scenic spots.

Given Chinese governance structures, stakeholders from diverse backgrounds agreed that the development and governance of Moon Lake Park requires multi-party cooperation in the long run. However, participatory processes are not common in China and Chinese people are not accustomed to participatory co-design processes. Stakeholders are particularly reluctant to pro-bono participation in workshops without no or few economic benefits.

Living Lab results and outlook



Figure 3: Living Lab map outlining NBS implementation status in Ningbo

Achievements and lessons learnt

As a relatively developed city in eastern China, Ningbo takes the lead in urban construction and greening, notably in policies such as „Five Water Treatment“ in Zhejiang province and the construction of urban green infrastructure.

The rapid urban development over the last decades happened at the expense of the environment. Now the government, society, urban residents and stakeholders are paying more attention to the construction of urban green infrastructures, requiring the use of scientific methods to carry out a series of urban monitoring and management.

Major achievements and challenges of the Living Lab Ningbo are listed below:

NBS 3 - Planting aquatic plants along the shore of Moon Lake

In the Moon Lake Living Lab, planting aquatic plants along the lake was successfully implemented and contributed to beautifying the environment while purifying the water quality. Aquatic plants are being used to

re-nature a 5 km corridor surrounding the urban Moon lake Park in Ningbo. The aquatic plants (fig. 4) improve the water quality by reused water around the lake via water ecological restoration engineering measures. The measures of water ecological engineering



Figure 4: Plantations of aquatic plants around Moon Lake for water purification (c) IUE-CAS

to improve the water environment have been recognized by the government, and the urban lake management scheme is being vigorously promoted.

NBS 7 - Procedures for environmental compensation

Local environmental compensation procedures include ecological compensation measures of Moon Lake to purify the water quality. The implementation consisted of dredging at the bottom of the lake, planting aquatic plants, and finally judge whether the water quality standard is reached through the long-term series of water quality sampling, and carry out ecological environmental compensation according to the final standard. The implementation of environmental procedure compensation in Ningbo Moon lake provides a certain reference for the formulation of standards. In parallel, it enriches the diversity of environmental compensation methods. At present, the city of Ningbo has completed environmental compensation according to the assessment methods for improving water quality and the assessment methods for maintaining and cleaning Moon Lake.

This activity is based on the PPP (Public-Private Partnership) project of Moon Lake Water Ecological Comprehensive Improvement Project. In the field of public services, PPP means that the government adopts a competitive approach to select social capital with investment, operation and management capabilities. The two parties conclude a contract based on the principle of equal negotiation, and the social capital provides public services. The government pays compensation to the social capital based on the results of public services.

Outlook

The Zhejiang Provincial Party Committee Proposed the Introduction of the „Five Water Treatment“ to transform and upgrade the Water Management by friendly interest, preventing flood, draining flooded fields, guaranteeing water supply and emphasizing water conservation. The move will have important effect to moon lake water quality in the future, to improve the moon lake water quality, improve the comfortable degree of residents and life experience.

Water quality

Ningbo is continuing to monitor the implemented NBS 3 for improving the water quality of the man-made Moon Lake. Further Living Lab implementation will need to be contextualized within the existing implementation (aquatic filtering plants, fry fish, pumps for oxygenizing the water, water filter, new bamboo plantings) to support past and ongoing initiatives with complementary NBS 3 and NBS 7. The water ecological engineering measures to improve the water environment have been recognized by the government, and the urban lake management scheme is being vigorously promoted.

On the lake ecological comprehensive control project within one year after the completion of the main water quality indicators will reach IV class, reaching III class for two years. Water quality purification and ecological restoration projects will continue to remove pollutants in water bodies through moderate human intervention; improve self-purification ability of water bodies through ecological technology.



Aquatic plants on Moon Lake



Ningbo Living Lab

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Partners



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Living Lab Turin



CITTA' DI TORINO



- ▨ Laboratory for Nature based Solutions
- ▨ Wastelands
- ▨ Existing green spaces
- ▨ Buildings
- ▨ Waters
- ▨ Regional green corridor



0 2 km



Deliverable 3.5
Implemented Living Lab
Mirafiori Sud, Turin, Italy



NBS 3 - Orti Generali in Mirafiori Sud district

Vision, goals and management of the Living Lab



Mirafiori Sud district with Songone river

Vision for the Living Lab

Mirafiori Sud connected through nature! ProGReg contributing to revitalize a post-industrial district by experimenting with nature-based solutions (NBS) that are aligned with social needs and supported by local civic engagement.

Living Lab Turin overview

Turin is characterized by typical features of a post-industrial city that has turned from an (almost) exclusively industrial centre to an innovative city based on culture and services. Deindustrialisation of the core of the local industrial manufacturing sites has resulted in areas being emptied, disused or abandoned.

The Living Lab in Turin is located in Mirafiori Sud, a post-industrial district that witnessed remarkable growth during the 50s-60s thanks to the car industry (especially FCA). The industrial crisis in the 80s-90s led to the progressive population decline and ageing in Mirafiori Sud district, and the entire city of Turin. Mirafiori Sud is a suburb with poor quality urban environments (neglected green and grey infrastructures) and social issues such as social segregation, poverty and safety problems.

The Mirafiori district has weaknesses and great opportunities that can play a pivotal role in transforming the area with successful implementations of several NBS. Key features of the Living Lab can be summarized as follows:

- The district is characterized both by strong community bonds, however, growing worrisome dynamics are threatening this social cohesion;
- The presence of community foundations and citizen associations help to avoid further degradation of the social fabric at local level;
- Low population density and high degree of empty spaces left by the industrial downturn affects interactions, communication and connections among citizens, companies and associations.
- The district suffers from higher incidence of different diseases (compared to city level): in particular, cardio and respiratory diseases, chronic and mental stress. There is also a significant presence of single elderly people with psychic discomforts.
- Severe youth unemployment rate (over 50%) and generally low education levels.
- Low number of local businesses with the majority of the labour force employed in the service sector.
- Both low real estate values and high availability of empty accommodations could become a pull factor for attracting new citizens to the district.

Challenges and Goals

Given the district's challenges, some of the weaknesses and necessities have been turned into opportunities and used as strategic starting points for several NBS implementations. The NBS implementations in the Living Lab of the proGReg research project pursue the goal of addressing social, economic and urban problems. The Living Lab approach entails testing specific NBS in real life conditions by involving diverse stakeholders including citizens at an early stage in co-design and co-implementation processes (based on the quadruple helix approach), aimed at boosting collaborative and long-lasting engagement including vulnerable and marginalised groups.

ProGReg uses nature for renewal for regenerating green infrastructure and land accessibility by:

- Creating green corridors by connecting already-existing cycle paths,
- Turning empty buildings into green infrastructures, i.e. green roofs and walls
- Transforming brownfields into community gardens,
- Using regenerated soil (NBS 2 New Soil), to give new life to poor and non-fertile land;
- Experimenting with collective farming practices as a tool for urban regeneration and social inclusion in several NBS 3 interventions:
- Involving educational institutions and residents to experiment with horticultural practices,

- Designing, managing and maintaining green areas (green infrastructure) shared with local businesses, associations and citizens

The long-term objective is to disseminate and replicate these solutions and practices in other areas of Turin, national and international cities, identifying business models and transversal planning tools whose added value lies in the integrated and shared management of green infrastructure systems.

Living Lab Management

Given the high number of 17 implemented NBS in the Living Lab (out of eight proGReg NBS - fig. 1) and the complexity and necessary expertise for specific NBS required the involvement of a large number of local stakeholders beyond the official local proGReg partners. The initial plenary meeting with all relevant stakeholders revealed the need for creating three „boards“ with the purpose of managing the planning activities within proGReg. Each board designated a proGReg partner as coordinator of the board's activities.

To guarantee a shared planning process among local partners, a “core team” (“cabina di regia”) was formed with the City of Turin (European Funds and Innovation Dept.) acting as overall coordinator following a “variable geometry” principle, where local partners are invited to each meeting depending on the needs and issues to be discussed.

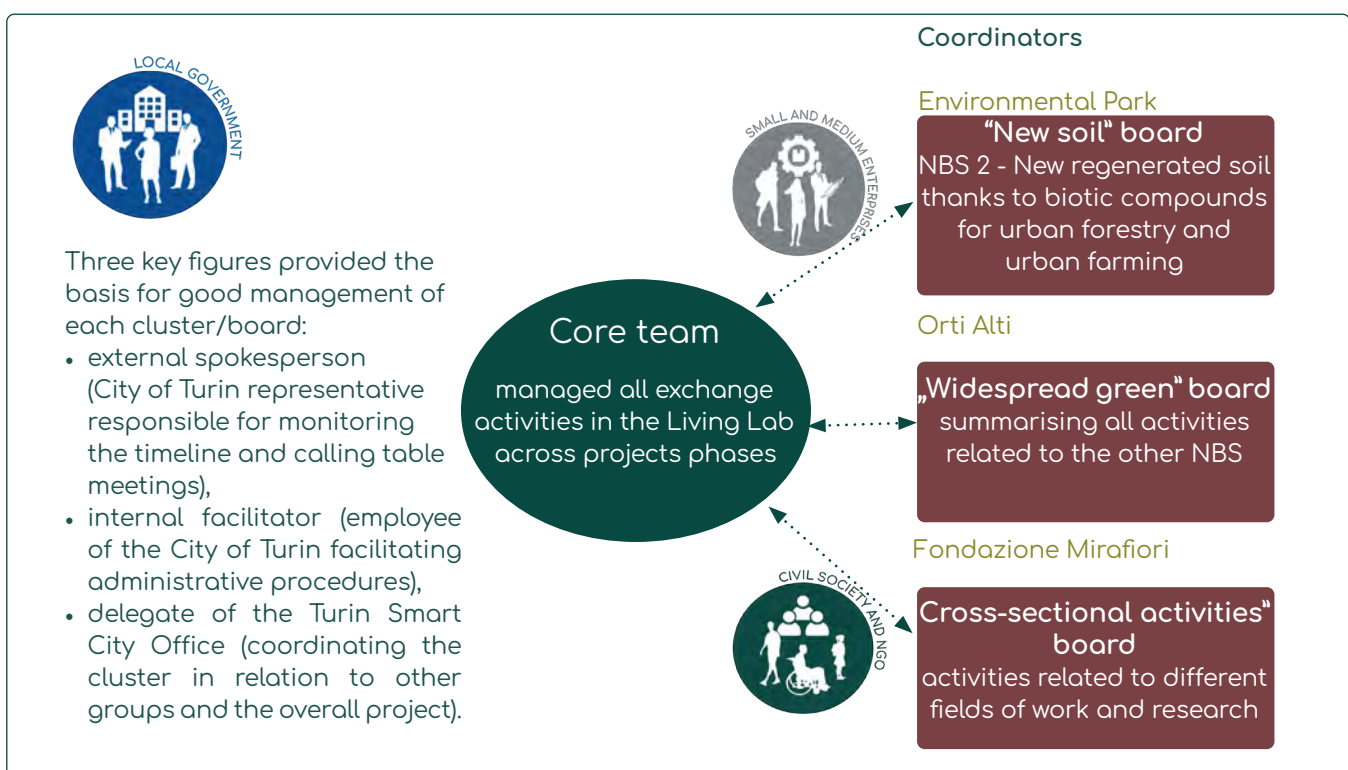
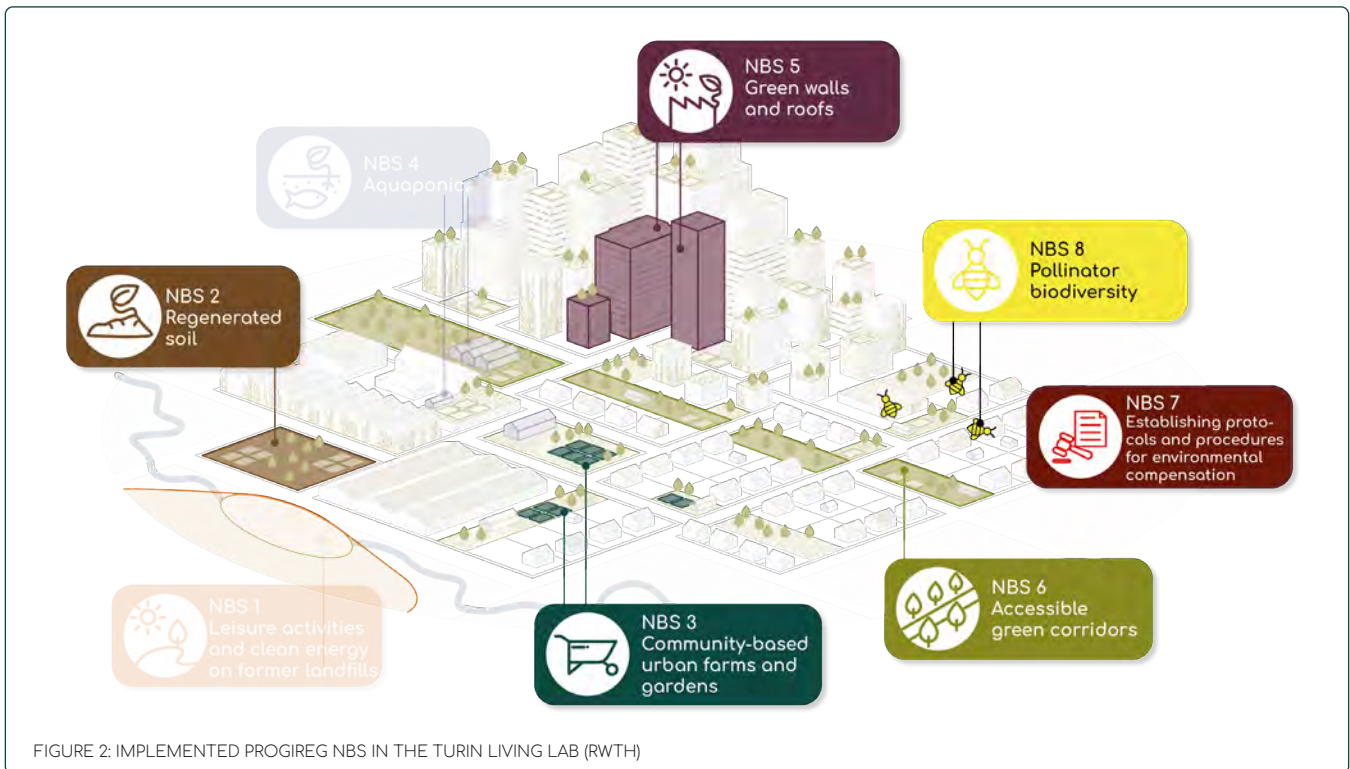


FIGURE 1: MANAGEMENT STRUCTURE IN THE LIVING LAB TURIN

Co-design activities



The co-design and pre-implementation activities represented first and crucial steps in the Living Lab allowing to:

- Inform and involve stakeholders and citizen
- Resolve administrative barriers to start working operatively in the field

In most cases, the aim of the co-design process is to achieve participant buy-in of NBS to create identification and foster the development of finding ways to safeguard the NBS, social awareness and citizen ownership. Given each NBS implemented is context-specific, a flexible approach to matching context-based and technical issues is required. This is also reflected in the degree of engagement varied from simple information to active participation in construction and maintenance. Common methodological steps of the co-design approach are outlined as follows:

- Stakeholder mapping together with social analysis of beneficiaries to better understand the social composition of the area and identify relevant target groups
- Design and implementation of engagement activities by field experts, stakeholders with sound experience and deep knowledge of the territory
- Documentation, i.e. guidelines, dissemination materials, event documentation to support and communicate the engagement process

The Living Lab Turin implemented **17 different NBS** (fig. 2 and 3). Major achievements and challenges across NBS are highlighted below:

- The active involvement of citizens in NBS activities is essential to make the installations ‘alive and useful’ and to avoid acts of vandalism – citizen co-ownership.
- The implementation of the community garden *Orti Generali* has attracted gardeners from different districts of Turin, thus bringing attention to an area that is usually underrated within the city of Turin.
- COVID-19 related restrictions caused severe delays by halting most co-design, implementation and maintenance activities. Despite this, the different NBS teams involved managed to find innovative ways to keep in contact with stakeholders and beneficiaries by organising and managing online activities.
- The co-implementation process faced numerous complex situations due to bureaucratic obstacles. ProGREG offered an opportunity to get a better understanding of how to deal with public procedures, thus innovating regulations with new agreement pacts that foster collaboration between the public and private sector.

Outcomes, challenges and lessons learnt

It is noteworthy to highlight some significant results and criticism of co-design and engagement activities for specific NBS:



NBS 2 Regenerated soil

For NBS New Soil, the co-design activities included building and running a technical implementation board and to formulate the composition of the new soil. In addition, analysing respective regulations on how to frame the request to the authorization bodies, and carry out all chemical analysis to support the decision.

Mirafiori Castle's ruins recovery and new planting

Co-design activities focused on ordinary and extraordinary maintenance works preparatory for the NBS set-up (information panel and the bulletin board). This generated a deep historical knowledge of the area, supporting the proper clearing of the ruins.

The gardeners involved in **NBS Orti Generali** cooperate to maintain the gardens, the kiosk and other common areas. This is strengthening civic engagement. Stakeholders benefit from training courses about organic agriculture, permaculture, pruning and composting. It also offers collateral activities linked to environmental topics such as apiculture, painting with dyeing plants, food preservation. Orti Generali aims at social inclusiveness: Establishing a differentiated charge system to ensure access to those who are economically disadvantaged. The NBS receive positive feedback from disadvantaged people engaged in horticultural activities and farmyard animals.

Didactic gardens in schools, Micro vegetable gardens and Green wall indoor at school

The NBS have been co-designed and co-implemented with teachers and pupils; deciding the layout of the garden boxes, e.g. number and dimensions of the containers, positioning of the boxes in the school premises, types of vegetables to be cultivated, involvement of families in the management of the gardens. Relatives participating in co-design workshops welcomed the approach and offered their availability to maintain the gardens.

Gardens around the houses

The project was initially co-designed through activities (cognitive mapping, collages) that allowed detecting participants' expectations and predispositions of urban horticulture activity.



NBS 3 Community-based urban farms and gardens



NBS 8 Pollinator biodiversity

The NBS implemented in the WOW space (**Pollinator friendly gardens and New green roof**) developed a community engagement process aimed at building a social community: from communication plan to event and social entertainment plan of the space, organization of training activities for the management group. The process ended with signing a formal collaboration

pact with the City administration to ensure long-term maintenance for the implemented NBS and the whole area around the WOW building.

Butterfly gardens for disadvantaged people developed the first Italian Citizen Science project. Citizen scientists were users of Mental Health Day Centres. Accompanied by staff of the zoology laboratory of DBIOS (UNITO), users set up a green area with food and nectar plants. In addition, the users have been engaged in regularly surveys of butterflies in the green area. Their active participation in project knowledge transfer and awareness raising is noteworthy ("Butterflies go to school").

Living Lab results and outlook



FIGURE 3: LIVING LAB MAP MIRAFIORI SUD, TURIN

Achievements and lessons learnt

ProGReg has contributed to achieving the goal of fostering the Living Lab's urban regeneration efforts by improving land accessibility and social inclusion in the Mirafiori Sud district while supporting innovative models of green economy.

The methodology developed in the Living Lab follows a broad green infrastructure approach based on the idea to carry out multiple NBS interventions of limited scale but wide-spread throughout the urban regeneration area, creating a green infrastructure network within the large and fragmented district (see Living Lab map for NBS interventions). The implemented strategy also pursues the activation of abandoned areas and spaces: small interventions serve as showcases to revive the interest of the community and politicians in the area.

The planning and co-design processes addressed the district's stark spatial east-west divide regarding differences in the socio-economic make-up and infrastructure distribution. This led to shifting the focus to the more neglected western part.

ProGReg has contributed to regenerating and transforming the Living Lab in the Mirafiori Sud district:

- by disseminating ideas and examples of good practice as seeds for future developments;
- by contributing to build a new and green identity of the district,
- by testing key innovation features in implementing NBS in urban context,
- by building strong partnerships and synergies with local key actors from public and private sectors as the basis for greater and lasting NBS benefits over time.

Further positive outcomes include strengthening education, e.g. in local schools, improved social inclusion and reinforcement of social links.

On the administrative level, proGReg activities have supported the establishment of a common goods regulations that is critical for specific NBS.

The following table provides an overview of how proGReg and the NBS implementations are supporting and impacting the Living Lab's transformation of its post-industrial legacy:

OVERVIEW OF CHALLENGES VS. ACHIEVEMENTS AND IMPACT OF NBS IMPLEMENTATIONS IN THE LIVING LAB TURIN

| Mirafiori weaknesses... | ...turned into opportunities | Impact of proGReg |
|---|--|-------------------|
| Strong community bonds but also dynamics threatening social cohesion. | Involving embedded community foundations and citizens' associations to facilitate communication between stakeholders while fostering inclusion of disadvantaged social groups (social housing inhabitants, people with disabilities) | High |
| A higher incidence of different diseases compared to city level (cardio and respiratory diseases, chronic and mental stress) and elderly with psychic discomforts. | Harnessing the existing assets such as the green belt running along the Sangone river district border, proGReg has contributed to creating quality green spaces and green corridors (community gardens, cycle paths etc.) | High |
| Severe youth unemployment rate (over 50%) and generally low education level. | Supported by community NGOs, educational training offers on urban gardening were stepped up in several sites incl. schools and community gardens | High |
| Low population density and high degree of empty post-industrial sites affects interactions, communication and connections among citizens, companies and associations. | Green corridors and tourist-oriented infrastructure as well green roofs and walls boost the liveability and thus the attractiveness of the area, given low real estate values and availability of accommodations | Medium to high |
| Low numbers of local businesses with the majority of the labour force employed in the service sector. | Supporting the creation of new entrepreneurship and new green jobs, e.g. green roof and wall or aquaponics professionals | Medium |

Outlook

Strong evidence of multiple NBS benefits generated by proGReg's Living Lab activities has fed the debate of an integrated urban planning approach with NBS and GI in the city of Turin.

The municipality's proGReg team has built strong and durable connections between partners, residents and institutions in order to guarantee the continuity of NBS implementations. Initiated good practices can be replicated in other parts of Turin and other cities: In fact, a second Living Lab in the northern part of Turin is currently under study.

Moreover, the city of Turin is building a strategy for the revitalization of abandoned areas and spaces: small but integrated interventions together with local partners and citizen engagement helped regaining community and politicians' interest.

For instance, the WOW building owned by the municipality was abandoned for many years

but has been transformed into a lively area now. Finalising this intervention will require significant resources. However, proGReg has initiated first and crucial steps for its transformation.

ProGReg has already served as an attractor of additional resources and urban development projects in the Living Lab area. The results of proGReg, both in terms of approach (Living Lab) and NBS centred projects are being replicated in other Horizon 2020 European funded projects under the research and innovation programme in Turin:

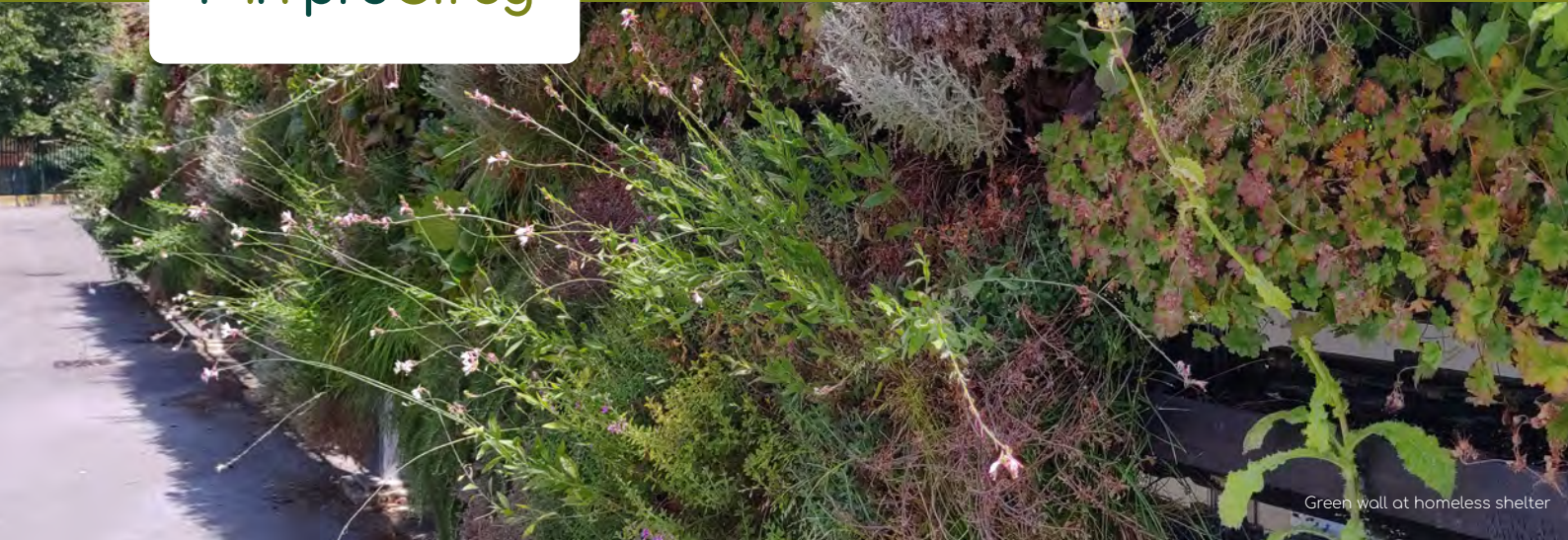
> [CONEXUS](#) (Co-Producing Nature-Based Solutions And Restored Ecosystems: Transdisciplinary Nexus For Urban Sustainability)

> [FUSILLI](#) (Fostering the Urban food System Transformation through Innovative Living Labs Implementation)

In addition, elaborating urban green plans ([Green Infrastructure plan](#) - in Italian).



Living Lab Turin



Green wall at homeless shelter



Turin Living Lab

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Living Lab Zagreb



GRAD
ZAGREB

Deliverable 3.5
Implemented Living Lab
in Zagreb, Croatia



Living Lab Sesvete with Info Point and former Sjieme meat factory

Vision, goals and management of the Living Lab



Mirafiori Sud district with Songone river

Vision for the Living Lab Zagreb-Sesvete

Living Lab Sesvete in Zagreb utilizes nature-based solutions (NBS) to gently reclaim the area of the Sljeme former meat factory, using it as a platform for social inclusion

Living Lab Zagreb-Sesvete overview

The Sesvete city district is located on Zagreb's east administrative border, being the largest district covering approximately 165 square kilometers. Sesvete has witnessed the highest population development due to immigration and natural growth, being on average the youngest community in Zagreb. The community is rather traditional, very tightly connected with an entrepreneurial mind-set. The north part of Sesvete is situated on the foothill of the Medvednica mountain, the river Sava plain forms the southern border. The central district center area is crossed by roads and rail connecting Zagreb to the east of Croatia.

Due to Sesvete's rapid growth and urban sprawl over the past decades, it never developed a clear urban form and identity. In recent years, activities of the local NGO ZIPS supported by experts from the Zagreb University Faculty of Architecture have fostered an urban consciousness among the local community, demanding a new urban identity and dignity including:

- quality public and green urban spaces,
- a main square,
- better public facilities,
- an efficient road network, bike lanes, a secure crossing of the railway,
- new space for the music school,
- a hub with spaces for small spin-off firms, fablabs and maker culture.

The study "The Green and Blue Sesvete" (2016) articulated these aspirations. A group of local citizens of varied backgrounds conducted an analysis of the strengths, weaknesses, opportunities and threats (SWOT) for the Sesvete district. This helped to focus the dialogue and planning propositions for NBS.

Challenges and Goals

Due to the young population, Sesvete is a growing community offering development opportunities. However, the district's growth potential is hindered by two key spatial factors:

- the railway dividing Sesvete into two parts,
- Sesvete's geometric centre is dominated by former industry and a business zone with insufficient public facilities and space.

Thorough urban transformation with high level of public involvement requires lengthy procedures. The EU funded proGReg research project aims at resilience to increasing climate change effects through urban regeneration addressing the environment, economy, and society. This represents an over-arching and cross-cutting challenge to develop integrated nature-based solutions (NBS) in Sesvete. The proGReg Living Lab provides first steps in the process of reclaiming and regenerating the formerly inaccessible industrial land: Using small-scale green infrastructure interventions that support community cohesion and inclusion of most vulnerable members.

The goal of NBS interventions for inclusive urban regeneration on the former industry site of "Sljeme" was to develop nature-based proposals for:

- principles and architectural solutions for regenerating the deprived and abandoned post-industrial area.
- public spaces promoting urban activity, social cohesion and increase safety.
- Recreation areas to promote healthy and sustainable lifestyles.
- Define useful inter-generational spaces
- Develop area programming and planning to promote public and private investment with the aim of creating urban character and identity
- Develop FabLab and entrepreneurial

programs for teenagers (HUB) to promote innovation and a new business culture.

Living Lab management

The City of Zagreb - Office for Economy, Environmental Sustainability and Strategic Planning of Zagreb is the coordinator (fig. 1). Other local partners include Green and Blue Sesvete (local NGO with wide outreach in the community), City of Zagreb Bureau for Physical Planning and Zagreb Faculty of Architecture. The private venture "Komfor Klima Grupa" (KKG) meant to implement green walls, roof and aquaponic system in the HUB_S building in the Living Lab's Northwest but plans had to be abandoned. The sub-contracted company Vesela motika (Happy Shovel) replaced KKG to create a modular urban container farm combining green walls and roof technologies with aquaponics.

The city-owned day-care center for children with multiple disabilities "Mali dom" enables users to regularly work and stay in the calming environment of the therapeutic garden (fig.1). The Living Lab co-design and implementation focused on four NBS (fig. 2): community-based urban gardens (NBS 3), aquaponics (NBS 4) and green roofs and walls (NBS 5), reusing derelict land for the new green corridors (NBS 6), and introducing low-carbon guidelines into new strategic documents (NBS 7).

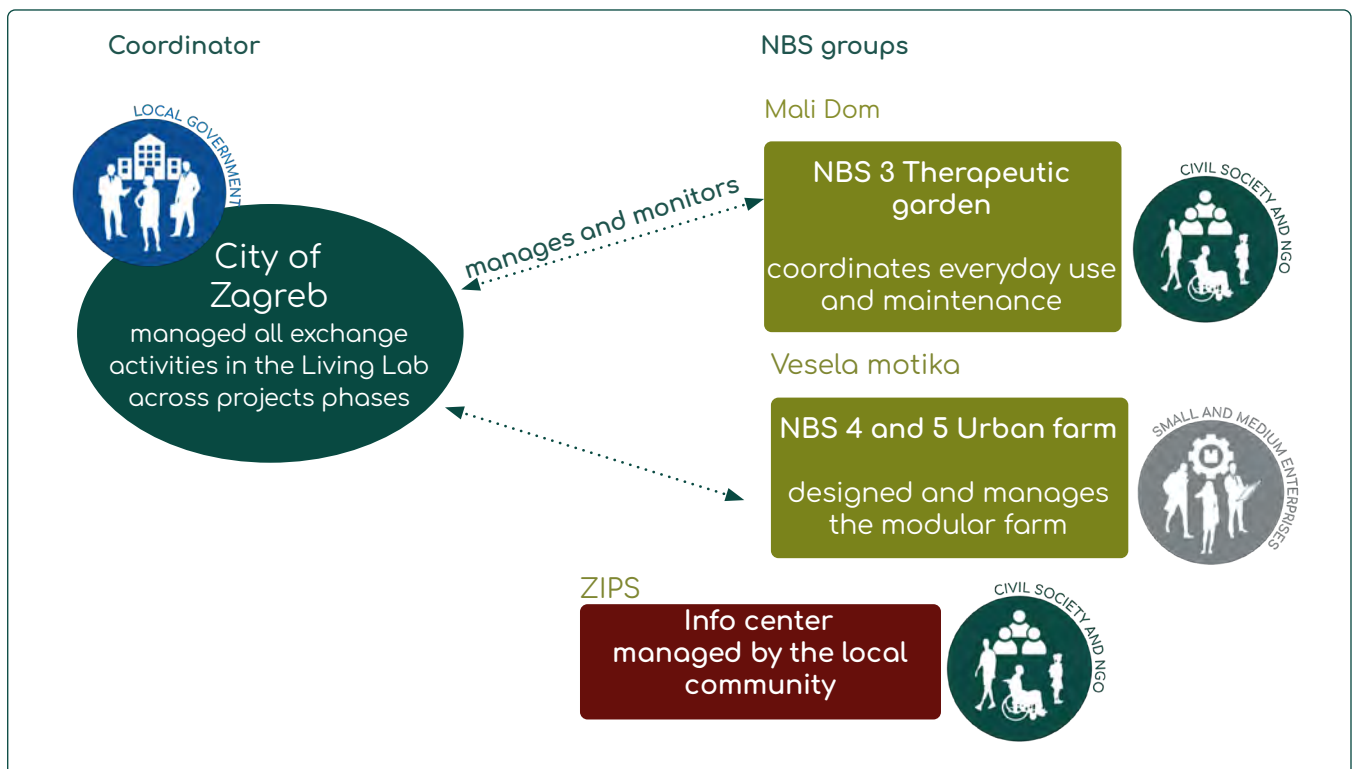
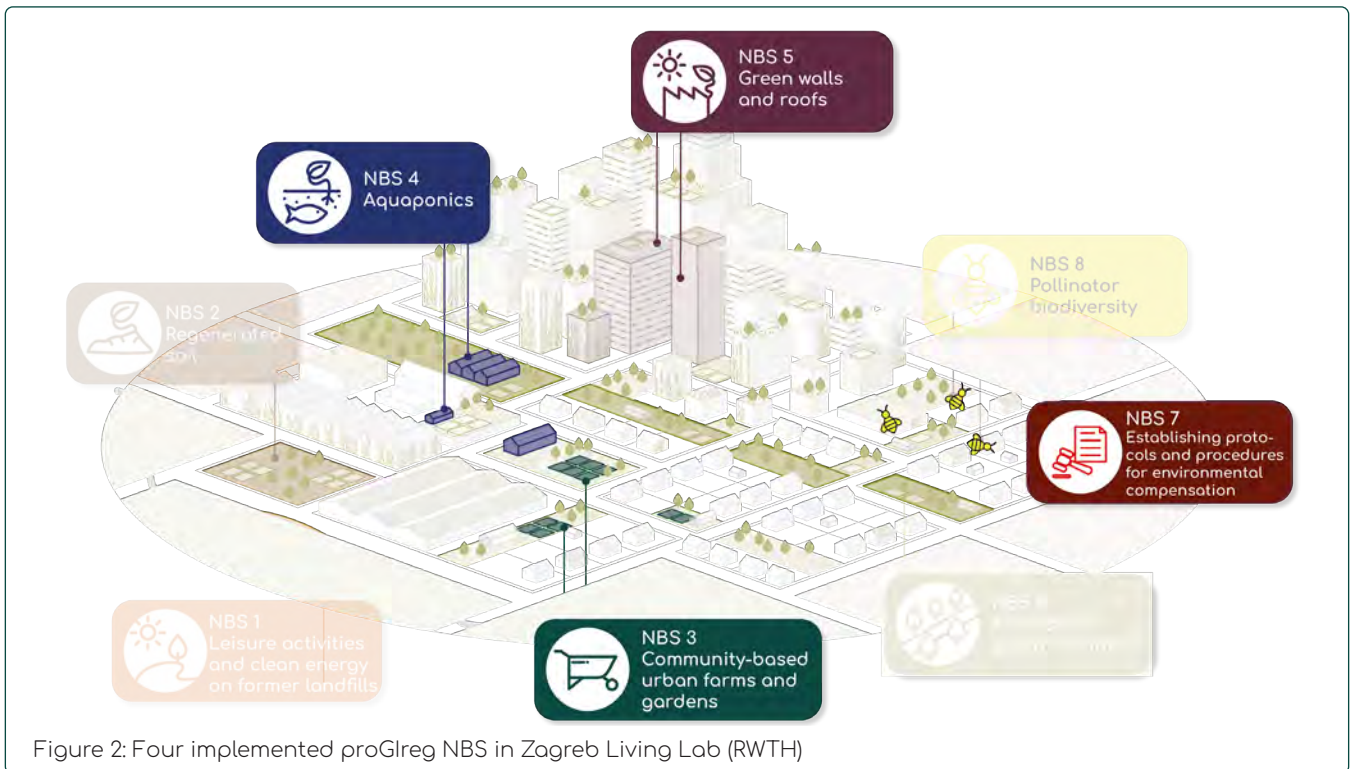


Figure 1: Living Lab management structure

Co-design activities



The co-design process included a number of workshops organized at the Info centre at the heart of the Sesvete Living Lab. The building was refurbished very early on in the project and is increasingly becoming a central meeting place for the district. Additionally, it is developing into an attractive hotspot for Sesvete's young population and entrepreneurial community. The local proGReg partners are keen to engage these groups in future activities. The Info center also serves as a meeting point for proGReg partner co-design and replication workshops.

Outcomes, challenges and lessons learnt

From the start, consistently involving local stakeholders was important to ensure users and local residents accept and embrace the new NBS. Co-design processes proved useful for successful implementation while acting as a catalyst to detect underlying problems and risks.

- Local NGO Green and Blue Sesvete (ZIPS) played a crucial role in this process based on its strong and active ties to the local community, engaging the local population in the decision-making process.
- On project management level, partner ICLEI encouraged co-design and co-creation providing a structured framework for involving citizens.

- Local partners extended this by inviting all relevant institutions to discuss the programme for the therapeutic garden and other NBS demonstration projects.

As part of proGReg, the local NGO ZIPS initiated and implemented several local activities from 2019 to 2021:

- Planting 550 different tree and shrub saplings in cooperation with c. 250 citizens (mostly parents with children and members of various sports organisations to increase biodiversity (fig. 4+5).
- ZIPS attracted financial donations from companies and organizations contributing material or work. The Croatian forestry department and a local radio station donated the trees.
- Changing locals' perception of the neglected South of the district. ProGReg contributes to moving the centre of Sesvete closer to the south while connecting different areas via NBS.
- Cloning two centuries-old linden trees from the north of Sesvete. Around hundred saplings will be grown and distributed to citizens and various institutions to preserve the gene pool of trees and to point to the importance of genetic diversity.

NBS 3
Community-based urban farms and gardens

Therapeutic garden

The codesign approach proved critical for designing the therapeutic garden. The City of Zagreb invited stakeholders identified during the stakeholder mapping process to discuss user requirements. The therapists proved crucial in planning the garden and responding to the special needs of its users.

Modular Urban Farm
Combines green walls and roofs technologies and aquaponics in a modular container. It meets its energy needs by solar panels or classic electricity. The green wall and roof significantly reduce the sensitivity of the assembly to atmospheric conditions by isolating the inside from temperature extremes while containing excess rainwater through green roof technology. In the process, several roof and wall plant species were tested for Zagreb climate to be recommended for wider use.

NBS 4
Aquaponics

NBS 5
Green walls and roofs

NBS 6
Accessible green corridors

ZIPS has organized a number of waste removal activities in public spaces from 2018 to 2022: Transforming a construction material dump into a 12,000 m² landscaped urban area. Citizens and local companies removed c. 500 m³ of discarded concrete, municipal and bulky waste, and invasive vegetation. The remaining vegetation was kept according to the model of assisted natural regeneration. Different flower species were seeded for pollinators. In autumn 2022, flowering trees and shrubs are planted on the western border of Sesvete to benefit citizens and to create green infrastructure stepping stones for future interventions.



Figure 3 and 4: Tree planting activity



Proposing guidelines for decarbonisation on city level
The guidelines developed for this NBS propose new procedures for development and adoption of spatial plans through early participatory processes involving citizens, and foster energy transition to decarbonisation, use of sustainable materials and circular economy, renewable energy sources, green infrastructure, sustainable water management, nature-based solutions, and re-naturalisation of urban centres.

NBS 7
Establishing protocols and procedures for environmental compensation

Living Lab results and outlook

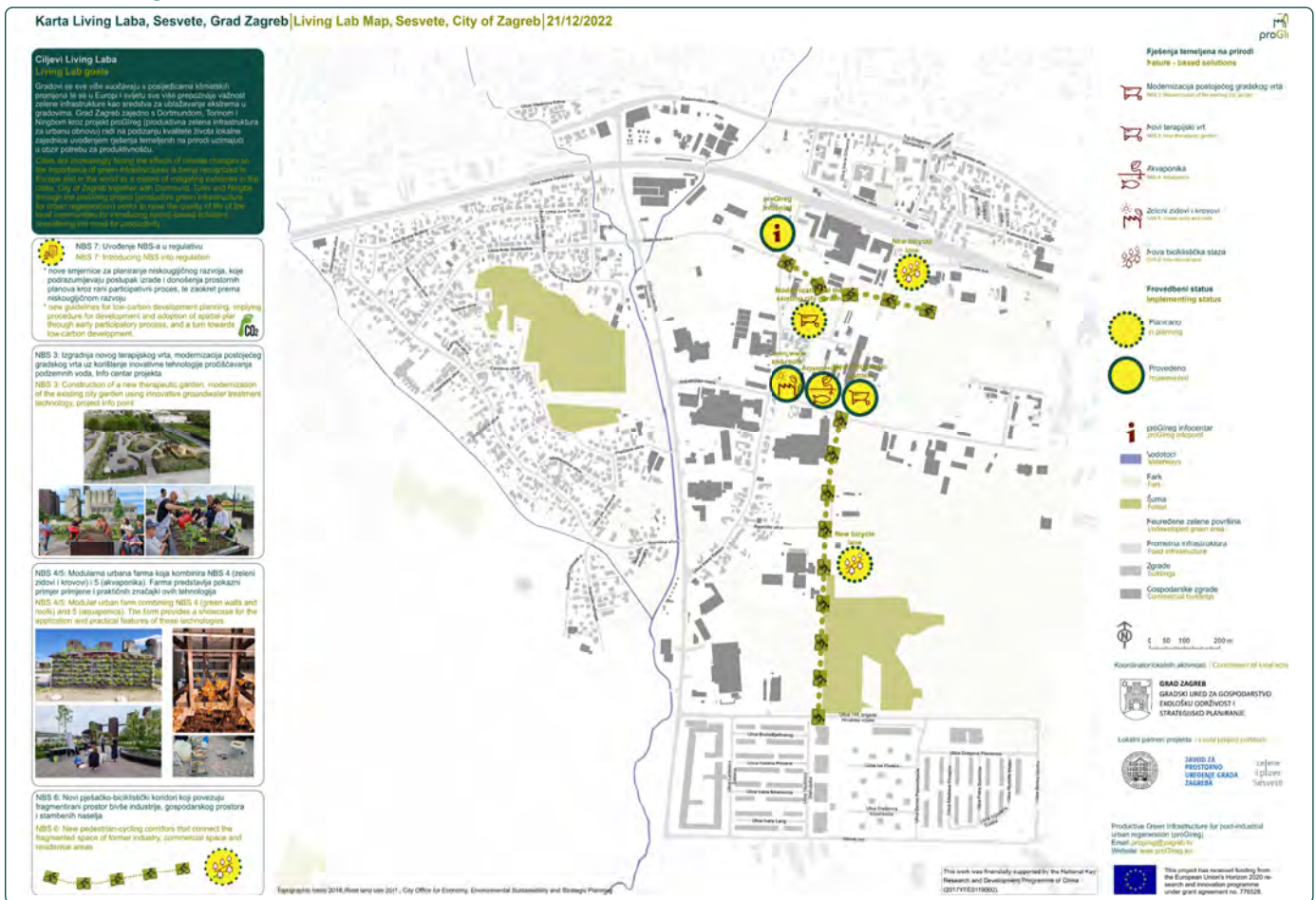


Figure 5: Living Lab map outlining NBS locations, implementation status and NBS descriptions

Achievements and lessons learnt

The co-design approach has been crucial in the successful implementation of the Living Lab NBS interventions. The NBS implementation of NBS 3 - Community urban gardens provide plenty of benefits in Sesevete district, in particular social shifts:

- Greater inclusion of vulnerable groups into society
- Responding to demands for offering people with disabilities the opportunity to engage in gardening activities
- The therapeutic garden can be seen as the most successful NBS. It improves the well-being of users with physical and mental abilities by providing accessible and serene spaces for social interaction and contemplation. It has connected several care institutions to bring people with disabilities to the garden.

NBS 4 and 5 achieve greater resource efficiency and create economic value:

- The existing urban garden is in the

process of modernisation by installing an improved water distribution network and a solar purification device rendering the slightly contaminated groundwater with spores into potable water.

- Detailed analysis prior to the installation of the aquaponic system resulted in a realistic business model that could be



Figure 6: Green wall as part of the modular urban farm

appealing to local people. The installed container modular urban farm provides a showcase for the application and practical features of these technologies.

NBS 7 - Establishing protocols and procedure for environmental compensation represents a key project outcome:

- Proposal of guidelines for low-carbon development planning, created in accordance with European green policies. The proposed guidelines and new direction considers risk assessment and management, and solutions for mitigating climatic extreme effects and natural disasters (floods, extreme precipitation and droughts etc.). Starting point is the transition from grey to green infrastructure in spatial planning and the protection of natural resources in early trans-disciplinary processes.

A number of external reasons (i.e. damages by the earthquake in 2020, land ownership issues) and procedural reasons led to delays and cancellations of original plans for planned NBS implementations (NBS 4 and 5, NBS 6). This required several modifications, however, flexibility to change the NBS design was an important driver for the success of local activities. NBS 6, bike and walking path connecting the district with the former meat factory and other parts of Sesvete changed. An alternative path is undergoing final procedural steps (NBS 6 - Green corridor):

- The first section of the cycling route connecting the centre of Sesvete to the north was built along the Vuger stream prior to the proGReg project. The next phase of the route continues south along the newly planned street No. 6, connecting the Living Lab with the housing development south of Sesvete built on the site of the former pig farm (part of the meat industry complex). Implementation was not feasible during the project timeline. The alternative cycling track runs in east-west direction along the road crossing the Living Lab.
- The original modular urban farm (NBS 4 and 5) planned at the HUB building had to be cancelled due to procedural and financial difficulties. It aimed to provide a venue for young innovators and entrepreneurs

from Sesvete while showcasing green wall and roof technology and aquaponics on the roof. However, the lead partner and local food tech company Vesela motika conceived an alternative modular urban farm solution that combines technologies in a small-scale intervention.

Outlook

The conversion of the abandoned industrial facilities in Sesvete (Sljeme and Badel) has started a wider urban regeneration process of Sesvete to provide productive green spaces and creating a contemporary identity. Empty silos and interesting industrial buildings are planned to be reconstructed and reused, turning industrial plants into mixed use areas (housing, commercial activity, hospitality, work, recreation etc.).

The guidelines (NBS 7) promoting early participatory processes and green infrastructure transition is included in the proposal for the Decision on amendments to the Sesvete Master plan, which is currently in process of public consultation, expected to be adopted by early 2023.

Hence, Sesvete can serve as a living laboratory for advanced technology solutions in tackling numerous challenges based on urban plans for environmental protection and sustainable development. This includes traffic solutions, housing, economic zones, agriculture, energy production, waste management centres, water purifiers, recreation zones tailored to the community. This approach should generate educational, cultural and development interest of the wider community, to be a model for Zagreb and Croatia.



Living Lab Zagreb, Croatia



Urban gardens next to the former meat processing factory Slieme (c) City of Zagreb



Zagreb Living Lab

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📘 [proG!reg: Nature for Renewal](https://www.facebook.com/proG!reg)

📷 [#proG!reg](https://www.instagram.com/proG!reg)

📺 [proG!reg: Nature for Renewal](https://www.youtube.com/channel/UC...)

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Sesvete



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Living Lab Dortmund, Germany

NBS description

At the site of a former brick manufacture, a four hectare public park was designed and realized in the 1980's. It is located within Huckarde settlement and comprises large green areas and old trees. Except for benches and a playground for toddlers, the park offered few incentives for recreational activities.

Various movement devices have been installed at three areas close to main paths of the park. Their red poles gain attention from afar and are intended to invite park visitors to spend time while improving physical fitness playfully.

Aims & goals

The installation of movement park has been realized to upgrade the green area, and to invite visitors to achieve, improve, and sustain physical fitness in daily life.

The overall idea is to offer devices that stimulate physical exercises as health prevention and as an adjustment to mainly sedentary activities during daily routine. The periods of Covid-19 lockdowns highlighted the great value of providing a movement park located in the neighbourhood for users of all ages in the outdoors. The chosen movement devices are easy to use, ranging from low to high difficulty levels.

Target groups (beneficiaries)

The public movement park is open to all citizens of Huckarde and other neighbourhoods.

- Main target group are adults who use the park
- Joggers who can integrate exercises into their training
- Pupils of the adjacent Gustav-Heinemann-School during sports classes

Main responsible partner

City of Dortmund, Department of Urban Renewal (lead) in cooperation with the Department of Green Spaces (planning, project control, maintenance).

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Area of implementation

Eastern part of Gustav-Heinemann-Park in Dortmund-Huckarde
GPS coordinates: 51,53279, 7,40902

ProGireg partners involved

City of Dortmund, Department of Urban Renewal

Other stakeholders involved

- Citizens of the adjacent neighborhoods
- Huckarde sport clubs
- Umbrella association of Huckarde clubs
- Gustav-Heinemann-School
- Local politicians of Dortmund-Huckarde
- Realization: landscape gardener & FHS (devices construction company)

Implementation budget

Total implementation budget: 145.000 €

proGireg funding: 120.000 €
proGireg overhead funding: 25.000 €

Timeframe

Start
January 2020



Completion
October 2020

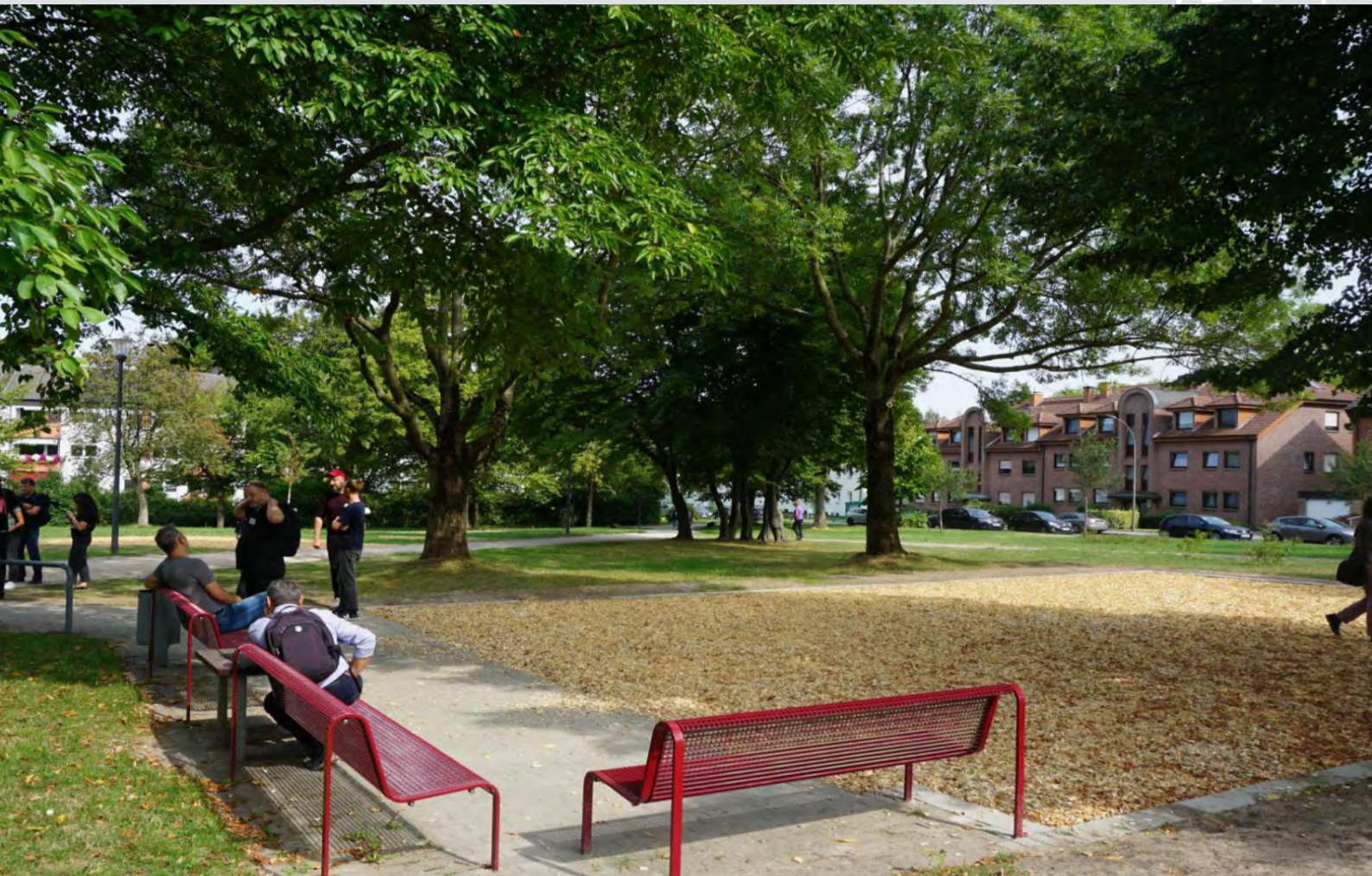


Living Lab Dortmund Huckarde, Germany



Renaturing landfill sites for leisure use and energy production

Exercise Park in Huckarde



Exercise Park in Huckarde

At the site of a former brick factory, Gustav-Heinemann-Park, a four hectare public park in Dortmund-Huckarde was built in the 1980's. Despite large green areas and mature trees, the park offered few incentives and attractions for Huckarde residents to spend time there. The park is managed and maintained by the City of Dortmund, Department of Green Spaces.

The NBS implementation comprises three areas with various sports devices next to the main paths, inviting park users of all ages to leave the park's paths and spend time. The choice of devices ranges from easy to challenging and support coordination and balancing skills:

- trampolines
- slack line
- balancing wooden bar
- rocking plates
- balancing parcours

Aim & goals

The installation of movement park aims at increasing the quality of the green areas and to

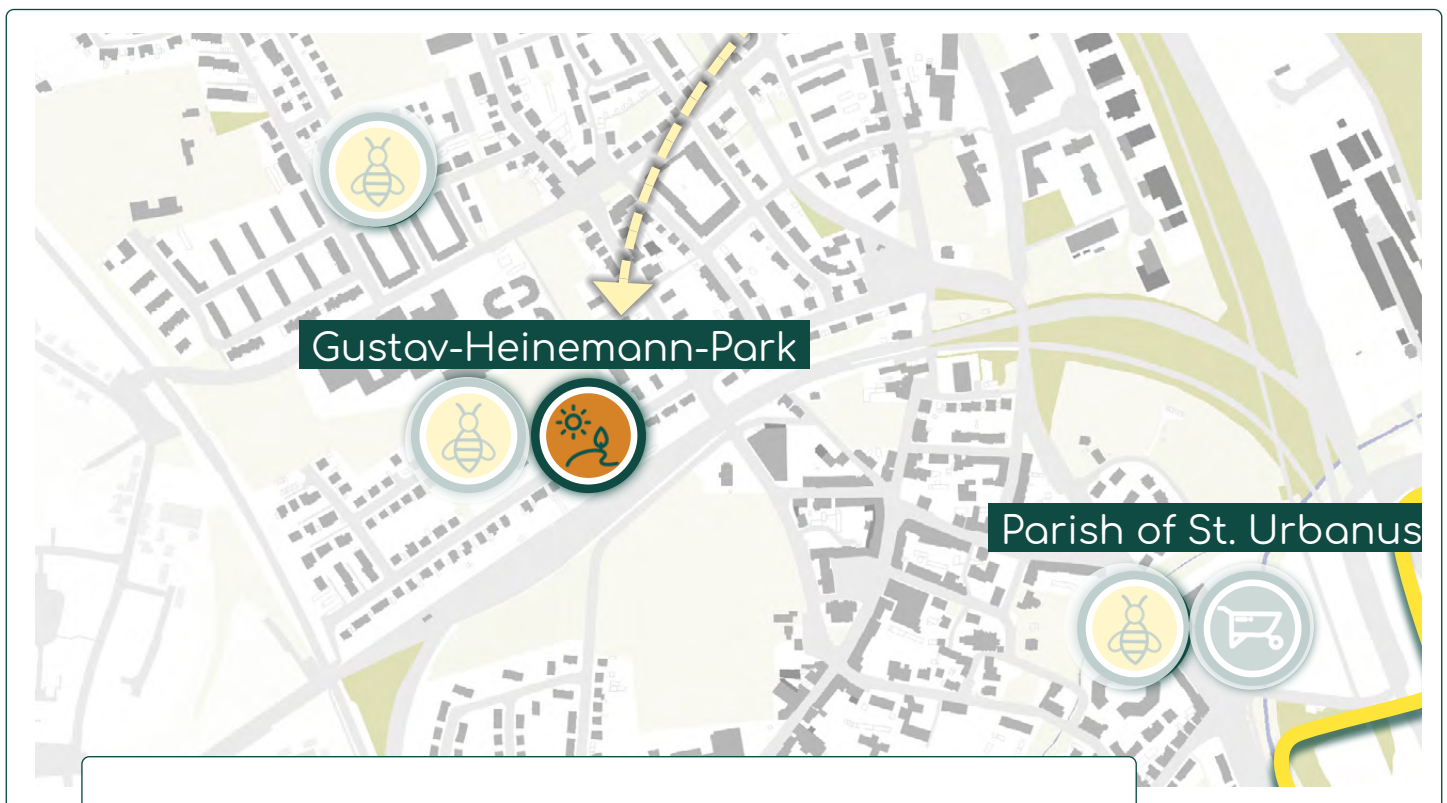
invite park visitors to achieve, improve, and sustain physical fitness in everyday life. The overall idea is to offer devices that:

- stimulate physical exercises as health prevention and as a balance to mainly sedentary activities during daily routine. The period of Covid-19 lockdowns highlighted the great value of such a public movement park located within the settlement for local residents.
- offer citizens of adjacent neighborhoods movement devices that are easy to use for a range of different users according to individual fitness levels.
- provide an area for the adjacent school to use the devices during sport classes.

The overarching goal of the NBS intervention is to enhance the image and increase popularity of Gustav-Heinemann-Park while offering attractive green spaces with recreational value and for social interaction to enjoy time with others.

Area of implementation

Eastern part of Gustav-Heinemann-Park in the Dortmund Huckarde district.

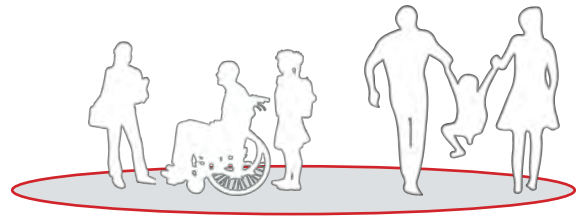


GPS coordinates: 51,53279, 7,40902

Target groups (beneficiaries)

The public movement park is open to all citizens who would like to use the devices.

- Main target group are park users of all ages
- Joggers who can integrate exercises into their training
- Pupils of the adjacent Gustav-Heinemann-School during sports classes



Stakeholder constellations

Main responsible partner

City of Dortmund, Department of Urban Renewal (lead) in cooperation with the Department of Green Spaces (planning, project control, maintenance).

ProGReg partners involved

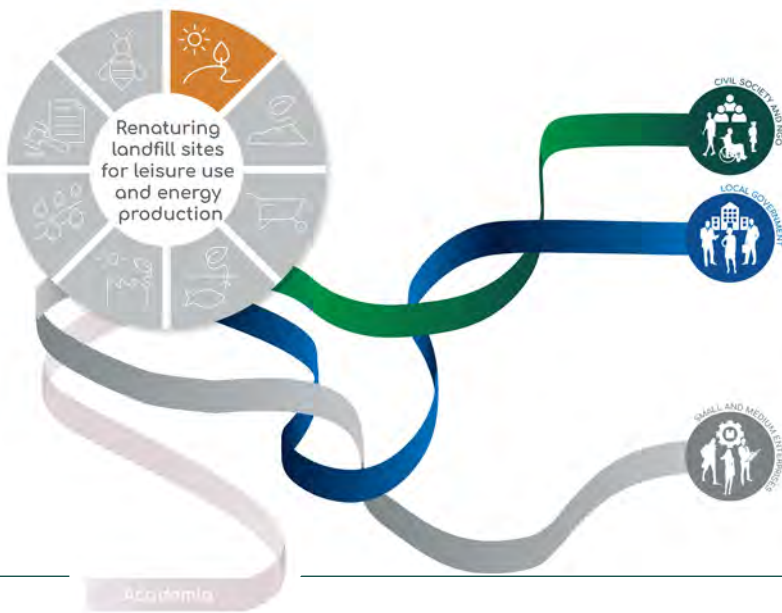
City of Dortmund, Department of Urban Renewal (project lead).

Other stakeholders involved

- citizens of adjacent neighborhoods
- Huckarde sport clubs
- umbrella association of Huckarde clubs
- Gustav-Heinemann-School
- local politicians of Dortmund-Huckarde
- Secondary stakeholders involved in realization: landscape gardener & FHS (devices construction company)



Co-design activities, stakeholder engagement, and pre-implementation activities



Co-design activities were strongly hampered by the Covid-19 pandemic, however, citizens were informed about the plans for the exercise park. Feedback and suggestions was considered in the planning process.

Planning and preparatory activities (administrative and technical procedures)

Initially, the movement park was planned on the former landfill site Deusenberg. In 2019, it emerged that the large International Garden Exhibition 2027 would occupy this area, requiring the search for a new site. The Department of Green Spaces, City of Dortmund offered the Gustav-Heinemann Park in Huckarde as an alternative and took over responsibility for planning and implementation.

Co-design and engagement activities

As a first step, local politicians were informed in August 2020 about the planned NBS and voted for implementing the movement park. The jury with politicians and other stakeholders to select the best design was rendered unnecessary since only one design plan was handed in during the official bidding process. Communication between stakeholders and politics was continuous.

Implementation budget



Total implementation budget:
145.000 €

proGReg funding:
120.000 €

proGReg overhead funding:
25.000 €



Huckarde citizens were invited to two co-design meetings held in smaller groups as planned due to Covid-19 restrictions. The main proGleg partner invited and informed selected stakeholders (e.g. Huckarde sport clubs, local politicians, adjacent school) about the concept of movement parks in September 2020. Before receiving political support in November 2021, residents living next to the park were also invited to discuss the intended concept. Useful suggestions from both meetings contributed to improving the design were taken on-board. Planning details, e.g. soil issues, were reconciled with respective city departments or external experts as needed. The devices were constructed by a company specialized in movement and playground devices.

Key achievements and implementation results

The concept of a movement devices, inviting park users to playfully exercise balancing and coordination abilities is new to Dortmund public parks. Even though the key target group are adults, the choice of devices allows all age groups to use them including toddlers from the adjacent daycare center.

The intense use right after handing over the devices to the public shows that the concept of the movement park met the citizens' expectations and wishes. A positive side effect is that social control within the park has increased since more people spend time within Gustav-Heinemann-Park, also preempting vandalism. Local politicians are satisfied with the implemented movement park.

Synergies with other proGleg activities

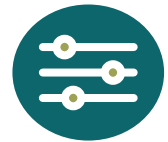


NBS 8: Pollinator diversity

Adjacent to the movement park, areas have been changed into biodiversity sites with flowering meadows.

Feeding into pro Gleg Work Package 4 (NBS benefit monitoring and assessment): post-implementation NBS-visitor questionnaire, pre- and post-implementation SOPARC.

Critical implementation issues and barriers encountered



- Convincing local politicians to vote for the realization of the movement park was critical as a similar concept for a multi-generation park had been rejected about 5 years earlier and turned out as a political, emotionally discussed subject. Close involvement into the planning process helped to reduce doubts.
- During the participation workshops, some residents living next to the park expressed concerns about possible noise deriving from the movement park. However, the implemented NBS and selected devices are not affecting local residents.
- Since another City department was responsible for the design and planning process, the influence to place new objects, ideas and procedures was partly tenacious and time-consuming.
- Hiring an external planner may have allowed to integrate more options for new approaches.

Links with other external projects or activities

The overall concept of the movement park has been closely harmonized with other playground and sports area developments that are planned for the Huckarde district over the next years (Concept of green spaces/ Freiraumkonzept Huckarde).

The plans pursue the goal of offering spaces that complement each other functionally, for instance to target varying age groups and type of devices.

Communication activities



Local press and social media channels have been informed twice: the first time that local politicians have voted to realize the movement park, second time that the devices have been installed and that the movement park is open to the public.

A project description can be found at www.proGrieg.dortmund.de

In Huckarde, stakeholders of other NBS and involved multipliers have been informed about the movement park as well. In addition, stakeholders from senior groups (e.g. Caritas, Begegnungsstätte Huckarde) have shown interest checking how to integrate use of the movement park into existing programmes.

At the proGrieg international replication workshop in August 2022, the movement park and its implementation phases for potential upscaling in other contexts were presented to international governmental and non-governmental participants.

Maintenance & Sustainability beyond proGrieg

Maintenance for the Park is secured beyond the proGrieg's project timeframe. The Department of Green Spaces/ City of Dortmund will maintain the movement park. A respective paper will be signed.

NBS benefits for the Living Lab Huckarde

The NBS intervention has increased the accessibility and quality of green spaces in the Huckarde district as well as improving underused areas. In addition, it enhances the well-being of citizens while increasing the social cohesion among residents.



NBS benefits and co-benefits



Fact Sheet



Renaturing landfill sites
for leisure use and energy
production

Stadt Dortmund



Exercise Park in Huckarde

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in [proGReg-project](https://www.linkedin.com/company/proGReg-project)

📘 [proGReg: Nature for Renewal](https://www.facebook.com/proGReg-Nature-for-Renewal)

📷 [#proGReg](https://www.instagram.com/proGReg)

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Living Lab Zagreb, Croatia

NBS description

Therapeutic gardens are specially designed gardens with the aim of strengthening motor, sensory, cognitive, affective, nutritional, emotional and social potential. The therapeutic garden in the Sesvete district of Zagreb is used by various groups of disabled individuals of all ages throughout the year.

The garden is managed by the City Office for Economy, Environmental Sustainability and Strategic Planning and the everyday activities are managed by Mali Dom day-care center for children with disabilities.

Aim & goals

The aim of the therapeutic garden is to provide users with an opportunity to spend time outdoors that benefits their physical and mental health.

Key goals of the NBS are:

- fostering social inclusion of people with disabilities within the community of healthy individuals, representing a great benefit of the garden
- potentially promoting social equality within the community and reduce discrimination and prejudice based on social status, ethnicity, disabilities and other characteristics.

Target groups (beneficiaries)

The NBS key target groups are disadvantaged and socially excluded such as:

- autistic people in the neighbouring housing development of New Jelkovec,
- local people with physical and mental disabilities,
- war veterans,
- children and grown-ups with disabilities from the entire city

Main responsible partner

City Office of Economy, Environmental Sustainability and Strategic Planning of Zagreb

Contact

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- iva.bedenko@zagreb.hr
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(c) Mali Dom

Area of implementation

The therapeutic garden is implemented on a portion of land of 5145 m², in the southern part of the Sljeme factory area.

Approximate coordinates: 45°49'14.3"N, 16°06'28.9"E

ProGREG partners involved

- Mali dom
- NGO ZIPS - Green and Blue Sesvete providing the link to the local community
- AF- consultation on spatial planning
- ZZPU – city-owned consultation on planning regulations and requirements

Other stakeholders involved

Mali dom-Zagreb, Daycare center for the rehabilitation of children and youth founded by the City of Zagreb

Novi Jelkovec institution founded with the aim of providing social services in the community to children with developmental disabilities, younger adults and adults with disabilities.

City Office of Social Protection, Health, War Veterans and People with Disabilities

Implementation budget

Total implementation budget: 389.060 €

proGREG funding: 296.785 €

City of Zagreb: 92.275 €

Timeframe

Start
August 2020



Completion
May/June 2021

NBS 2 New generated soil for urban forestry and urban farming



Living Lab Turin, Italy



NBS 2 description

Creation of an area of „urban forest“ along the banks of the Sangone river through the use of regenerated soil (New Soil), based on excavated material with the addition of compost, zeolites and innovative bio-stimulants. Plants of different species were planted in the New Soil area and in the adjacent area as a control field. Growth analysis to monitor the effect of new soil on vegetation has been performed during the implementation phase.

Aims & goals

The NBS New soil supports:

- increased sustainability of the urban system
- urban regeneration through improvement of climate change risk management and resilience.
- supports viable business models with employment opportunities for local population.
- Significant technical, social and economic impacts are achievable to support sustainable innovation.
- the conversion of organic fraction of municipal solid waste in certified compost to be applied as fertilizer in the new soil application contributes to reducing GHG emissions.
- the nutrient content of the compost is significant as 1 ton of compost can substitute 37 kg of Urea.
- GHG emissions reduction potential, composting results in 87% of emissions saving with respect to traditional waste disposal.

Target groups and beneficiaries

- Green department technicians of the City of Turin
- Citizens
- Quarry managers
- Compost producers
- Legislators

Contact

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Area of implementation

2.000 m² in Sangone Park

GPS coordinates: 45.009040, 7.641200

Main responsible partner

Environment Park (private sector)

Other proGireg partners involved

Dual Srl
UNITO
City of Turin

Other stakeholders involved

- ACEA (TLP of Envipark)
- CCS (subcontracting of Envipark)
- Arpa Piemonte (TLP of City of Turin)
- Città Metropolitana di Torino (TLP of City of Turin)
- Private gardeners of adjacent municipal gardens
- Representatives of groups of citizens

Implementation budget

Total implementation budget: 278.000 €

proGireg funding: 278.000 €

Timeframe

Start
December 2019



Completion
February 2020

Living Lab Turin



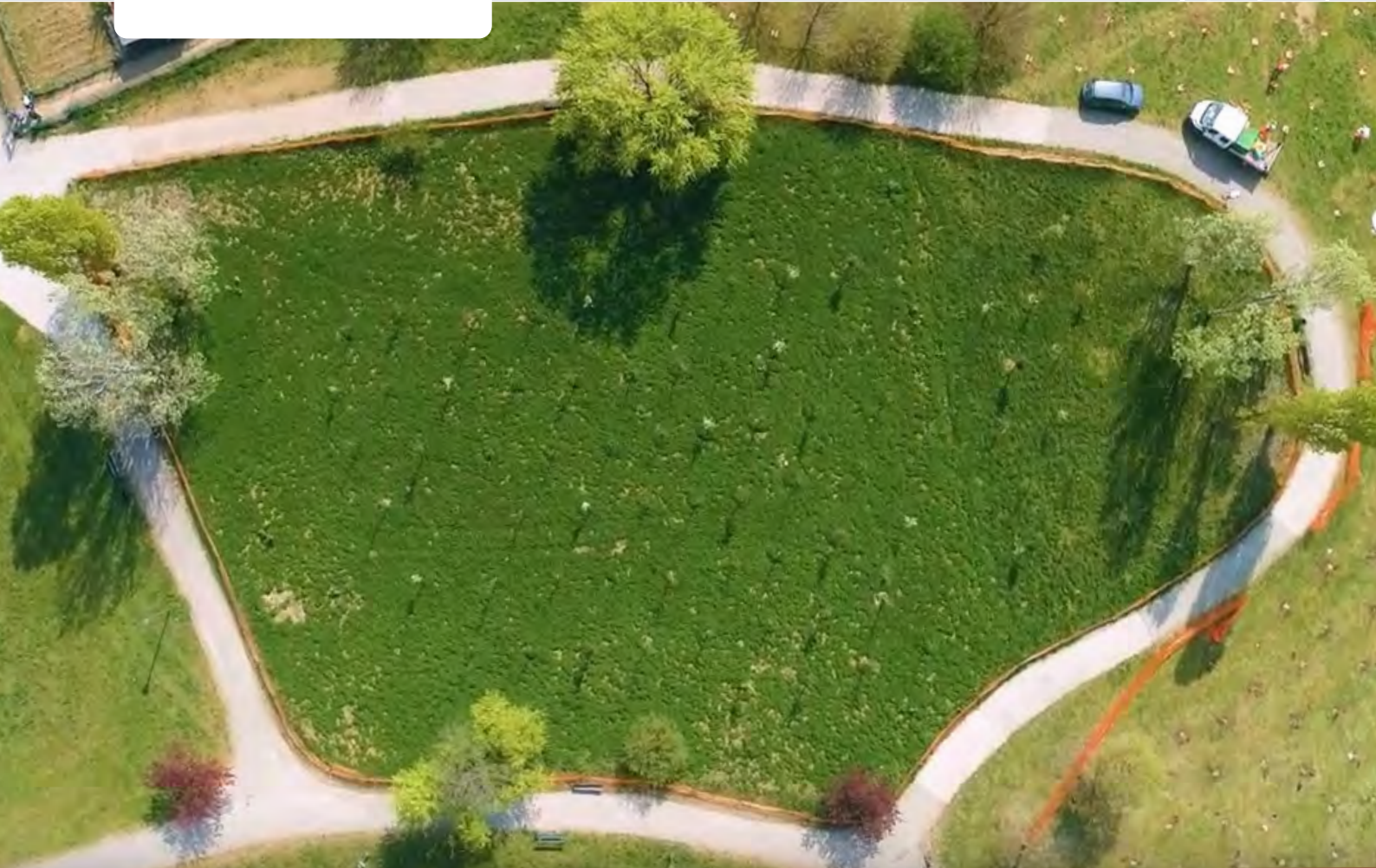
NBS 2

New regenerated soil for urban forestry and urban farming

(c) L. Ribotta



New soil production in Sangone Park



NBS New Soil in Sangone Park

This NBS in the Turin Living Lab Mirafiori Sud experiments with creating an „urban forest“ along the banks of the Sangone river by using regenerated soil (New Soil). The base material derives from deep excavations in Turin, added by compost, zeolites and innovative bio-stimulants (fig. 1,p.6).

- Key ingredient is excavated soil from construction sites in Turin
- Compost from OFMSW for organic matter and nutrients addition (10%)
- Zeolites in the surface layer for decreasing material density and an adsorbent function to retain water
- Mycorrhizae as bio-stimulants to improve nutrient uptake and resilience of plants.
- Planting different species in the New Soil area and in an adjacent control area.

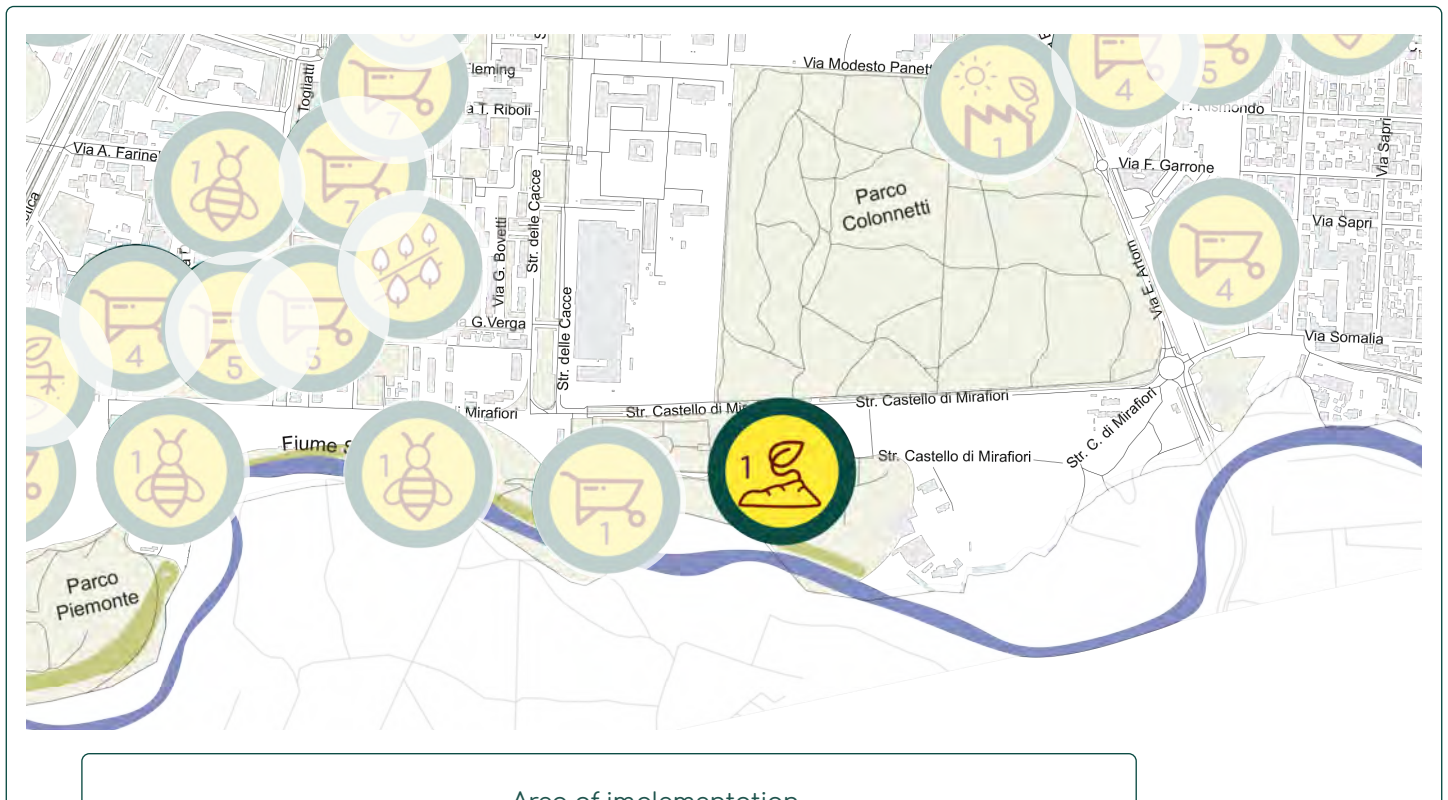
This technical NBS requires extensive analysis:

- Plant growth analysis to monitor the effect of new soil on vegetation.
- Chemical characterizations of excavated soil before and after
- Mixing with other ingredients to verify legal compliance and authorization procedures.

Aim & goals

Given competition of land uses in urban areas, the scarcity of the resource soil endangers urban environments. Contamination, poor chemical, physical and biological fertility and high heterogeneity are common traits of urban soils. Previous and ongoing projects have typified soils, fertility and environmental quality. Therefore, the NBS aims at:

- testing and providing soil of good agronomical and environmental quality for new urban green areas and restoration of derelict industrial areas.
- pursuing minimum maintenance of new soil composition.
- investigating the new soil concept at its very base, considering a wide variability of materials that may compose mixtures used as cultivation substrate.
- establishing a sampling strategy, and laboratory and field tests to prepare a methodology for generating new soil, centering on chemical, physical and agronomic quality of materials and mixtures,
- producing guidelines providing best strategy for preparing and utilising new growing medium of starting mineral and organic materials, quality of the site to be restored, type of plants to use.



Area of implementation
 2.000 m² in Sangone Park, Mirafiori Sud district, Turin Italy
 GPS coordinates: 45.009040, 7.641200

Target groups (beneficiaries)

- City of Turin Green department technicians
- Citizens
- Quarry managers
- Compost producers
- Legislators



Stakeholder constellations

Main responsible partner

Environment Park (coordination)
 Envipark coordinated activities by organizing periodic updating meetings between the partners to facilitate constant dialogue

ProGgreg partners involved

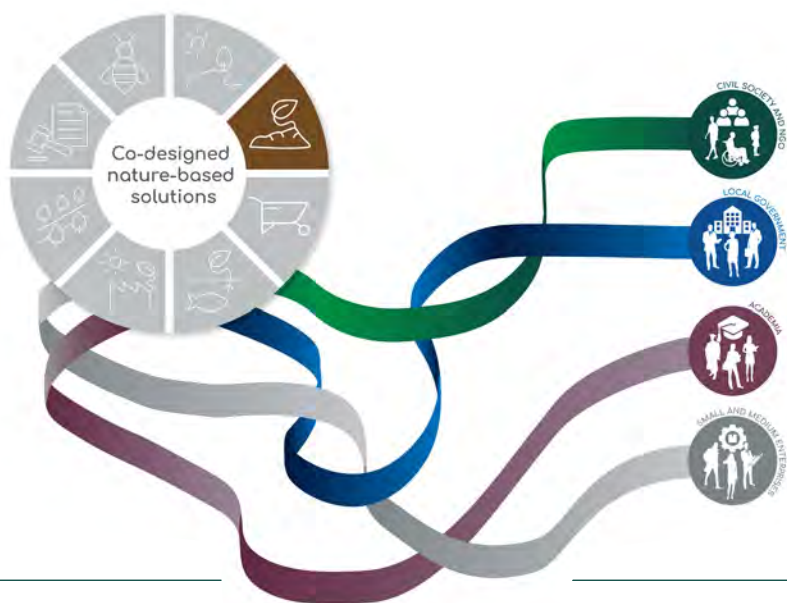
- Dual Srl (major part of funds: construction): Collaboration with nurserymen to generate the new soil, transport to the site, planting and maintaining the site during plant growth
- UNITO (monitoring activity): UNITO was responsible for carrying out soil and plant sampling and related chemical analyses
- City of Turin (coordination of administrative procedure): supported Envipark in the coordination, facilitating dialogue with citizens and obtaining authorization for the construction site at local bodies. The municipality disseminated experience with new soil both nationally and at European level. Kick-started the process of modifying local authorization processes to promote the NBS replication based on experiences gained.

Other stakeholders involved

- ACEA (TLP of Envipark, provide compost)
- CCS (subcontracting of Envipark, provide micosat: the biotic compound)
- Arpa Piemonte (TLP of City of Turin, help in administrative barriers)
- Città Metropolitana di Torino (TLP of City of Turin, help in administrative barriers)
- Private gardeners of adjacent municipal gardens
- Representatives of citizen groups



Co-design activities, stakeholder engagement, and pre-implementation activities



The NBS New soil in Sangone Park was conceived and produced in collaboration with diverse stakeholders spanning from private sector companies, research centers to public authorities.

Planning and preparatory activities (administrative and technical procedures)

Planning started in 2016 with the proGReg research project proposal. The City of Turin (green department) faced the problem of finding soil to build new parks without taking soil from agricultural land. The company Dual srl needed to reuse soil from deep excavation in Turin.

First experiments of mixing soil with compost in urban construction sites proved unsatisfactory. Envipark proposed to use ACEA compost and the biotic compound produced by CCS Aosta, and adding zeolites for water retention capacity and lower material weight (as superficial layer on ground application and roof substrate mixes). Arpa and Città Metropolitana sought to overcome administrative limitations in the use of soil from deep excavation.

- Brief training on new soil organized by actively involved project partners (POLITO, UNITO, City of Turin, Arpa Piemonte (TLP of City of Turin), Città Metropolitana di Torino (TLP of City of Turin)).
- Creating a technical table for design and implementation processes of NEW SOIL to decide how on formulate the new soil recipe, analyse regulations for formulating the request to authorization bodies and carry out chemical analyses to support decision making.

Implementation budget

Total implementation budget: 278.000€ from proGReg funds



Other funds:

- 17.000 € Arpa
- 54.500 € Acea
- 20.000 € CCS Aosta

Co-design and engagement activities

Co-design activities involved representatives from companies, research centres and authorization bodies depending on the topics covered. Social involvement of the local population is key to increase awareness about the experimental site developments and aims, thus requiring:

- Meetings with neighborhood committees and the owners of the urban gardens located in Mirafiori



(c) L. Ribotta

Key achievements and implementation results

The New Soil experimentation allows evaluating market potential of natural solutions that fully meet public authorities' demands for soil used in urban green areas. Therefore, including new soil as a product in regional price lists and public procurement specifications.

- Defining the final material mixture used as 'New Soil' required a number of chemical characterizations in order to comply with legislation standards for land application.
- Setting up a discussion and coordination board with the authorities in order to promote new soil through legislative support to recognize the background values of pollutants in the destined locations of regenerated soil.
- Extensive monitoring of soil samples on both the testing area and the control area by the University of Turin for chemical analyses and PM10 and temperature.
- Obtaining useful indications for the public administration to regulate standards and update bureaucratic processes for including new soil in the urban environment.
- Monthly wetting with 2500 liters of water during very dry weather conditions
- Turin is leading the way to convince road construction authorities to modify price lists, tender specifications and authorization procedures.
- A team at the municipality identifying urban land quality in different areas as a reference for new soil materials quality. In 2021, a resolution by the Piedmont Region approved basic values.

Critical issues and barriers encountered during implementation

- Implementation delays required much effort to keep stakeholders engaged and motivated, and to feel part of the community.
- Plant failures on new soil and control area. Covid-19 restrictions limited access for sampling and watering. Dead plants were replaced in December 2021 by DUALgreen.
- Despite major obstacles in the production and use of regenerated soil, barriers are mostly administrative, not technical (authorizations for use of land from excavation works).
- Compliance between the analytical quality of new soil material mixture and requirements for use in urban application pose implementation barriers. Specific metals may exceed allowed legal values even though these can be found in urban land in which the new soil is to be used.
- Large quantities of new soil analyses composed as a structuring matrix of excavations materials were necessary.
- Providing a guarantee on the homogeneity of the material's chemical composition is not easy, requiring multiple sampling at different material heap depths on-site.
- Samples for chemical analyzes are not always representative of the chemical composition of the entire heap due to the possible non-homogeneity in the composition.
- Long distances between site of destination for new soil and extraction sites may limit widespread use of NBS New Soil

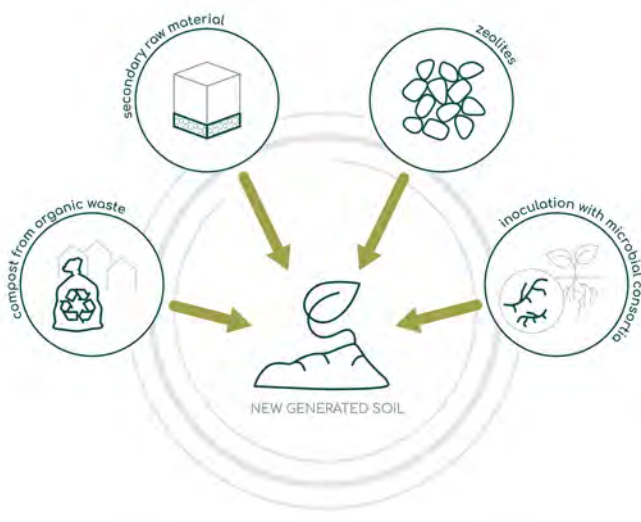


Fig. 1 Biochemical processes to generate new soil (RWTH)



Synergies with other proGReg activities



NBS8:
wildflower lawn attracts pollinating insects



NBS3: pollinator garden:
New soil to be used for pollinator garden

NBS3: Orti Generali: flowerbed with new soil to carry out further experiments financed by Axto circular economy project

Links with other external projects or activities

- AxTO circular economy project
- SATURNO project: production of bio-fertilizers from waste

NBS benefits for the Living Lab Turin

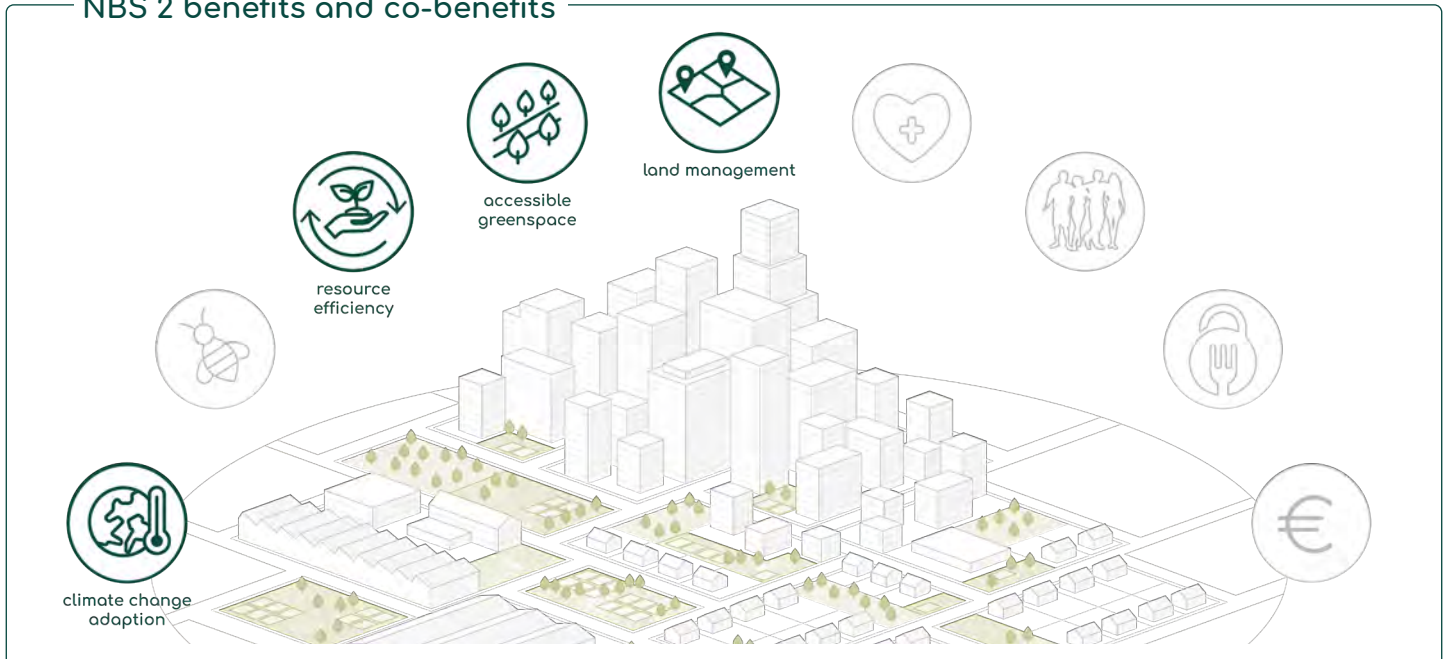
The NBS tested a new type of soil already used in other NBS in the Living Lab, thus underlining the experimental purpose and potential uses. Being in a public park, the new soil area presents proGReg activity to a wide target group.

Communication activities



- City of Turin will give wide publicity of the approved values and the simplification of the procedure for the new soil application.
 - Press release to announce the opening of the construction site and articles in the local press.
 - Envipark edits Facebook posts on new soil.
 - Videos and images of the construction site to make a film describing the action.
 - Dissemination of proGReg and new soil activities during Climathon 2020 Turin (global hackathon on climate change, fully digital on 13 and 14 November 2021).
 - The event organized by Envipark and the Municipality of Turin was dedicated to nature-based solutions, involving 72 participating competitors divided into 16 teams.
 - Some working groups used the new soil for developing their project work.
- f** A dedicated Facebook group counts 450 members (<https://www.facebook.com/groups/744008156185287>).

NBS 2 benefits and co-benefits



Maintenance & Sustainability beyond proGReg

- Maintenance will be carried out by Dual srl. during proGReg, the City will take over after project end.
- Following the successful trial outcomes, it is planned to produce a brand for the new soil and to include it in public specifications for the construction of new

urban areas.

- Economically, it would be useful to connect the NBS to soil resources already active on the market to structure a list of possible commercial links and collaborations.
- The NBS New soil can be used to implement NBS in other parts of the Mirafiori district and beyond, e.g. urban gardens.

Fact Sheet



NBS 2



Newly planted flowers and trees on new soil area (c) L. Ribotta

New regenerated soil for urban forestry and urban farming



New soil production
in Sangone Park

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in proG!reg-project

📘 proG!reg: Nature for Renewal

📷 #proG!reg

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Partners



CITTA' DI TORINO

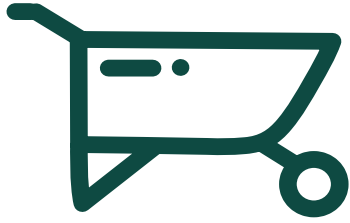


UNIVERSITÀ
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DI TORINO





Living Lab Zagreb, Croatia



NBS 3



(c) Mali Dom

Community-based urban farming and gardening on post-industrial sites

Therapeutic Garden Sesvete



NBS description

The City gardens project was introduced in 2013, with the aim of using city-owned land as gardens for citizens. When planning started, the idea of creating new gardens as therapeutic gardens was welcomed by partners and the local community. The garden is managed by the City Office for Economy, Environmental Sustainability and Strategic Planning and the everyday activities are managed by Mali Dom daycare center for children with disabilities.

The therapeutic garden consists of three zones:

1. area for user interaction (gazebo, grill, wooden platform/stage, and circular benches),
2. area for therapeutic gardening and education (elevated garden beds for growing herbs, hügelkultur beds, storage for tools and a trellis)
3. sensory garden and sensory rest areas (elevated and classic beds with herbs, reflexology path, quiet rest areas and interactive sculpture).

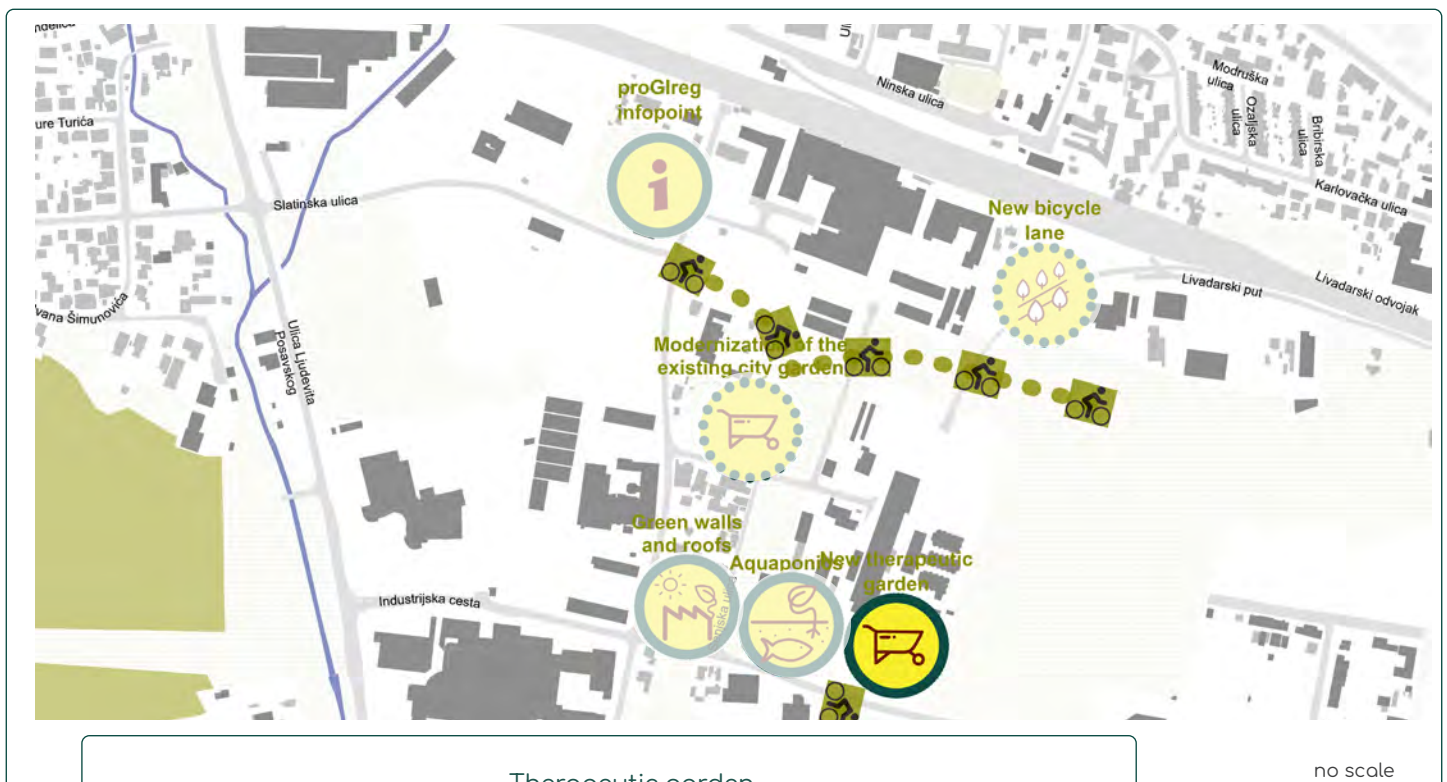
The design intends to be uncomplicated, readable and down-to-earth, using natural materials and simple forms. The garden is designed as a sequence of experience-zones along a curved path creating a circular trail. Common areas encourage socializing and relaxation of children and grown-

ups with disabilities, their therapists, parents and caretakers and people without disabilities. The stage is placed in the centre and used for theatrical plays and other events. Gazebos are equipped with green roofs, and the therapeutic garden features pollinator-friendly plants.



Area of implementation

The therapeutic garden is implemented on a portion of land of 5,300 m², in the southern part of the Sljeme factory area.



Therapeutic garden
GPS coordinates: 45°49'14.3"N 16°06'28.9"E

no scale

Aim & goals

The overarching aim of the project is to contribute to the quality of life of vulnerable groups and citizens with disabilities by providing opportunities to be active outdoors that benefit their health and wellbeing. Participating in workshops and trainings is for all interested citizens, hence positively impacting the wider community. The project can be upgraded by involving garden therapists, specially trained experts in medical and psychosocial effects of garden work who are part of the therapeutic-rehabilitation team.

Key goal of the therapeutic garden and education is to encourage social inclusion including:

- integrating vulnerable groups into society

- enabling people with developmental or acquired difficulties and other socially vulnerable groups to do gardening in city gardens
- offering the opportunity to develop and show empathy and understanding.
- offering longer term training for multiple types of users.

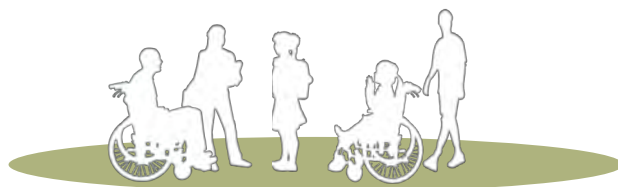
The therapeutic garden is meant as a living incubator inside the Living Lab. While the city garden's product is food, the therapeutic garden's product is the process.

Additionally, the garden is part of redeveloping the brownfield site of the former meat processing plant, opening up new public spaces, thus providing momentum of brownfield transformation.

Target groups

Key beneficiaries include:

- people with mental and physical disabilities,
- families of disabled children,
- care institutions for the disabled,
- schools of the district.



Stakeholder constellations

Main responsible partner

- City Office of Economy, Environmental Sustainability and Strategic Planning of Zagreb is the main responsible partner and coordinator of activities of the therapeutic garden.
- The City coordinates planning, implementation, use and maintenance of the therapeutic garden, and everyday use is managed by Mali dom, daycare center for children with disabilities.

ProGReg partners involved

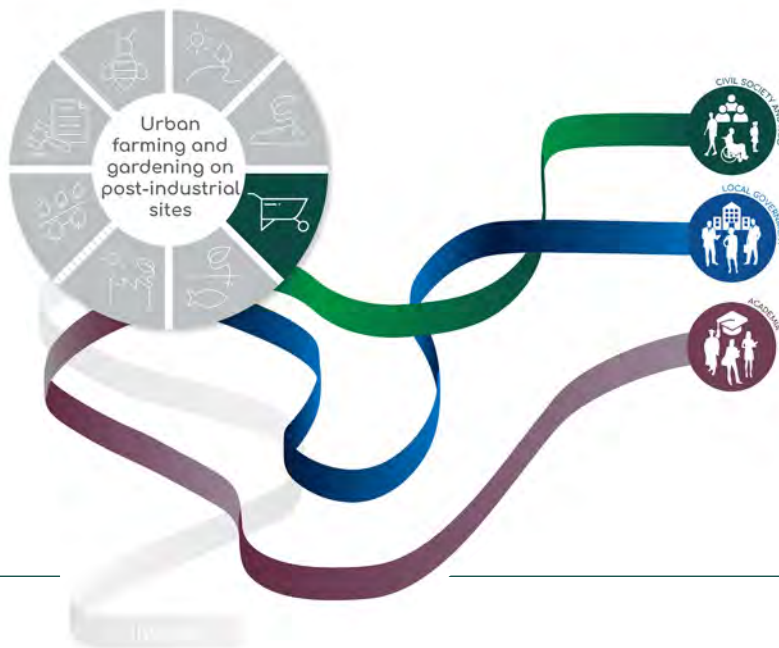
- Green Blue Sesvete provide the link to the local community.
- Zagreb Faculty of Architecture provided consultation on spatial planning, and City Bureau of Spatial Planning on planning regulations and requirements

Other stakeholders involved

- Mali dom-Zagreb, Daycare center for the rehabilitation of children and youth founded by the City of Zagreb – organizes everyday activities and manages other users
- Novi Jelkovec institution for assisted living – organizes use of the garden
- City Office of Social Protection, Health, War Veterans and People with Disabilities – provides information and support



Co-design activities, stakeholder engagement, and pre-implementation activities



(c) Mali Dom

Planning and preparatory activities (administrative and technical procedures)

In the eight years of implementing the „City Gardens“ project, vulnerable groups and people with disabilities have repeatedly expressed interest to participate in gardening activities. Initial ideas included integrating facilities into the existing garden but proved difficult.

This led to the idea of implementing an adequately equipped therapeutic garden for people with special needs. Since the future users include people with autism, children with various developmental disabilities, people in wheelchairs etc., the codesign workshops served to define the exact needs of the users, which formed the basis of the garden design.

Implementation budget



The implementation of this NBS has been funded by European Horizon 2020 projects. Funds have been transferred first to the City of Zagreb, which organized the implementation and payment. All phases have been accounted for.

Total implementation budget: 389.060 €
 Other funds:
 92.275 € City of Zagreb
 proG!reg Partners funds: 296.785 €



(c) Mali Dom

Co-design and engagement activities

The City of Zagreb as the main partner has been actively involved in the codesign phase of the project. During the codesign phase, partners from the City Office proposed the newly planned garden to be transformed into a therapeutic garden. Feedback of stakeholders confirmed the great need for such a garden in Sesvete, given plenty of potential users living in the neighbouring area (including war veterans and several housing communities of people with autism). The therapeutic garden has been conceived in an intense co-design process.

- First co-design workshops organized within proGleg offered the opportunity to gather all potential stakeholders for inclusion in the planning phase, ensuring the garden is planned adequately to cater to the needs of all the possible users
- Subsequent meeting with prospective users and the therapists from the Mali dom (little home) daycare center for children with multiple disabilities, the centre for people with cerebral palsy and centre for autism.
- Active engagement of local institutions representing the users to influence the design of the therapy garden to suits different user needs.

The City organized other meetings and workshops to ensure users needs are clearly defined in order to plan the garden accordingly. Participants provided comprehensive lists of special requirements. The garden was designed using this data assuring correct NBS implementation. Stakeholder mappings in collaboration with the City Office of Social Protection, Health, War Veterans and People with Disabilities provide a valuable source of contacts for future interventions.

Key achievements and implementation results

The implementation of the therapeutic garden is benefitting users including people with autism, children with various developmental disabilities, people in wheelchairs etc. Thus achieving the key goal of providing a serene space for relaxation and therapeutic activity.

Since its completion in June 2021, the garden has been in continuous use depending on the season: the users are assisted by their therapists or caretaker (parents/family) in executing all gardening work and maintenance of the raised garden beds. The raised beds have been assigned to the users to provide continuity in tending to the plants.

The project is expected to positively contribute to the quality of life of vulnerable groups and people with

disabilities. The possibility of staying in the natural environment and participating in workshops and trainings addresses all interested citizens, thus having a positive impact on the wider community. The project can be upgraded by involving garden therapists, specially trained experts in medical and psychosocial effects of garden work who are part of the therapeutic-rehabilitation team. New, safe, public space that was transformed from neglected land which was unsafe before, is created.

Critical implementation issues and barriers encountered



The COVID crisis and two subsequent powerful earthquakes hitting Zagreb in 2020 hindered implementation plans in Zagreb. However, since the therapeutic garden was largely financed by proGleg funds, municipal budget cuts had no impact on the construction works of the therapeutic garden. Implementation was finalized within the set timeframe. In the early implementation stage the land was owned by Zagreb Holding company, requiring political decision to assign the land to the City of Zagreb. Given the garden is an outdoor area and limited number of users at one time, social distancing measures had little impact on the use of the garden.

Synergies with other proGleg activities

Therapeutic garden is closely intertwined with the activity of the Info point and can be also connected with the NBS 4/5 self-standing fixture -modular urban farm as an educational platform. The inclusion and constant dissemination are crucial to ensure activity and awareness of the importance for the local community and beyond.



NBS 4: Aquaponics



NBS 5: Green roofs and walls

Links with other external projects or activities

The NBS is linked to the city gardens, especially the Borovje garden that is planned in the eastern part of Zagreb. The institutions managing everyday use of the garden occasionally organize educational activities, food production workshops and gatherings with parents and friends.

Communication activities



All project activities are being advertised in the Info point through lectures, exhibitions, discussions, film projections and other events, and the programme of the Info point is published in the local media, especially social media.

The Mali dom and Novi Jelkovec institutions have their own communication channels – both have web pages and Mali dom has a Facebook page with 4.600 followers.

Green and Blue Sesvete provide communication channels through an active web page and Facebook page with 7000 followers.

Links with other external projects or activities

The NBS is linked to the city gardens, especially the Borovje garden that is planned in the eastern part of Zagreb. The institutions managing everyday use of the garden occasionally organize educational activities, food production workshops and gatherings with parents and friends.

Maintenance & Sustainability beyond proGReg

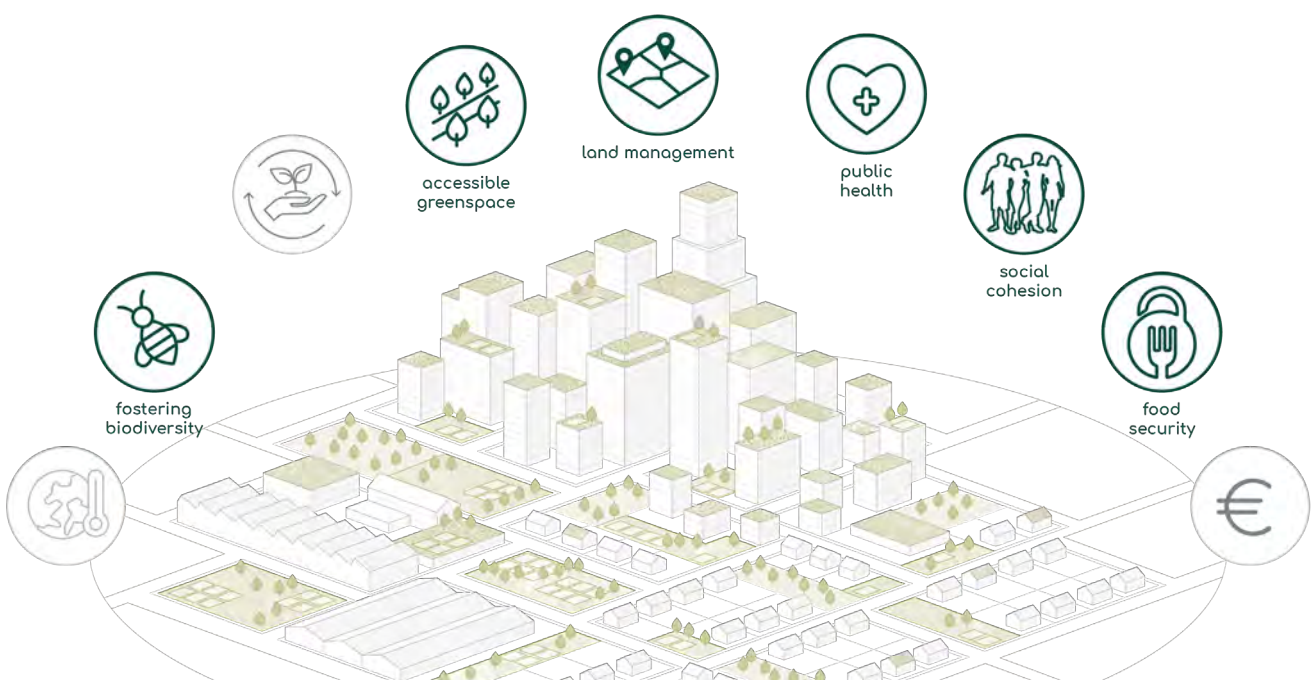
The operating of the therapy garden is in line with the Goal 5 of the City of Zagreb Development Strategy, Improving the quality of life; Priority 5.2 - Social integration of local communities, safety and quality leisure time; Measures 5.2.4. Facilitate greater inclusion of persons with disabilities in the community life and 5.2.5. Facilitate greater community inclusion of children and young people with developmental difficulties. Therefore, the long-term aim of the City is to ensure the operation of the therapy garden.

Further upgrading of the garden, and introduction of interactive tools and playground elements for children with disabilities is planned in the future.

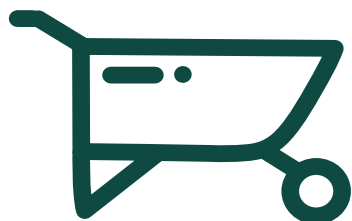
Therapeutic garden is a thoroughly flexible concept. It can be planned in an area of any size - from a small backyard or part of a public green area to a large, comprehensive public garden. It can provide a gardening, sensory stimulating, relaxing or socializing area, depending of the investor's wishes and needs. It can also be planned as part of a schoolyard.

There is also a possibility of introducing a part dedicated to people in wheelchairs in every city garden, enabling therapeutic gardening in all the neighbourhoods.

NBS benefits and co-benefits



Fact Sheet Therapeutic Garden



NBS 3



Community-based urban farming and gardening on post-industrial sites



Therapeutic Garden Sesvete

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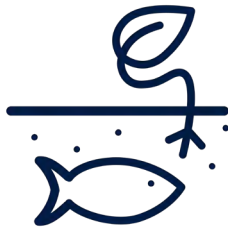
🌐 www.progireg.eu
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in proGireg-project
📘 proGireg: Nature for Renewal
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Partners

zele
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Sesvete



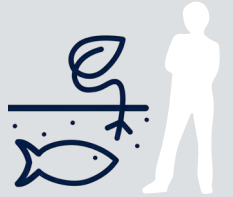
Living Lab Dortmund



NBS 4

Aquaponics as soil-less agriculture on polluted sites

Community managed aquaponics system





Living Lab Dortmund, Germany

NBS Community managed aquaponics

Aquaponics is a sustainable food production system that combines fish and plant production using aquaculture and hydroponic systems. Fish wastewater provides nutrients for plants. The aquaponics system was envisioned by proGReg for its potential to produce food on polluted post-industrial land with poor soil quality. Scaling effects drive economic performance of aquaponics facilities, thus sustainable business models apply to small to medium facilities, which at best allow interim use of already planned brownfield sites for several years. This led to constructing two identical 200 m² greenhouses on the former Hansa Coking Plant in Dortmund Huckarde. The aquaponic facility is operated and supervised by die Urbanisten and South Westfalia University of Applied Sciences (SWUAS) within the timeframe of proGReg (2019-2023).

Aim & goals

NBS 4 aims at creating a community managed aquaponics system by applying social and technological innovation solutions to achieve:

- Energy and water savings
- Use of natural fertilizers from fish waste
- Higher productivity per square meter than conventional farming
- Technological innovation of coupling two systems (aquaculture and hydroponics (soilless cultivation of crops))
- Use as an education facility and scientific experiments

Target groups (beneficiaries)

- Huckarde residents who can rent hydroponic beds in the aquaponic facility (rent-a-raft concept)
- Students and citizens for educational purposes

Main responsible partner

Die Urbanisten e.V. is the key partner responsible for implementation and citizen participation until May 2023.

Contact

✉ progireg@dieurbanisten.de
🌐 dieurbanisten.de



Area of implementation

1,200 m² on the former Hansa Coking plant – an industrial heritage area, touristic highlight of the Ruhr Valley and main venue during International Garden Exhibition in 2027.

GPS coordinates: 51.541558, 7.410900

ProGReg partners involved

- South Westphalia University of Applied Science - responsible for planning, economic viability, technical and optimization of the facility.
- Aquaponik Manufaktur GmbH developing sizing, technical planning and filters in collaboration with SWUAS.
- Citybotanicals (HEI-TRO GMBH) - supported concept development in the early stages
- Department of Urban Renewal, City of Dortmund - proposing the site at Hansa Coking Plant, supported in obtaining building permit and facilitated communication

Other stakeholders involved

- Foundation for Preservation of Industrial Monuments and History Culture (Stiftung Industriedenkmalpflege und Geschichtskultur) (land owner)
- Department of Urban Planning and Building Regulation, City of Dortmund

Implementation budget

Total implementation budget: ca 243.500 €
proGReg funding: 199.500 €

Timeframe

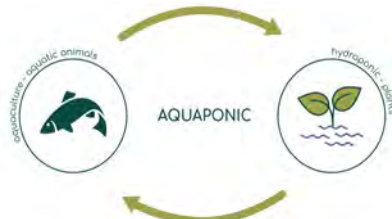
Start
Autumn 2020



Completion
December 2022

NBS 4 Aquaponics

The sustainable aquaponics food production system combines fish and plant production.



Being the Living Lab Dortmund-Huckarde's focal point, it combines implementing nature-based solutions (NBS) on post-industrial brownfields at industrial monument sites.

Two identical 200 m² greenhouses are constructed on 1,200 m² area of former Hansa Coking Plant. Firstly, to technically develop the concept of aquaponics plants will be produced in the greenhouses. Food products are not marketed as in conventional models; the hydroponic beds are rented to interested citizens. The economic performance of aquaponics facilities is subject to a strong scaling effect, and sustainable business models could be developed for small to medium facility sizes. These allow at best interim use of already planned brownfield sites for several years. The aquaponic facility is operated and supervised by the project partners die Urbanisten and South Westfalia University of Applied Sciences (SWUAS) within the timeframe of proGREG (2019-2023).

Aim & goals

In comparison to existing aquaponics systems, this NBS focuses on social and technological innovation solutions using natural processes (fig. 1) to achieve circular economy effects, resource savings, educational and scientific offering:

- Producing food on post-industrial sites with poor soil or contaminated land
- Using natural fertilizers from fish waste
- Higher productivity/m² than conventional farming
- Potential to intensify urban-rural connections

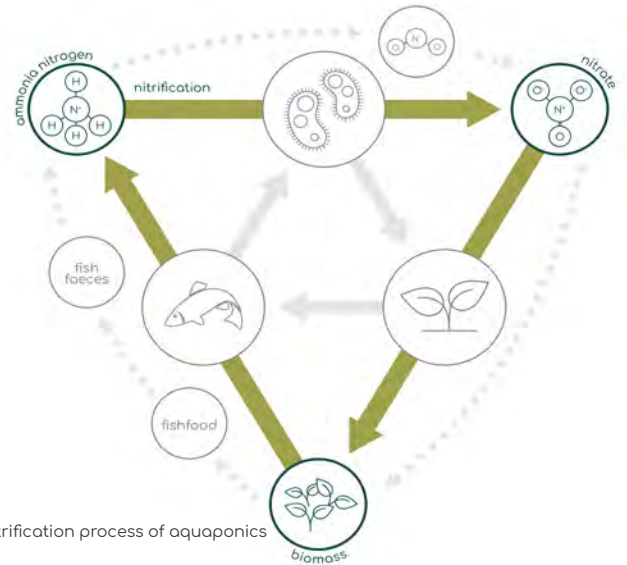


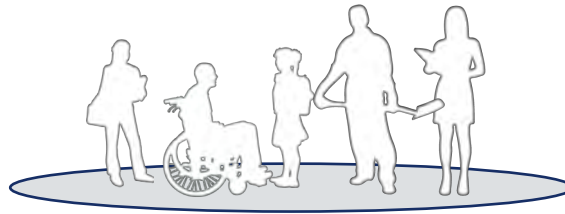
Fig. 1: Nitrification process of aquaponics



1,200 m² on the former Hansa Coking plant
GPS coordinates: 51.541558, 7.410900

Target groups (beneficiaries)

- interested citizens including families in Huckarde and one-person households,
- students of schools and university from Huckarde district, Dortmund and beyond



Stakeholder constellations

Main responsible partner

The NGO Die Urbanisten responsible for:

- preparing building permission in cooperation with an architectural firm,
- pre-implementation and implementation phases,
- organizing future workshops to introduce the facility to the general public within the timeframe of proGReg until May 2023
- co-guarantee the continuity of this NBS over time



ProGReg partners involved

South Westphalia University of Applied Science (SWUAS) responsible for planning, economic viability, technical and organizational hurdles, operational optimization of aquaponics. Also, environmental monitoring of the aquaponics system and collaborating in dissemination incl. conference, international trade fair, scientific papers.

Aquaponik Manufaktur GmbH developed sizing and technical planning in collaboration with SWUAS: Aquaponics filter, piping design and operational mode of the system for maximum flexibility when running. Optimize the technology readiness level (TRL) of the aquaponics in collaboration with SWUAS

Heitro: supported the concept in early development stages.

Department of Urban Renewal, City of Dortmund proposed the Hansa Coking Plant site, supported in obtaining building permission and facilitated communication between NBS partners and other city departments involved during the planning process

Other stakeholders involved

Department of Urban Planning and Building Regulation (Stadtplanungs- und Bauordnungsamt), City of Dortmund

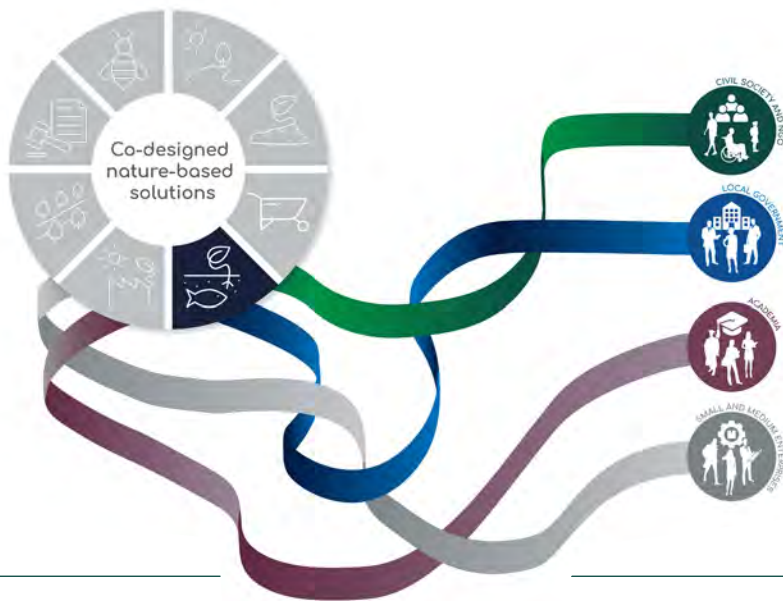
- Granting building permit - Foundation for the Preservation of Industrial Monuments and Historical Culture (Stiftung Industriedenkmalpflege und Geschichtskultur, IDS)

Site owner - renting and extending the rent contract beyond the proGReg timeframe to guarantee continuity.

- Mense (Architectural Firm): jointly preparing building permit application with project partners
- Ahlenberg (Consultant Engineering firm): soil contamination test
- Geotechnik Institut Dr. Höfer GmbH & Co. KG: Monitoring construction phase for ground cover layer
- Glass Tiefbau GmbH (construction company): construction preparation work
- Exner grüne Technik (greenhouse construction company)
- N.N.: testing produced plants quality for ration of toxic gases
- Team of the International Garden Exhibition, IGA 2027



Co-design activities, stakeholder engagement, and pre-implementation activities



The complex technical, administrative and legal procedures for this NBS limited the involvement of citizens in the early stages of the co-design process. However, intense stakeholder exchanges took place between local authorities, academia and aquaponics manufacturers, technicians and land owners.

Planning and preparatory activities (administrative and technical procedures)

The Hansa Coking Plant site was proposed by the City of Dortmund. Its unrivaled location in the Living Lab and during International Garden Exhibition IGA 2027 offers maximum public visibility given its historical significance and high visitor numbers, despite obvious soil contamination issues. As a prerequisite for signing the contract, the site owner (IDS) demanded a deposit of 10,000 € from Die Urbanisten. Due to limited financial resources as a small NGO, the University of Applied Sciences

South Westphalia became official tenant by signing the contract in February 2020, thus solving the stalemate. Otherwise the City of Dortmund had also taken a political resolution to pay the deposit.

The contaminated soil on-site has posed a number of challenges in the process of obtaining building permission. Despite aquaponics being soil-independent, further backfill was necessary. The contaminated soil is remaining on-site and only secured by a top soil layer, prohibiting any soil interventions.

Implementation budget



Total implementation budget: ca. 243,500 €

proGReg funding: 199,500 €

Die Urbanisten: 137,000 €
 FH SWF (SWUAS): 62,500 €
 City of Dortmund: 44,000 €
 (overhead proGReg fund)



Co-design and engagement activities

Co-design activities were necessary with various stakeholders. The landowner of the coking plant was engaged in the process since the first co-design workshop in December 2018.

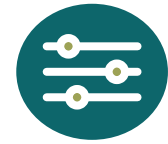
- die Urbanisten prepared the aquaponics building permission application in collaboration with an architectural firm to the Department of Urban Planning and Building Regulation at the City of Dortmund. To meet all legal requirements, several meetings with respective involved departments of the City of Dortmund were necessary in order to work out licensable solutions.
- During construction phase, intense communication with project partners, involved companies and the site owner took place to ensure that all interests and necessities were met.
- Onsite meetings with representatives of other development projects such as IGA 2027 future perspectives for the aquaponics facility were envisioned creating synergies with other projects beyond proGReg.
- Adaptations of the rent-a-raft business model are explored: citizens can rent microgarden units for producing own food but no need in having an allotment garden. Plants are watered and cared for and are very productive.

Key achievements and implementation results

Given planning an aquaponics system of this size for the first time, the planning and construction process has been an inter- and transdisciplinary learning process lasting four years. Intense communication, information exchange with all involved stakeholders were necessary to meet complex organizational, administrative and legal aspects and to overcome financial constraints. This meant significant adjustments to the concept and operating model throughout the building permission process to work out realizable solutions. Key achievements include:

- Gain of knowhow to implement aquaponics innovative solution and food production on contaminated industrial sites
- Conception of energy optimization of aquaponics facility
- Social innovation of renting rafts inside the facility (rent a raft approach)

Critical implementation issues and barriers encountered



Several administrative and technical barriers were met during the implementation process.

- Building permit was mandatory. After several feedback loops, the building application was submitted in November 2020, requiring major conceptual changes and operating model on EU research project level.

Challenges: Building permission for foil greenhouses could not be granted for public use given structural design is certified for agricultural uses only, requiring additional calculations of the building's structure and load-bearing capacity, hampering co-design activities.

> Solution: adopt „rent-a-raft“ concept, allowing for workshops outside the greenhouse and venues at Hansa Coking Plant.

- Gaseous emissions from contaminated soil at the aquaponics site required an impermeable foil underneath the greenhouses and additional food analysis for harmful substances

> Solution: food analysis regarding harmful substances will be done

- Challenge: Increasing construction costs of around 90,000 €.

> Solution: In February 2021, funding gap was secured by budget shift of c. 90,000 € between project partners (~ 1/3 of overall costs, e.g. construction of contamination-proof foundation 71.000 €, experts 15.000 €).

- Challenge: 15 months implementation time frame, human resources

Necessary, but time-consuming preparations pre-construction until end 2021 led to shortage of left-over operation time (expected June 2022 to May 2023).

Personell shortage solved by budget shifts until May 2023.

Synergies with other proGReg activities



NBS 8: Pollinator diversity by planting pollinator-friendly species around the aquaponics facility

Work Package 4: NBS monitoring and assessment (General questionnaire, air quality and air temperature, economic and labor impact questionnaire, environmental footprint).

Communication activities



- Die Urbanisten organized workshops about aquaponics in several Dortmund schools: students could build and operate their own school aquaponics system with the goal among others to establish interest and cooperation options for the "Hansaponic" system.
 - Presenting the aquaponics facility during the VertiFarm trade fair about future vertical farming in Dortmund in Sep 27-29, 2022
 - Communication through social media channels
- [project homepage](#)

Maintenance & Sustainability beyond proGReg

During proGReg, Die Urbanisten and SWUAS are jointly managing and running the facility. The operation will be continued by SWUAS until the end of the International Garden Exhibition in 2027 (aquaponics facility is located in the main exhibition area). IGA will co-manage and maintain the facility. Research is conducted into a low-tech heat storage system based on water tanks to improve energy optimization of aquaponics greenhouses.

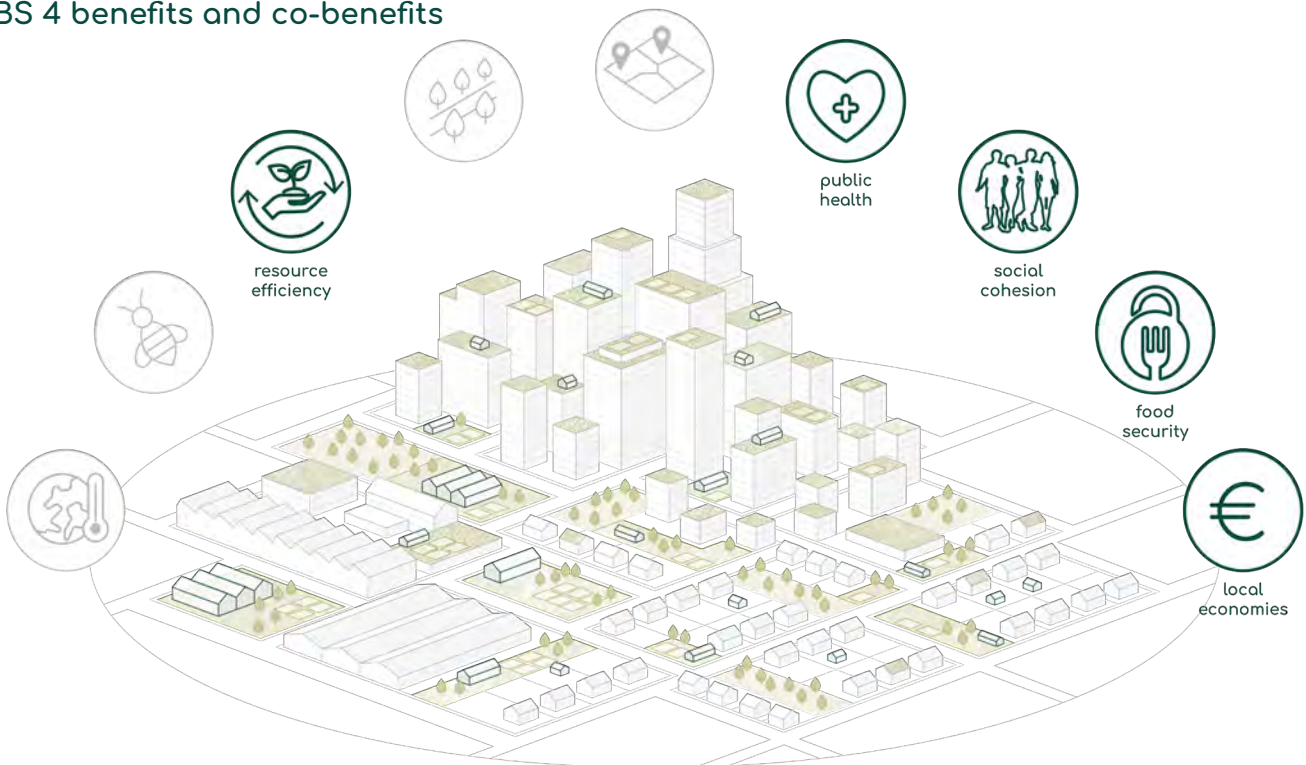
NBS benefits and co-benefits for the Living Lab Dortmund-Huckarde

The NBS has been an experimental testbed for all stakeholders involved, providing a steep learning curve. Soil-less aquaponic systems can utilise spaces e.g., contaminated brownfields for urban regeneration otherwise not usable. Resource efficient food production can enhance food security of the neighbourhood providing fresh products, thus reducing food transport emissions and lowering the CO2 footprint. If operated with the right business model, medium scale systems may create and support the local economy. Medium and small scale systems can foster and support community cohesion through the rent-a-raft model. Being part of the IGA 2027 will further strengthen local identity.

Links with other external projects or activities

- The facility is likely to further developed and operated through the international research project INCiTIS-Food, coordinated by SWUAS until 2026.
- International Garden Exhibition IGA 2027.

NBS 4 benefits and co-benefits



Fact Sheet



Aquaponics as soil-less agriculture on polluted sites

Hansaponik - Community managed aquaponics system

Contact

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- [HansaGrün | Huckarde blüht auf! \(hansagruen.de\)](http://HansaGruen.de)



- 🌐 www.progireg.eu
- 🐦 [@proGReg](https://twitter.com/proGReg)
- in [proGReg-project](https://www.linkedin.com/company/proGReg-project)
- 📘 [proGReg: Nature for Renewal](https://www.facebook.com/proGReg-Nature-for-Renewal)
- 📷 [#proGReg](https://www.instagram.com/proGReg)
- 📺 [proGReg: Nature for Renewal](https://www.youtube.com/channel/UC...)
- 📺 [proGReg: Nature for Renewal](https://www.youtube.com/channel/UC...)

Partners



Fachhochschule
Südwestfalen
University of Applied Sciences

Stadt Dortmund



aquaponik
manufaktur





Living Lab Turin - Mirafiori Sud

NBS description

Creation of an extensive green roof on a currently abandoned public building, located in an area named WOW in the Mirafiori Sud district. The green roof covers an area of 140 sqm and is intended to be a “natural lawn” by sowing a mixture of seeds from stable meadows of northern Italy. These seeds can be calibrated to be used in plains and mountain areas. Further extensions are foreseen.

Aim & goals

The NBS addresses multiple dimensions:

- Experimenting with technical and administrative issues relevant to green roofing technical implementation.
- Promoting the re-use of the abandoned building, representing a first step in proposing innovative uses of green infrastructure by implementing the green roof in a small part of the roof
- Long-term goal is to extend it further to other parts of the roof.

Target groups (beneficiaries)

- local residents
- local network of farmers (Codiretti), manage a local food market within the WOW area
- customers of the farmers market
- local NGOs
- students and teachers of surrounding schools,
- disadvantaged people

Main responsible partner

NGO OrtiAlti coordinated, designed and managed the implementation of the green roof and will maintain the roof until the proGREG project end.

Contact

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🌐 www.ortialti.com



Area of implementation

Roof section of a public building located, previously known as VOV102 now named WOW. Originally a factory, the building is owned by the City of Torino and currently unused and abandoned.

GPS coordinates: 45.017254, 7.644881

ProGREG partners involved

Heritage Management Department, City of Turin (Owner of the building)

University of Turin (Department of Life Sciences and Systems Biology, DBios and Department of Agricultural, Forest and Food Sciences, DISAFA)

Other stakeholders involved

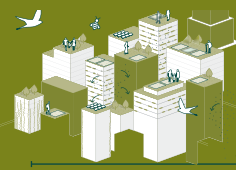
Associazione Parco del Nobile (local NGO of beekeepers)

Implementation budget

Total implementation budget and proGREG funds: 53.500 €

Timeframe

Start
February 2020



Completion
June 2020



Living Lab Turin



NBS 5



(c) L. Ribotta

Green roofs and walls

OR
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AL
TI

FARM YOUR
ROOFTOP.
ENJOY
SHARING!

New green roof at
WOW



Target groups (beneficiaries)

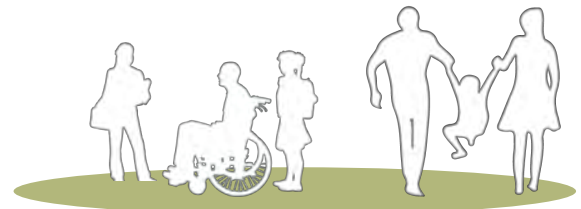
Core beneficiaries are families and elderly people living near the NBS area. They could benefit from the general interest in renovating and opening the building to the public in the future.

Key target groups include:

- local residents to spend time in the newly refurbished area.
- local network of farmers Codiretti who manage a local food market within the WOW area
- customers of the farmers market have now the possibility not only to be hosted in a friendly and green area, but they can also to see the

innovative green roof and get inspiration from it.

- the WOW area is also frequented by local NGOs, students and teachers of surrounding schools,
- disadvantaged people



Stakeholder constellations

Main responsible partner

Orti Alti

- coordination of the implementation of the NBS, structural works and final testing of the implemented roof.
- design and production of all the technical drawings required to obtain the permit to transform the roof
- coordination of the worksite for the construction and the planting phase
- temporary maintenance (maintenance (until the end of the project))

ProGReg partners involved

City of Turin – responsible (owner of the building):

- owner of the building
- administrative permissions
- co-maintenance

University of Turin:

- air quality monitoring

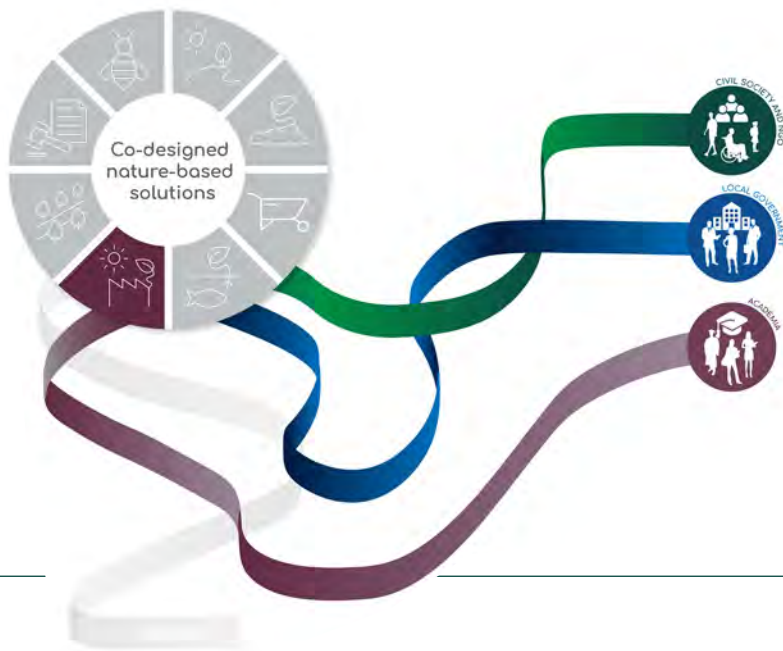
Other stakeholders involved

Associazione Parco del Nobile (local NGO of beekeepers)

- maintenance of the green roof



Co-design activities, stakeholder engagement, and pre-implementation activities



The green roof at the WOW building is the result of mainly citizen-driven engagement, involving a number of civil society associations with the support of botanists from the University of Turin. The municipality of the City of Turin played a secondary role in the implementation of this NBS.

Planning and preparatory activities (administrative and technical procedures)

The initial project started with the idea of creating a roof top garden to be managed by a citizens' association. After evaluating and excluding other buildings, the feasibility study led to the roof of the building located in via Onorato Vigliani 102 (WOW).

Structural loadbearing studies limited the construction of the roof garden to a specific portion of the building's flat roof. Consequently, planning focused on an area of 140 sqm to create an extensive, low maintenance green roof with a flowering lawn, serving as a pasture for bees. Alternative types of extensive green roof vegetation were also considered including:

- sedum (requires less maintenance but is less attractive for pollinating insects);
- lippia nodiflora (low maintenance, quite attractive for pollinating insects);
- meadow florin plant (higher maintenance but higher biodiversity and attraction of pollinating insects).

Given the willingness of the beekeepers to mow a flowering meadow, it was decided to opt for the flowering meadow.

The roof has been provided with a lifeline. The roof is accessed through an aerial platform, restricting access only to specialized personnel.

Irrigation is secured by harvesting rainwater.

Implementation budget

Total implementation budget and proGReg funds:

53.500 €





Co-design and engagement activities

Fondazione Mirafiori, Coldiretti and an informal network of beekeepers were engaged in the co-implementation process of the Pollinator friendly Garden. The Covid-19 hampered the engagement process, and restarted after the end of the restrictions by organizing the maintenance and accompaniment activities with citizens.

During the co-design process, the Heritage Management Department of the City of Turin provided its offices for managing the construction site.

Botanists from UNITO consulted in selecting suitable vegetable species to plant on the green roof to create a mellifluous garden.

Key achievements and implementation results

The decision of the City Council to develop the site and collaborating with Fondazione Mirafiori in the co-design and management process has a major achievement. In addition, the process has led to opening a tender for the future renovation and reuse of the building.

Critical implementation issues and barriers encountered

Citizens are not allowed to use the internal stairs to the roof by the Heritage Management Department of the City of Turin due to safety issues since the building is not supervised and only used occasionally. The cost of external stairs would outstrip the green roof cost.

The City will transfer the use of the building to a new entity.

Key barriers are connected to the city's difficulty to find a new and long-term use for the building, having repercussions on the management of the green roof (maintenance requires an annual mowing).

Another critical issue is to engage the City's Green Maintenance offices in maintaining the site.

Synergies with other proGReg activities



Direct connection with NBS 8 Pollinator Friendly Garden - same location and also managed by OrtiAlti.

- Enabled joint co-design processes for the two NBS.
- Serves as a showcase for potential future use of the area.

Links with other external projects or activities

European project (CWC- EU program Interreg):

- the reuse of rainwater for a green roof was source of inspiration for the watering system of the roof.

Communication activities



- documenting and disseminating different phases of the construction through OrtiAlti's social media channels.
- local press interview with OrtiAlti
- several articles about the green roof and the pollinator friendly garden between February and March 2020 (before Covid-19 lockdown)

Maintenance & Sustainability beyond proGReg

Associazione Parco del Nobile together with OrtiAlti, will be responsible for maintenance of own human and financial resources. The sustainability of the NBS beyond proGReg is linked to the future use of the building and the area.

The City of Turin is determined to find a strong new stakeholder for managing the building and the surrounding green area. It is envisaged to use the area to build a new Science Center for disseminating proGReg NBS and other green solutions for citizens and scholars. This may stimulate new collaborations between the Science Center and other local stakeholders by means of a collaboration pact (Fondazione Mirafiori, Parco del Nobile, informal beekeepers, etc.).

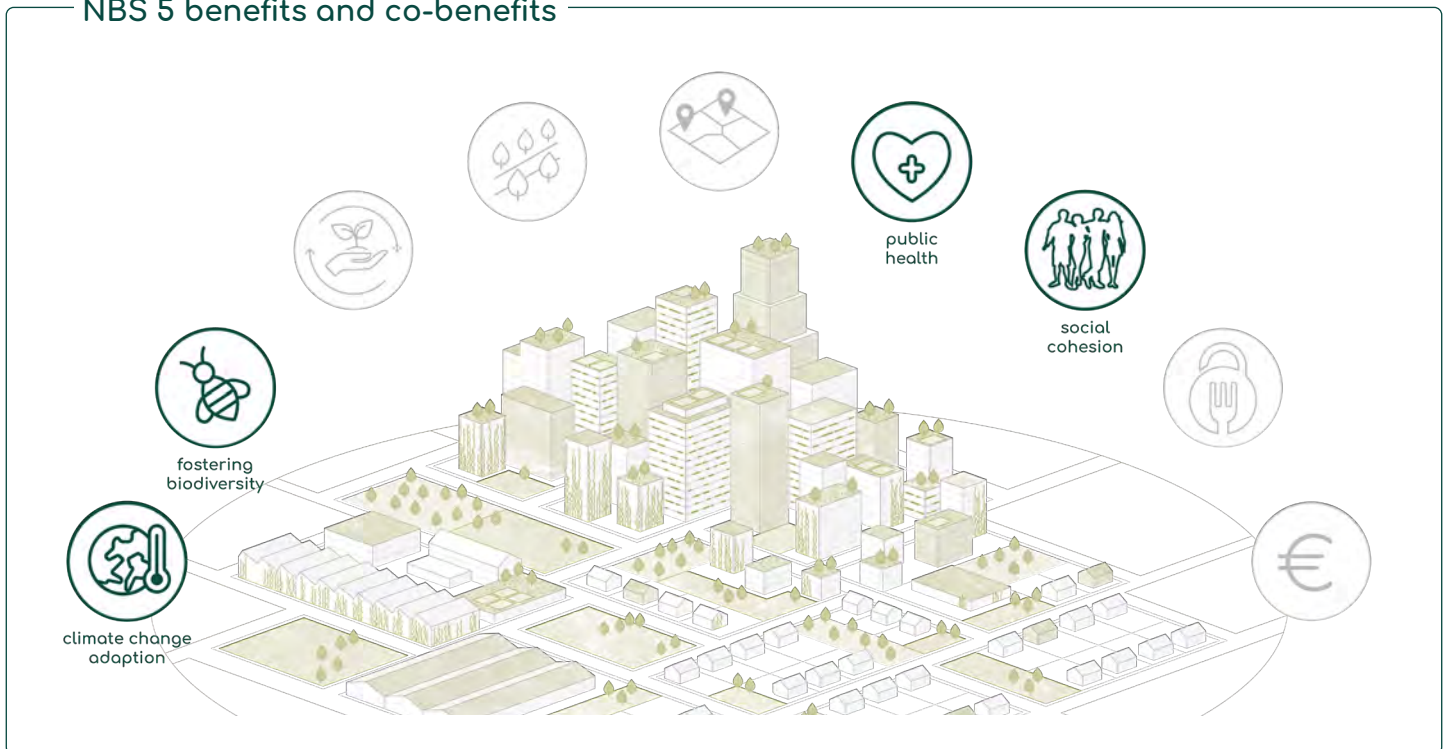


NBS benefits and co-benefits for the Living Lab Turin

The intervention has stimulated new perspectives of the future reuse of the WOW building.

To date, private sector players have expressed interest in renovating and using the building in accordance with the new “green vision” of the City of Turin.

NBS 5 benefits and co-benefits



Fact Sheet



Green roofs and walls



New green roof at WOW

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🌐 www.progireg.eu

🐦 @proGireg

in proGireg-project

📘 proGireg: Nature for Renewal

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🗣️ proGireg: Nature for Renewal

📺 proGireg: Nature for Renewal

Partners



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DI TORINO



Living Lab Turin



NBS 6

Accessible green corridors



Green corridor and local natural heritage enhancement





Living Lab Turin, Italy

NBS description

This NBS transformed a stretch of road into a green corridor connecting the residential area with the Mirafiori Castle and Piemonte Park. The construction work was accompanied by a strong engagement process and planting grasses, shrubs and trees, as well as placing landmarks/signs for providing information of the site. Through various activities, events and visits, local residents connected to the site. This has created a sense of identification and affection, and will further stimulate care and community ownership.

Aim & goals

The NBS addresses societal and environmental issues:

- to create an ecosystem path capable of redeveloping formerly unattractive areas
- to establish NBS in an area with high risk of „heat island effects“
- to foster processes of residents' involvement, participation and awareness
- to increase biodiversity by planting pollinator friendly species

Target groups (beneficiaries)

Citizens living in the area, e.g. residents of social housing and smallholders, communities with economic and social difficulties, physical and mental disabled people in care homes

Main responsible partner

- City of Turin
- Fondazione di Comunità Mirafiori

Contact

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 info@fondazionemirafiorie.it



Area of implementation

The „Green Corridor“ area in the Mirafiori district is developed in incremental sections along via Rodolfo Morandi in the stretch between via Castello di Mirafiori and via Palmiro Togliatti: the first section lies between via Castello di Mirafiori and via Rodolfo Morandi n.17

GPS coordinates: 45.013366, 7.633085

ProGReg partners involved

University of Turin (Department of Life Sciences and Systems Biology, DBios and Department of Agricultural, Forest and Food Sciences, DISAFA)

Associazione Miravolante – local community association (proGReg Linked Third Party)

Other stakeholders involved

- ATC (Housing Agency)
- Casa Farinelli (house for displaced families)
- AIAPP – Italian Association of landscape architecture
- Catholic Parishes of the neighborhood
- ASL Città di Torino (public healthcare agency)
- I Passi Social Cooperative

Implementation budget

Total implementation budget and proGReg funds: 82.000 €

Timeframe

Start
August 2020



Completion
June 2022

NBS description

The Sangone waterway surrounding the city to the south and the Piedmont Park area offered the opportunity to create an ecosystem path that regenerates neglected areas at risk of „heat island effects“ through agricultural, horticultural and beekeeping activities. The NBS fosters citizen involvement, participation and awareness-building processes among local residents. Citizens living in the surrounding area have developed a sense of identification and affection for the territory, leveraging community ownership and maintenance of the site.

The former traffic barriers and small gardens lacked character, and hence poorly used by inhabitants. Planting grasses, shrubs and few trees in the area and along the road enhanced the living environment of local residents while creating green corridors for pollinating insects and birds that feed on them. The NBS intervention was designed as pre-defined and modular elements, making the operation economically viable in line with the available budget. Thus allowing for extending the NBS when further funding is sourced. In addition, information totems and a set of visiting paths have been designed to improve

access to natural heritage of the Mirafiori district while raising awareness of proGReg NBS in the neighbourhood. Guided tours complement the dissemination campaign from spring 2021 to the end of the project at the end of 2023.

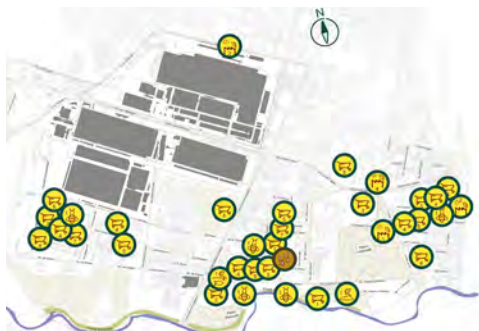
Aim & goals

The NBS addresses societal and environmental issues with aim of:

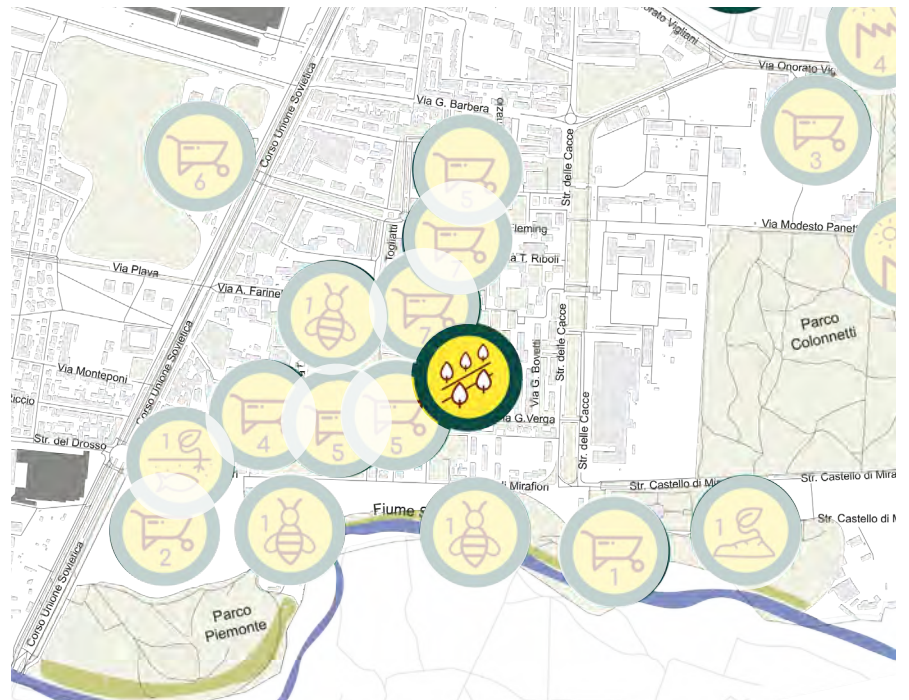
- creating an ecosystem path capable of redeveloping areas that lacked character
- building NBS in an area with high risk of „heat island effects“
- fostering processes of involvement, participation and raising awareness among residents
- increasing biodiversity by planting pollinator friendly species
- developing a sense of community, spatial belonging and co-ownership to ensure co-maintenance by residents together with the municipality of Turin

Area of implementation

The „Green Corridor“ in Mirafiori Sud district consists of incremental sections developed along via Rodolfo Morandi.



Living Lab Turin map - total and NBS zoom-in

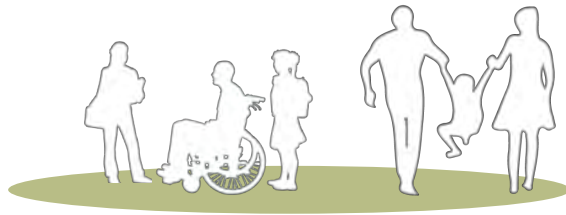


GPS coordinates: 45.013366, 7.633085

Target groups (beneficiaries)

Local citizens including:

- residents of social housing and smallholders,
- communities with economic and social difficulties,
- physically and mentally vulnerable people living in care homes



Stakeholder constellations

Main responsible partner

- City of Turin – Mobility and Infrastructure Department – Urban plan Service; Project design and coordination

Facilitating collaboration between several municipal departments, enabling the Urban Plan Service to coordinate the design of the NBS “Green Corridor”. Meetings with various stakeholders facilitated communication, professional and design exchanges.

- Fondazione Mirafiori

- > Coordinating active citizen involvement and participation.
- > Managing and organising meetings with various stakeholders to harness organizational experience and historical knowledge of the area.
- > coordinating a group of vegetable volunteers involved in creating the green corridor.
- > responsible for coordinating the information totem’s design and organising guided tours, together with its LTP Miravolante

ProGReg partners involved

- University of Turin (Department of Life Sciences and Systems Biology, DBios and Department of Agricultural, Forest and Food Sciences, DISAFA):

Scientific support for identifying flora and fauna species on the territory.

Contributed fundamental scientific characteristics for designing the NBS, in particular regarding the choice of botanical and faunal species, and then for pre and post-implementation monitoring activities to assess the benefits of the NBS and produce evidence-based data.

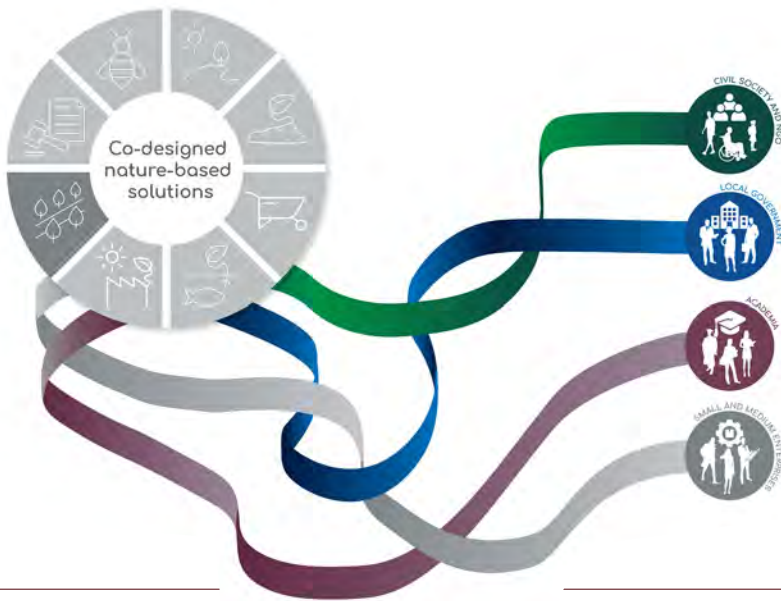
Miravolante - local community association: organising activities and visits for citizens

Other stakeholders involved

- ATC (Housing Agency): contacts with tenants
- Casa Farinelli (House for displaced families): engagement activity with citizens and users
- AIAPP – Italian Association of landscape architecture - Piemonte and Valle d’Aosta section: professional consultancy about project technical features
- Catholic Parishes of the neighborhood: involved in engagement and volunteering activities
- ASL Città di Torino (public healthcare agency): involved in engagement and volunteering activities
- I Passi Social Cooperative: involved in engagement and volunteering activities



Co-design activities, stakeholder engagement, and pre-implementation activities



The need to involve citizens in safeguarding, maintaining and designing when redeveloping green areas was the starting point. The co-design process aimed at promoting the creation of a small ecosystem that have positive impacts on both human and other living beings.

Planning and preparatory activities (administrative and technical procedures)

Key implementation steps for the NBS included:

- meetings with the City of Turin to plan and coordinate other NBS actions
- preparing and clearing the site
- organise training for constructing and maintaining the Green Corridor,
- gathering groups of citizens for light maintenance works, accompanied by controlling and reporting any critical maintenance and management issues
- contacting the City of Turin department in charge of urban furniture for identifying the necessary administrative procedures to install landmarks/signs
- requesting and collecting cost estimates for landmarks/signs from three possible suppliers
- following the co-design process, final designs were submitted to the Administration to start the physical implementation.

Co-design and engagement activities

A social analysis identified relevant stakeholders to engage in the co-design process:

- DBios University, Casa Farinelli, ATC, ASL, the local Parish and I Passi engaged in the design process, notably in the phases of involving families with housing or economic difficult conditions in regard to future maintenance

Implementation budget

Total implementation budget and proGReg funds:

82.000 €



of the NBS and training on re-introducing pollinating insects.

- Participating in the planting to generate and an understanding of construction and monitoring works, and the benefits of (symbolic) food production strengthened civic commitment: people involved continue to engage in maintaining the area.

Key achievements and implementation results

The NBS is driven by citizen engagement and NGOs active in the area, e.g. participating in workshops and maintenance activities.

- Citizen engagement was re-assessed when entering the co-maintenance phase in order to plan dedicated activities.
- Fruitful collaboration with the University Turin department DBios to select the most suitable plant species for the green corridor to foster the propagation of butterflies and pollinating insects.
- Subsequently, DBios has started monitoring butterfly activity in the area to compare before and after effects.

Synergies with other proGReg activities

The area is part of a series of proGReg interventions:

NBS 3 - development of community farming (Orti Generali), organization of box gardens with the involvement of citizens living in the neighborhood (Gardens around the houses).



NBS 8 - beekeeping activities (Butterfly gardens for disadvantaged people)

- Feeding into the „Spatial analysis and analysis framework“ of Work Package 2.1
- Feeding into “Methodologies and variables for NBS monitoring and evaluation” (Work Package 4) in collaboration with UNITO.

Links with other external projects or activities

The activity is linked with the Iperurbana project that organises visits and events to promote the Mirafiori Sud district.

The redevelopment of the Sangone riverbanks, a COTO project financed by local funds will continue the regeneration and transformation of the area.

Critical implementation issues and barriers encountered



- The Covid-19 pandemic caused delays leading to the suspension of a series of meetings on site for the design, monitoring and inspections of the NBS implementation.
- Difficulties in obtaining planning permission also caused delays.

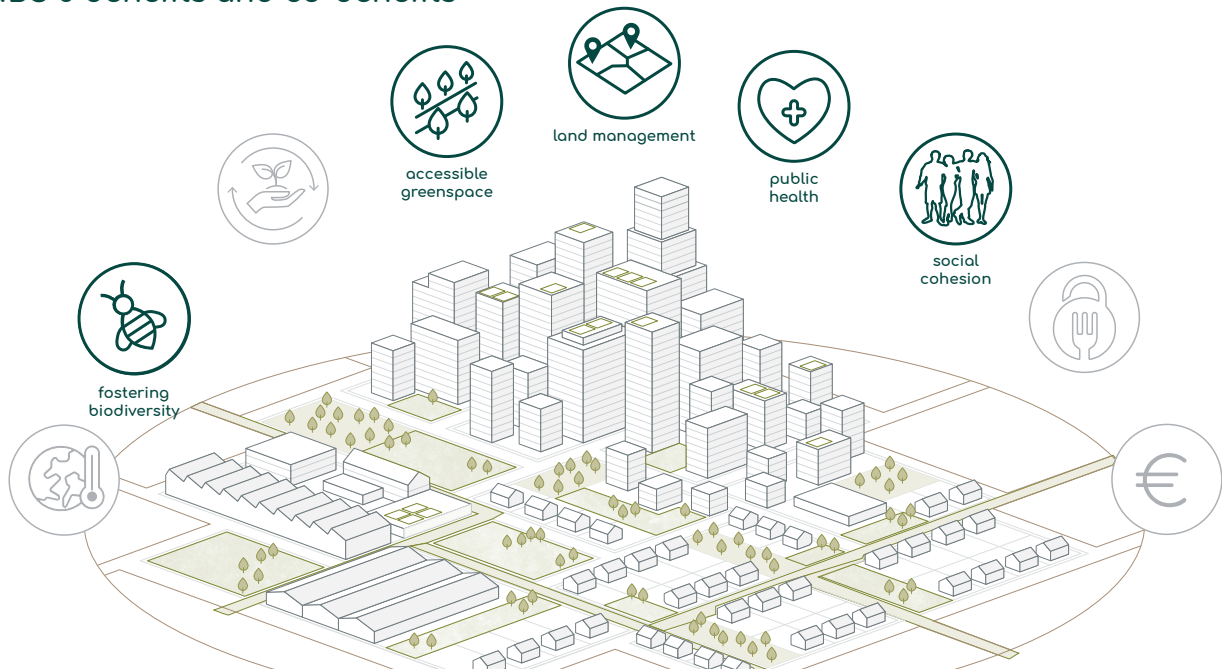
Communication activities



Activities address several levels:

- “Endogenous” workshops with the aim of involving the resident population in different situations to contribute to the formation of a heterogeneous community.
- “Exogenous” workshops, with the aim of involving multimedia networks (radio, television, local and national press) to disseminate the potential role of NBS and increase awareness and participation.
- Small training courses aiming at a better understanding of the importance of vegetation and the fundamental role of pollinating insects, the synergetic effects of different actions that foster a respectful behaviour for green spaces, and a collaborative maintenance and management approach.
- Workshops and meetings aimed at highlighting the value of experiencing cultivation as a heritage of popular traditions.
- Design and construction of information totems.
- Design and organisation of guided tours.

NBS 6 benefits and co-benefits



NBS benefits and co-benefits for the Living Lab Mirafiori Sud in Turin

The NBS benefits the entire Living Lab area by:

- Creation of a community feeling among residents in different residential housing and social conditions with the aim of sharing and understanding the preciousness of social commitment
- Positive effects of biodiversity
- Contribution to mitigating climate change effects and heat island risks highlighted in the analysis of locations

Maintenance & Sustainability beyond proGReg

- Forming citizen associations present in the area, and a group of volunteers to carry out maintenance and further development of the NBS, in collaboration with municipal and district technicians.
- Planning to raise further funds to develop other ambitious projects to achieve wider goals.
- The Iperurbana project will be involved in organising events and visits and to promote sustainable tourism on the Sangone riverbanks with access to proGReg NBS.



Fact Sheet



Accessible green corridors



Green corridor and local natural heritage enhancement

Contact:

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info@fondazionemirafiorie.it



www.progireg.eu

[@proGireg](https://twitter.com/proGireg)

[in proGireg-project](https://www.linkedin.com/company/proGireg-project)

[f proGireg: Nature for Renewal](https://www.facebook.com/proGireg-Nature-for-Renewal)

[@ #proGireg](https://www.instagram.com/proGireg)

[proGireg: Nature for Renewal](https://www.youtube.com/channel/UCproGireg)

[proGireg: Nature for Renewal](https://www.youtube.com/channel/UCproGireg)

Partners



UNIVERSITÀ
DEGLI STUDI
DI TORINO



Living Lab Turin, Italy



NBS 7

Establishing protocols and procedures for environmental compensation

Strategic public-private partnership for greening the City of Turin



NBS 7 Establishing protocols and procedures for environmental compensation



Living Lab Turin, Italy

NBS description

This NBS allowed the municipality to identify, collect and display tools and concrete cases in order to improve the administration of city-owned green assets. Green areas should be considered as main „urban commons“. In contemporary cities this means shared management can link different realities, helping to build a sense of community. Engaging the private sector supports boosting the development of green areas by providing win-win solutions.

Target groups (beneficiaries)

Urban planners, city departments interested in using such tools and solutions

- Private companies interested in environmental and green issues as a form of social responsibility action

Main responsible partner

City of Turin, EU Funds and Innovation Department

Other stakeholders involved

Different City administration departments were involved to collect experiences and needs as follows:

- Green,
- Environment,
- Public and Private building,
- ICT,
- Urban planning.

Total budget

Total implementation budget: ca 25.000 €
proGlgreg funding: 20.000 €
private sector co-funding: 5.000 €

Timeframe

Start January 2019 → Completion December 2022

PRE-IMPLEMENTATION PLANNING ACTIVITIES

The management of public green

The NBS „Establishing protocols and procedures for environmental compensation“ in Turin addresses the management of public green. The City of Turin owns more than 18 million square meters of municipal public green (2019), representing about 14% of the city's surface. This patrimony implies a very important heritage: preservation, maintenance and enhancement requiring not only necessary skills and professionalism, but also adequate resources: hence the decision of the City to adopt initiatives that encourage greater collaboration, including financial support from the private sector.

Aim & goals

In recent decades, the actions of the Public Administration have been considerably affected by the difficult overall economic situation. While local authorities have been increasingly called upon to carry out primary tasks in the administration and meet the growing expectations of citizens suffered from a decrease in available resources, partly due to reduced government transfers.

Therefore, alternative ways of managing certain activities are increasingly being tried out at the local level, not least with the aim of limiting expenditure.

For instance, private party involvement in developing new infrastructures such as new green areas, playgrounds, sports areas, urban gardens, as well as in supporting maintenance and care of existing green assets, incl. green areas, trees and woods, playgrounds, dog areas, urban gardens, furniture and fountains.

A priority area of involvement of private entities is also the enrichment of the city's arboreal heritage, through interventions of urban forestation, which may involve new plantings or creation of urban forests.

MANAGEMENT STRUCTURE AND RESPONSIBILITIES

Main partner and role/function

The municipality of Turin coordinates the NBS activities. Implementing this NBS started useful collaborations between different sectors of the City of Turin ranging from departments Green



Environment, Urban planning, ICT, Private and public building. Fruitful dialogue and exchange have led to collecting and elaborating a list of different opportunities for financing public green areas and adopting some of them in the Living Lab.

TOOLS/SOLUTIONS

Donation & sponsorship

Donation is a simple mechanism to involve the private sector in the care of the public green.

- Financial support or participation in interventions, citizens and companies can act with purely philanthropic attitudes. This method is used by non-profit organizations or individual citizens and companies as part of social responsibility actions.
- Sponsorship is a contract whereby one party (the sponsee) allows another party (the sponsor) to use its public image and name to promote a brand or product in return for payment. The private subject carries out maintenance and enhancement of the city's green areas at their own care and expense in response to public calls for proposals and following an evaluation procedure of proposals. In return, the sponsors image is enhanced established by the contract in addition to tax benefits according to current fiscal laws (may vary according to the sponsor's legal nature and tax position).

Collaboration agreements

The municipal Regulation n. 357, about municipal contracts, defines the collaboration agreement between the City's administration and private organizations and citizen. The Regulation n. 375, about urban commons, regulates the collaboration agreement for care, shared management and regeneration of green areas and other spaces and buildings within green areas.

ICT Tools

Provided the City and the territory to develop IT tools and technologies able to systematically collect all spatial and non-spatial data on common cartographic databases. The City Acquired "FME software suite" a Geo ETL (Extract, Transform, Load), to build workflows that receive input from heterogeneous data sources, perform transformations on them (e.g. mapping, restructuring, manipulation, coordinate projections) and generate output in as many formats as possible, both proprietary and free.

CASE STUDIES

Donation & sponsorship

The sponsorship tool helped companies to invest resources as a measure of corporate social responsibility. In April 2020, the first urban forestation intervention was carried out under the protocol with the partner Mellin S.p.a. for [3,000 trees planted in Piedmont Park](#) along the ecological corridor of the Sangone river in the Mirafiori Sud district. In 2021, another 3.000 trees were donated by Ikea in the same Piedmont Park within a forestation campaign named "[Mosaico Verde](#)".

Collaboration agreements

The regulations allowed to improve and simplify procedures for finding a sponsor and stipulate collaboration agreements. As a result, the Municipality of Turin adopted a multi-year program to find sponsors for the care and enhancement of the city's public green areas. The collaboration agreement fosters collaboration and private engagement in the maintenance of the NBS implemented at WOW building (Green Roof, Pollinator gardens).

ICT tools: flat roofs

The City Heritage Department collects estates data inside fragmented CAD files, one for each cadastral sheet, which are suitable for a graphic representation but not for data analysis. FME technology has helped the ICT department to translate CAD files to GIS format, providing the City with a full-view city map of estates and a dataset suitable for further processing and analysis. Exemplary for the use of the GIS estates dataset, the ICT department leveraged FME to get a map of public buildings with flat roofs: Valuable support in identifying potential sites for NBS.

ICT tools as a policy and regulatory instrument

FME is a powerful instrument demonstrating possible effects of applying NBS widely in urban areas, verifying the improvements, i.e. related to heat islands effects. Reference is made to instruments helping the administration to design and implement good policy mix to support innovation in the NBS sector:

- Municipal regulations (e.g. Building Regulations)
- Thematic action plans (e.g. Climate Adaptation Plan)
- Instruments to engage private sector (environmental compensation, CSR Green network)

RESULTS AND OUTLOOK

All tools elaborated within this NBS need to be further developed and shared by collaborating with several third parties and networks in the area to respond to the demand of the private sector seeking opportunities for environmental compensation or the creation of social and environmental value to increase the quality of the environment and of public green spaces.

Next steps

- Development of a software and procedural tools helping the municipality to assess and guide urban transformations and supporting the Administration in calculating possible environmental compensations. The tool should allow the analysis of changes in the value of eco-systemic functions by modeling and comparing different intervention in land use transformations.
- A further opportunity for innovation in this area will be to attract even unusual investments in the environmental field. Due to an increasing attention to the state of the environment, climate change and its impacts on the territories, the value of the soil and biodiversity, as well as the need to compensate the environmental impacts of individual economic activities, some private investment funds are looking for opportunities to generate environmental value to complement the economic and financial value generated by traditional investments.



Fact Sheet



NBS 7

Strategic public-private partnership for greening the City of Turin



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🌐 www.progireg.eu
🐦 [@proGireg](https://twitter.com/proGireg)
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f [proGireg: Nature for Renewal](https://www.facebook.com/proGireg-Nature-for-Renewal)
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Partners



CITTA' DI TORINO





Living Lab Dortmund-Huckarde

NBS description

The necessity to re-establish flowering meadows and natural living spaces in urban areas to recreate habitats especially for pollinating insects has become more and more important during the past years. Biodiversity projects have gained acceptance and wide support in society, also since their implementation is low cost, requires comparatively low planning effort and is possible on lots for temporary use.

In Dortmund the citizens led association "Naturfelder Dortmund e.V." was founded which serves as a catalyst for seeding projects.

Since 2020, more than 10 public and private areas within and outside the Living Lab (e.g. park areas) were converted into extensively cared for biodiversity spaces, using regional type grass and flower seeds.

Aim & goals

Key goal is converting intensively cared for urban green spaces into habitats that are also nourishing for pollinating insects. The Naturfelder Dortmund e.V. association aims at:

- Converting new areas in the Living Lab and beyond into flowering meadow habitats to increase biodiversity.
- Activating interested citizens from the Huckarde and Deusen district in the transformation of space into a flower meadow.
- Involving vulnerable and marginalized groups in the co-design and implementation of this NBS
- Mitigate pollution and slow down erosion

Target groups (beneficiaries)

Huckarde citizens, especially those who use the public park paths adjacent to the biodiversity spaces

Main responsible partner

South Westphalia University of Applied Science (SWUAS)

Contact

✉ progireg@dieurbanisten.de
🌐 naturfelder.de
dortmund.de
hansagruen.de



Area of implementations

Location of Dortmund flower meadows (smaller projects not included):

Huckarder Straße,
51.531225883009036, 7.4200856108000135
Gustav-Heinemann-Park,
51.53316186588006, 7.409193049796729
Grafen Grundschule,
51.54704697306564, 7.4277988637637815
Allotment garden area Glückauf Hansa,
51.537983485247196, 7.404910941102673

ProGREG partners involved

Die Urbanisten e.V., APM, SWUAS: working on Co-Design concepts.

City of Dortmund, Department of Green Spaces; seeding and maintaining extensively cared for park areas

Other stakeholders involved

N.A.B.U. (environmental association)

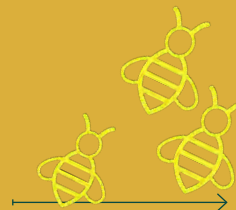
B.U.N.D., Klimabündnis Dortmund, Emschergenossenschaft

Implementation budget

Total implementation budget: 2,000 €
proGREG funding: 2,000 € (SWUAS)

Timeframe

Start
Fall 2020



Completion
December 2022



Living Lab Dortmund-Huckarde



NBS 8

Pollinator biodiversity

HansaGrün

Improving and monitoring
pollinator biodiversity in
Huckarde



NBS description

The necessity to re-establish flowering meadows and natural living spaces in urban areas to recreate habitats especially for pollinating insects has become increasingly important. Biodiversity projects have gained acceptance and wide support in large parts of the society. Implementations are low cost, require comparatively low planning effort and possible on plots available for temporary use.

The citizen-led association "Naturfelder Dortmund e.V." was founded in 2021. Since then, the association managed to motivate interested citizens in joining the group, acting as a catalyst for seeding projects that otherwise might not have been realised.

Since 2020, more than 10 areas within and outside the Living Lab Huckarde (e.g. park areas) have been converted into extensively cared for biodiversity spaces featuring regional grasses and flower seeds. The pollinator-friendly plants offer living and nourishing habitats providing rich food sources such as pollen and nectar for pollinating insects.

Area of implementations

Flower meadows have been implemented on several locations in the Living Lab and other city districts.

Aim & goals

Naturfelder Dortmund e.V. was founded in order to convert urban spaces into pollinator friendly habitats. The structure of the association allows long-term existence beyond proGReg. Main goals of the NBS implementations include:

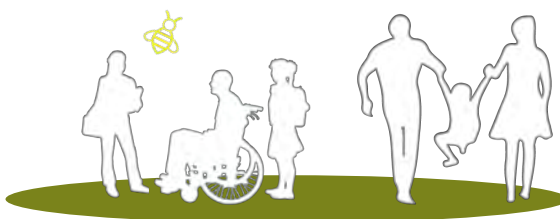
- Activating interested citizens from the Huckarde and Deusen district for pollinating insects and biodiversity topics
- Sowing flower meadows or planting insect friendly plants that increase biodiversity on public or private land in cooperation with owners
- Participating in events to inform about pollinator friendly measures
- Supporting citizens or groups: implementation of pollinator friendly areas on their land
- Offering workshops in schools: e.g. sowing flower meadows, building insect houses
- Supporting projects of the municipal Department of Green Spaces: e.g. proposing usable areas for sowing or helping to irrigate newly seeded areas
- Involving a wide range of citizens, including vulnerable groups in co-design and implementation actions such as children in the seeding activities.



Target groups (beneficiaries)

Key beneficiaries include:

- all residents of Huckarde and neighbouring districts
- families in Huckarde
- individuals
- School students



Stakeholder constellations

Main responsible partner

South Westphalia University of Applied Science (SWUAS)

ProGReg partners involved

City of Dortmund, Department of Green Spaces: selecting locations, soil preparation activities, seeding, and maintaining the biodiversity spaces.

Die Urbanisten e.V:

- public communication within other living lab events such as local seed festival and presenting the project in public events (e.g. Students for Future)
- media campaign for citizen activation
- co-founding of Naturfelder Dortmund e.V. association

Other stakeholders involved

N.A.B.U. Dortmund, B.U.N.D. Dortmund: Environmental organizations that advise the Naturfelder association with expert knowledge on biodiversity

Emschergenossenschaft und Lippeverband (EGLV): Provision of sites for implementation



ACADEMIA



CIVIL SOCIETY AND NGO



LOCAL GOVERNMENT



CIVIL SOCIETY AND NGO

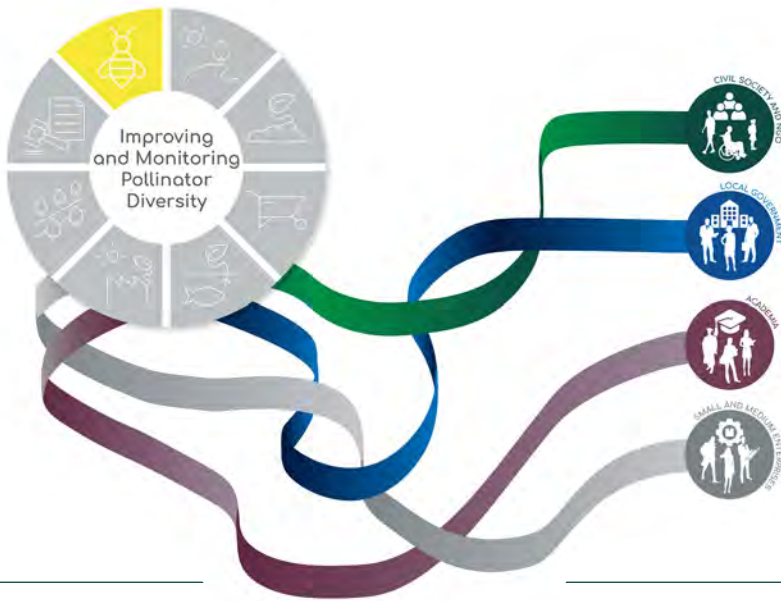


LOCAL GOVERNMENT



SMALL AND MEDIUM ENTERPRISES

Co-design activities, stakeholder engagement, and pre-implementation activities



Stemming from a bottom-up citizen-led initiative, the co-design process created a growing multi-stakeholder network that overcame a number of challenges at the beginning of NBS design and implementations, despite the limitation caused by the pandemic.

Planning and preparatory activities (administrative and technical procedures)

Finding sites for the seeding activities proved time-consuming due to several reasons:

- Housing companies were contacted in vain.
- Site visits on the former landfill Deussenberg revealed that the selected 1 ha area already benefitted from high ecological value.
- Contact to the Department of Green Spaces, City of Dortmund led to a cooperation for seeding on intensely cared for green areas in public parks (e.g. allotment area “Glückauf Hansa”, Gustav-Heinemann-Park).

In 2019, the Department of Green Spaces started a Dortmund-wide initiative “Stadtgrün naturnah” (“green city spaces close to nature”) for creating biodiversity habitats mainly in public parks. This cooperation created a win-win-situation, enabling the conversion of Huckarde areas earlier than planned. Grass and flower seeds typical for the Dortmund region have been selected in cooperation. The Department of Green Spaces ordered seeds twice, being refinanced by SWUAS.

SWUAS and Die Urbanisten established an NGO to identify new seeding areas for this NBS. The association Naturfelder Issum served as prototype.

Implementation budget

Total implementation budget: 2,000 €



ProGReg budget for material costs has been transferred directly from SWUAS to projects partners in charge.



(c) R. Morgenstern

Co-design and engagement activities

ProGREG project partner aquaponik manufaktur GmbH had founded an association called Naturfelder e.V. that converts plots into flower meadows in Issum, Germany. This concept has been adapted for the Dortmund Living Lab in collaboration with the Urbanisten and SWUAS in autumn 2020. Members of the association include activists and agriculture, permaculture and nature conservation experts.

The first co-design meetings took place online during Covid-19 lockdowns. Experts of pollinator diversity and general biodiversity from NABU and the City of Dortmund participated. This cooperation identified suitable spaces for conversion in public areas and selected regionally produced seeds most beneficial to increase pollinator biodiversity.

Therefore, contact with participants took place online but limited the target group, excluding potential participants who were less proficient with digital technologies, e.g. retirees who are nature-oriented, interested in 'hands on' nature projects and have time.

- Building trust during online sessions with the participating groups in comparison to physical meetings is more difficult.
- Lengthy approval processes to gain tax privilege "for the common good" due to missing information of the paperwork
- Lacking this special status, opening a bank account was not possible, therefore no new members could be attracted. This issue was finally solved after the association was legally registered in August 2022.

Key achievements and implementation results

Naturfelder Dortmund has carried out soil preparation, seeding and irrigation at 10 sites in Dortmund. The first site was seeded in cooperation with the regional association EGLV (Emschergerossenschaft und Lippeverband) in spring 2021, even before the association was founded.

Success factors for social innovation (trust and liability) is a social contract between the different stakeholders by establishing the bottom-up citizen-led association Naturfelder e.V. The group advocates biodiversity and engages citizens in activities achieving:

- Citizen empowerment and promotion of public ownership of the NBS.
- Risk taking in social innovation,
- Being experimental and open for success but also for failure in the first attempts and developing the know-how for new implementations

Synergies with other proGREG activities

Small spaces on the implementation sites of NBS 1 and NBS 3 were converted into pollinator diversity sites by respective stakeholders. It is also planned to grow pollinator friendly plants in the front area of NBS 4.



NBS 1: Movement park



NBS 3: St. Urbanus urban garden and food forest



NBS 4: Community-managed aquaponics at Hansa Coking Plant

Critical implementation issues and barriers encountered



- At the start, identifying available implementation spaces for the NBS and finding contacts who could offer suitable areas posed significant barriers.
- Over time, the stakeholders network in Huckarde has grown, finding more site options.
- Social distancing rules during the Covid-19 pandemic limited in person meetings during the media campaign and citizen activation phase.

Links with other external projects or activities

Contact with Naturfelder e.V. in Issum has been established which shares resources like branding and website with new Naturfelder associations and acts as an umbrella organization.

Communication activities



On the project website all informations about the ProGReg and the LL area are provided:

www.proGReg.dortmund.de

Moreover, die Urbanisten initiated creating a website for proGReg in Huckarde presenting the Dortmund NBS addressing Huckarde citizens and involving them in local projects activities. Currently, the webpage www.hansagrueen.de includes most project activities and implementation steps.

- Kick-off event to activate citizens for the foundation of the association (December 2020)
- Advertising for the event on the PR-channels of the City of Dortmund
- Press release on the foundation of the association (July 2021) led to three newspaper articles in local press
- Networking with projects that share similar goals to exchange information of best practices, such as nordwärts (Kooplab).

Presentation of the association on the www.naturfelder.de website.

Maintenance & Sustainability beyond proGReg

The Department of Green Spaces maintains the implementation sites in public parks in Huckarde. The areas of the allotment garden "Glückauf Hansa" are cared for by the allotment garden association, and the EGLV (Emschergenossenschaft und Lippeverband) maintains the implementation on their sites. The flower meadow at Grafen Grundschule (primary school) is maintained by the primary school.

NBS benefits and co-benefits for the Living Lab Dortmund-Huckarde

The benefits for living beings in the Huckarde are multiple: environmentally, socially and indirectly contributing to public health through joint outdoor activities.

Apart from fostering biodiversity for pollinating insects and contributing to tighter habitat networks, the implemented flower meadows are aesthetically attractive, upgrading derelict or underused existing green spaces. It also serves as a good example of social innovation where citizens are empowered to take responsibility for engaging actively in urban regeneration and transformation of their living environment.

NBS 8 benefits and co-benefits



Fact Sheet



NBS 8

Pollinator biodiversity

HansaGrün

Improving and monitoring pollinator biodiversity in Huckarde

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in [proGReg-project](https://www.linkedin.com/company/proGReg-project)

📘 [proGReg: Nature for Renewal](https://www.facebook.com/proGReg-Nature-for-Renewal)

📷 [#proGReg](https://www.instagram.com/proGReg)

📺 [proGReg: Nature for Renewal](https://www.youtube.com/channel/UC...)

📺 [proGReg: Nature for Renewal](https://www.youtube.com/channel/UC...)

Partners

HansaGrün



die urbanisten

Stadt Dortmund



Lage und Umsetzungsstand Huckarde Living Lab, Dortmund

Status quo of Huckarde Living Lab, Dortmund

Living Lab Plan | Living Lab Vision map

Update: 11 2022



- Ziel 1** Zur Stärkung des sozialen Zusammenhalts und der Identifizierung mit dem Stadtteil sollen in Huckarde neue Grüne Infrastrukturen entstehen und die Angebote an die Bevölkerung sich gärtnerisch zu betätigen, verbessert werden.
Goal1 Implementing Green Infrastructure and gardening activities to improve the social situation and to foster identity within Huckarde.
- Ziel 2** Beteiligung der Bürgerinnen und Bürger bei der Planung und Unterhaltung von „grünen Projekten“.
Goal2 Involving citizens in the design and management of projects with nature based solutions.
- Ziel 3** Beförderung von neuen Geschäftsmodellen, die auf der Idee einer natürlichen Kreislaufwirtschaft beruhen.
Goal3 Promoting new professionalism and business models based on natural solutions of circular economy.



NBS 1 – Sportangebote im Gustav-Heinemann-Park

Ort: Gustav-Heinemann-Park, Dortmund Huckarde

Beschreibung: Öffentlich zugängliche Bewegungselemente, die Bürger verschiedener Altersgruppen zum spielerischen Gebrauch einladen und die einen gesundheitsförderlichen Ausgleich zu überwiegend sitzenden Tätigkeiten im Alltag darstellen.

Partner: Stadt Dortmund, Amt für Stadterneuerung

Weitere Akteure: Grünflächenamt der Stadt Dortmund, Gustav-Heinemann-Gesamtschule, Huckarder Vereine



NBS 3 – Waldgarten in St. Urbanus

Ort: Garten der St. Urbanus-Gemeinde, Dortmund Huckarde

Beschreibung: Auf dem Gelände der St. Urbanus-Gemeinde in Huckarde entsteht auf einer Fläche von 3000 m² ein Waldgarten, in dem vorwiegend essbare Pflanzen in mehreren Vegetationsschichten angepflanzt werden. Der Waldgarten ist ein Beispiel, wie Gärten in der Stadt produktiv und umweltgerecht gestaltet werden können. Er wird in mehreren Workshops von der Gemeinde aufgebaut.

Partner: Fachhochschule Südwestfalen, die Urbanisten e.V.

Weitere Akteure: Kath. Kirchengemeinde St. Urbanus



NBS 4 – Aquaponik

Ort: Kokerei Hansa, Dortmund Huckarde

Beschreibung: Auf einer Fläche des Industriedenkmals Kokerei Hansa entsteht eine wissenschaftliche Versuchsanlage, in der perspektivisch Fisch- und Pflanzenzucht in einem Kreislaufsystem vorgesehen sind. Aquaponik heißt dieses Kreislaufsystem, welches dazu beitragen kann, die Menschen in der Stadt mit gesunder und umweltschonend produzierter Nahrung zu versorgen. Die Anlage dient zur Optimierung technischer Aspekte und zur Analyse, ob sich aufgrund kontaminierter Böden trotz baulicher Schutzmaßnahmen und bodenfreiem Anbau Schadstoffe in Nahrungsmitteln einlagern.

Partner: die Urbanisten e.V., Fachhochschule Südwestfalen, Aquaponik Manufaktur GmbH, Citybotanicals GmbH

Weitere Akteure: Stiftung Industriedenkmalpflege und Geschichtskultur



NBS 6 – Verbesserte Zugänglichkeit von Freiflächen

Ort: Halde Deussenberg, Dortmund Huckarde

Beschreibung: Seit der Einstellung des Betriebs 1992 und der anschließenden Rekultivierung hat sich die ehemalige Mülldeponie Deussenberg zu einem beliebten Naherholungsziel entwickelt. Die Zugänglichkeit auf die Halde besteht fast ausschließlich von Ostern, an den Huckarder Siedlungskörper ist die Halde daher nicht gut angebunden. Seit Jahren besteht der Wunsch der Huckarder Bürger, die Zugänglichkeit auf die Halde zu verbessern. Daher wurde eine barrierefreie Wegeverbindung am südöstlichen Hangfuß gebaut.

Partner: Stadt Dortmund, Amt für Stadterneuerung

Weitere Akteure: Entsorgung Dortmund GmbH (EDG GmbH, Sachwalter), Emschergenossenschaft



NBS 8 – Biodiversität für Bestäuberinsekten

Ort: an verschiedenen Orten in Dortmund Huckarde

Beschreibung: An den Standorten der NBS 3 und NBS 4 sowie an mehreren Orten in Huckarde werden Pflanzen für Bestäuberinsekten ausgesät. Die einzelnen Standorte sind miteinander verbunden, so dass sich die Insekten einfach zwischen den verschiedenen Grundstücken hin- und her bewegen können. Darüber hinaus profitieren auch die Menschen von der visuellen und ökologischen Aufwertung.

Partner: Fachhochschule Südwestfalen, die Urbanisten e.V.

Weitere Akteure: Stadt Dortmund, Grünflächenamt, N.A.B.U., Kleingartenverein „Glückauf Hansa“

NBS 1 – Sports infrastructure within Gustav-Heinemann-Park

Location: Gustav-Heinemann-Park, Dortmund Huckarde

Description: Publicly accessible movement elements which invite citizens of different age groups to playfully try out and which offer a health-promoting balance to predominantly sedentary activities in everyday life.

Partners: City of Dortmund, Department of Urban Renewal

Other stakeholders: City of Dortmund, Department of Green Spaces, Gustav-Heinemann-School, Huckarde Associations

NBS 3 – Food Forest in St. Urbanus

Location: Garden of St. Urbanus parish, Dortmund Huckarde

Description: A 3,000 m² food forest - a self-sustaining woodland ecosystem designed for food production at the St. Urbanus parish. The food forest of St. Urbanus has been built during workshops with the community and serves as an example of how gardens in the city can be designed in a productive and environmentally friendly way.

Partners: South Westphalia University of Applied Science, die Urbanisten e.V.

Other stakeholders: the parish of St. Urbanus (landowner)

NBS 4 – Aquaponics

Location: Hansa coking plant, Dortmund Huckarde

Description: On a site of the old Hansa coking plant two greenhouses are built for scientific purposes in which perspetively fish and vegetables will be produced in a circular system (aquaponics). The concept of aquaponics will be advanced technically. As the ground is contaminated constructional protection measures and soilless cultivation will occur. Transfer paths of harmful substances will be examined in the produced food.

Partners: die Urbanisten e.V., South Westphalia University of Applied Science, Aquaponik Manufaktur GmbH, Citybotanicals GmbH

Other stakeholders: The Foundation for the Preservation of Industrial Monuments and Historical Culture (landowner)

NBS 6 – Accessible green corridors

Location: landfill Deussenberg, Dortmund Huckarde

Description: Since the closure of the site in 1992 and its subsequent recultivation, the former Deussenberg landfill site has developed into a popular local recreation destination. The hill is almost exclusively accessible from the east, which means that it is not well connected to the Huckarde settlement. For many years, the citizens of Huckarde have wanted to improve access to the Deussenberg. Therefore, a barrier-free path connection has been built at the south-eastern foot of the slope.

Partners: City of Dortmund, Department of Urban Renewal

Other stakeholders: Dortmund waste management company (advocate), Emschergenossenschaft

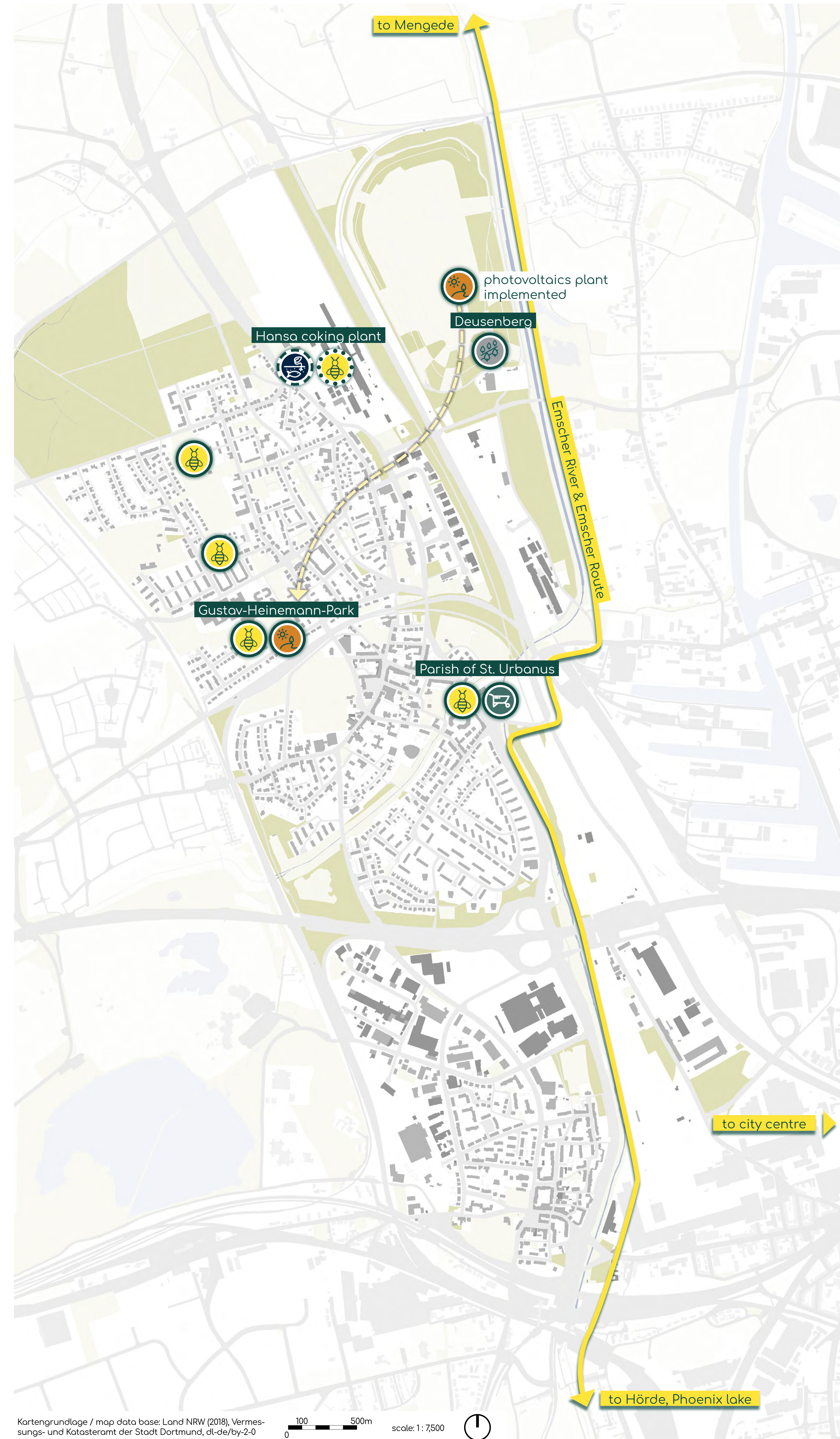
NBS 8 – Pollinator biodiversity

Location: at several locations in Dortmund Huckarde

Description: At the sites of the NBS 3 and NBS 4 implementations and at several locations in Huckarde, pollinator-friendly plants have been seeded. The selected sites are close to each other to eventually form a biodiversity pathway. This benefits both humans (color, scent, contemplation) but also enhances the biodiversity within the area by allowing insects to migrate easily between the different patches.

Partners: South Westphalia University of Applied Science, die Urbanisten e.V.

Other stakeholders: City of Dortmund, Department of Green Spaces, N.A.B.U. (environmental association), allotment association „Glückauf Hansa“



Naturbasierte Lösungen Nature-based solutions



NBS 1
Freizeitaktivitäten und Produktion regenerativer Energien auf ehemaligen Halden
Leisure activities and clean energy on former landfills



NBS 3
Gemeinschaftsgärten und urbane Landwirtschaft
Community-based urban farms and gardens



NBS 4
Aquaponik
Aquaponics



NBS 6
Verbesserte Zugänglichkeit von Freiflächen
Accessible green corridors



NBS 8
Biodiversität für Bestäuberinsekten
Pollinator biodiversity

Umsetzungsstand Implementation status



umgesetzt / in Nutzung
implemented



in Umsetzung
in progress



in Planung
in planning

Legende legend

- Gebäude Wohngebiet
Residential buildings
- Industrie-/ Gewerbenutzung
industrial or commercial use
- Grünflächen
green spaces
- Wald
forests
- Emscher
Emscher River
- Emscherweg
Emscher Route

Productive Green Infrastructure for post-industrial urban regeneration (proGREG)

Email: proGREG@stadtdo.de
Websites: www.proGREG.eu
www.proGREG.dortmund.de
www.hansagruen.de



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 776528.

Planerstellung
map design



Projektpartner
project partners



Ningbo Living Lab Map

Living Lab Plan
Living Lab Vision map

Update: 06.2021



NBS type: New regenerated soil thanks to biotic compounds for urban forestry and urban farming.

Brief project synthesis: This NBS is for reusing lake bottom sediments and turning waste into treasure.



NBS type: Community-based urban farming and gardening on post-industrial sites.

Brief project synthesis: Planting aquatic plants along the lake can beautify the environment while purifying the water quality. Aquatic plants are being used to re-nature a 5 km corridor.

Living Lab goals and overall vision

On the lake ecological comprehensive control project within one year after the completion of the main water quality indicators will reach IV class, will reach III class for two years.

Water quality purification and ecological restoration projects will continue to remove pollutants in water bodies through moderate human intervention; improve self-purification ability of water bodies through ecological technology.



NBS type: Establishing protocols and procedures for environmental compensation at local level.

Brief project synthesis: The main content of this activity is to evaluate the comprehensive management results of Mook Lake, that is, collecting meteorological, hydrological, chemical and ecological data to monitor the environment of Mook Lake.






Nature-based solutions

-  **NBS 2 (canceled)**
Transforming lake sediment into soil fertilizer
(Due to the high content of heavy metals in the lake sediment, decided not to implement NBS 2)
-  **NBS 3**
Planting aquatic plants along the shore of the lake
-  **NBS 7**
Procedures for environmental compensation

Implementation status

-  implemented
-  in progress

legend

-  Living lab
-  Water surface
-  Existing green spaces

Productive Green Infrastructure for postindustrial urban regeneration (proGReg)
Email: progreg@la.rwth-aachen.de
Website: www.proGReg.eu

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no. 776528.

This work was financially supported by the National Key Research and Development Programme of China (2017YFE0119000).

Mirafiori Sud Living Lab Torino | Mirafiori Sud Living Lab Turin

Mappa del Living Lab | Living Lab map

Update: DEC, 2022



Obiettivi e vision generale del LL
Living Lab goals and overall vision


Rigenerare e valorizzare le aree insicure o abbandonate del quartiere di Mirafiori coinvolgendo i cittadini nella progettazione e gestione di spazi verdi pubblici.
 To regenerate and enhance the abandoned or unsafe areas of the Mirafiori district by involving citizens in the design and management of public green spaces.

Promuovere nuove professionalità e modelli di business basati sulle soluzioni naturali.
 To promote new professionalism and business models based on natural solutions.

Valorizzare i benefici multipli (sociali, ecologici, economici e per la salute) delle soluzioni naturali inserendole negli strumenti di pianificazione e rigenerazione urbana.
 To demonstrate the multiple benefits (social, ecological, economic and health) of nature-based solutions as an integral tool of urban planning and regeneration.





Dettagli sulla NBS 2 | Details on NBS 2



NEW REGENERATED SOIL THANKS TO BIOTIC COMPOUNDS FOR URBAN FORESTRY AND URBAN FARMING


| | |
|---|---|
| <p>1</p>  <p>Produzione di nuovo suolo rigenerato nel Parco Sangone. Descrizione: Creazione di un'area di "foresta urbana" lungo le sponde del Sangone attraverso l'utilizzo di suolo rigenerato (New Soil), a base di inerti e compost da FORSU e biostimolanti innovativi. Partners: Dual, Envipark (Acea e ccs come terze parti), Unito (DISAFA e Dip. Chimica), Città di Torino.</p> | <p>New Soil production in Sangone Park. Description: Creation of an area of "urban forest" along the banks of the Sangone through the use of regenerated soil (New Soil), based on aggregates and compost from FORSU and innovative biostimulants. Partners: Dual, Envipark (Acea e ccs as third parts), Unito (DISAFA and Dip. Chimica), City of Turin.</p> |
|---|---|

Dettagli sulla NBS 3 | Details on NBS 3

COMMUNITY-BASED URBAN FARMS AND GARDENING ON POST-INDUSTRIAL SITES


| | |
|---|---|
| <p>1</p>  <p>Recupero rovine Castello di Mirafiori. Descrizione: Trasformazione paesaggistica per valorizzazione area di interesse storico-ambientale. Partner: Orti Generali - Comitato Borgata Mirafiori</p> | <p>Castello di Mirafiori ruins recovery. Description: Landscape transformation for enhancement of an area of historical and environmental interest. Partner: Orti Generali - Comitato Borgata Mirafiori</p> |
| <p>2</p>  <p>Orti Generali. Descrizione: Orti individuali e collettivi assegnati con contributo spese ai singoli cittadini, area didattica comune per attività formative e associative. Partner: Orti Generali</p> | <p>Gardens in Cascino Piemonte (Orti Generali). Description: Collective gardens rented to individual citizens, common educational area for training and community activities. Partner: Orti Generali</p> |
| <p>3</p>  <p>Giardini fioriti al WOW. Descrizione: Giardino in cassone e arnie. Partners: Orti Alti, Fondazione Mirafiori, Miravolante, Città di Torino.</p> | <p>Pollinator friendly gardens at WOW. Description: Box gardens and beehives. Partners: Orti Alti, Fondazione Mirafiori, Miravolante, Città di Torino.</p> |
| <p>4</p>  <p>Orto a scuola in cassone. Descrizione: Realizzazione o integrazione di orti didattici in cassone e di laboratori scientifici rivolti alla scuola primaria e superiore sui temi di proGReg. Partners: Fondazione Mirafiori, Miravolante, Unito (DBios e DISAFA).</p> | <p>School garden in box. Description: Realization or integration of educational gardens and scientific laboratories aimed at primary and high schools on the topics of proGReg. Partners: Fondazione Mirafiori, Miravolante, Unito (DBios e DISAFA).</p> |

| | |
|---|--|
| <p>5</p>  <p>Ortomobile. Fornitura di uno stock di cassette per la realizzazione di "micro-orti" e compostiere per le scuole e corso pratico per gli insegnanti. Partners: Iter, Unito (DBios e DISAFA).</p> | <p>Portable school gardens. Supply of a stock of wood cassettes for the realization of "micro-garden" and composters for schools and practical course for teachers. Partners: Iter, Unito (DBios e DISAFA).</p> |
| <p>6</p>  <p>Orti comunitari a scuola. Descrizione: Orto didattico in cassone. Partners: Iter, Liceo Scientifico Primo Levi, Unito (DBios e DISAFA)</p> | <p>Community school gardens. Description: Vegetable garden in wood boxes (raised bed). Partners: Iter, Liceo Scientifico Primo Levi, Unito (DBios e DISAFA)</p> |

| | |
|---|--|
| <p>7</p>  <p>Orto tra le case. Descrizione: Posa di cassoni fissi per orticoltura urbana. Partner: Fond. Mirafiori, Miravolante.</p> | <p>Gardens between houses. Description: Placing of fixed containers for urban horticulture. Partners: Fond. Mirafiori, Miravolante.</p> |
|---|--|

Dettagli sulla NBS 4 | Details on NBS 4

AQUAPONICS AS SOIL-LESS AGRICULTURE FOR POLLUTED SITES

| | |
|--|---|
| <p>1</p>  <p>Test di acquaponica. Descrizione: Sistemi di acquaponica su piccola e media scala, progettati con la comunità e installati in due edifici del quartiere. Partner: Città di Torino.</p> | <p>Aquaponics test. Description: Small and medium scale community - designed aquaponics system, to be set up on two local buildings. Partner: City of Turin.</p> |
|--|---|

Dettagli sulla NBS 5 | Details on NBS 5

CAPILLARY GI ON WALLS AND ROOFS

| | |
|---|---|
| <p>1</p>  <p>Nuovo tetto verde Casa Nel Parco. Descrizione: Ripristino dell'accesso del tetto verde di Casa Nel Parco Partner coinvolto: Città di Torino, Fondazione Mirafiori.</p> | <p>New green roof at Casa nel Parco. Description: Restoration of the Casa nel Parco green roof access Partners: City of Turin, Fondazione Mirafiori.</p> |
| <p>2</p>  <p>Parete verde a scuola. Descrizione: Parete indoor con sistema a vaschette estraibili. Progettazione partecipata e co-gestione per la cura delle pareti con coinvolgimento di studenti e personale scolastico. Partners: Città di Torino, Politecnico di Torino (DAD e DIATI).</p> | <p>Green Wall at school. Description: Green indoor wall with removable tray system. Participatory processes and co-management for the maintenance of the green walls with the students and the school staff. Partners: City of Turin, Politecnico di Torino (DAD and DIATI).</p> |
| <p>3</p>  <p>Parete verde dormitorio senza tetto. Descrizione: Parete verde autoportante esterna, con vaschette rimovibili e tasche in feltro. Progettazione partecipata e co-gestione per la cura delle pareti con coinvolgimento degli utenti. Partners: Città di Torino, Politecnico di Torino (DAD e DIATI).</p> | <p>Green wall at homeless shelter. Description: Outdoor self-supporting green wall, with removable trays and felt pockets. Participatory design process/co-management for the maintenance together with the users. Partners: City of Turin, Politecnico di Torino (DAD and DIATI).</p> |
| <p>4</p>  <p>Tetto verde al WOW. Descrizione: Realizzazione di un tetto verde estensivo sull'edificio WOW. Partners: OrtiAlti, Città di Torino.</p> | <p>Green roof at WOW building. Description: Realization of an extensive green roof WOW building. Partners: OrtiAlti, City of Turin.</p> |


Dettagli sulla NBS 6 | Details on NBS 6

ACCESSIBLE GREEN CORRIDORS

| | |
|---|--|
| <p>1</p>  <p>Corridoio verde. Descrizione: Realizzazione di un percorso verde e pollinator friendly. Partner: Città di Torino.</p> | <p>Green corridor. Description: Creation of a green and pollinator friendly course. Partner: City of Turin.</p> |
|---|--|


Dettagli sulla NBS 6 | Details on NBS 6

ACCESSIBLE GREEN CORRIDORS

| | |
|--|--|
| <p>1</p>  <p>Valorizzazione del patrimonio naturalistico nel corridoio verde. Descrizione: Potenziare la fruizione dell'area naturalistica del corridoio verde e promuovere l'utilizzo della pista ciclabile tramite segnaletica verticale e arredo urbano Partner: Fondazione Mirafiori</p> | <p>Local natural heritage enhancement in green corridor. Description: Enhancement of the naturalistic green corridor and promotion of the cycling path through the creation of vertical signage and street furniture. Partner: Fondazione Mirafiori</p> |
|--|--|


Dettagli sulla NBS 7 | Details on NBS 7

LOCAL ENVIRONMENTAL COMPENSATION PROCESSES

| | |
|--|--|
| <p>1</p>  <p>Partnership strategico pubblico-privato per il verde in città. Descrizione: Identificare, raccogliere e mostrare strumenti e opportunità concrete per permettere all'amministrazione di migliorare il patrimonio verde della città grazie alla collaborazione pubblico-privata. Partner: Città di Torino.</p> | <p>Strategic public-private partnership for greening the City. Description: Identify, collect and display tools and concrete opportunities in order to allow the Administration to improve the green assets of the City through public private collaboration. Partner: Città di Torino.</p> |
|--|--|

Dettagli sulla NBS 8 | Details on NBS 8

POLLINATOR BIODIVERSITY IMPROVEMENT ACTIVITIES AND CITIZEN SCIENCE PROJECT

| | |
|---|---|
| <p>1</p>  <p>Giardino farfalle nelle scuole e presso centri per disabili mentali. Descrizione: Realizzazione di un corso e di varie attività formative sulla vita delle farfalle. Supporto alla realizzazione del giardino delle farfalle. Biomonitoraggio con il metodo del transetto. Partners: Unito (DBios) e Unito (DISAFA).</p> | <p>Butterfly gardens in schools and for disadvantaged people. Description: Realization of training activities on the life of butterflies. Supporting the creation of the butterfly garden. Biomonitoring with the transect method. Partners: Unito (DBios) e Unito (DISAFA).</p> |
|---|---|

Partner locali proGReg (e altri importanti stakeholders)

Local proGReg partners (and other important stakeholders)



Legenda | Legend

Soluzioni nature based

Nature based solutions

-  Rigenerazione di suolo
NBS 2: Regenerating soil
-  Orticoltura di comunità
NBS 3: Community urban gardening and farming
-  Acquaponica
NBS 4: Aquaponics
-  Tetti verdi e verde verticale
NBS 5: Green roofs and vertical gardens
-  Migliorare l'accessibilità ai corridoi verdi
NBS 6: Improving accessibility to green corridors
-  Processi di compensazione ambientale
NBS 7: ICT Tools
-  Insetti impollinatori e biodiversità
NBS 8: Pollinator biodiversity

Stato di implementazione

Implementation status

-  Realizzato implemented
-  In corso in progress
-  Programmato in planning

Legenda dei colori

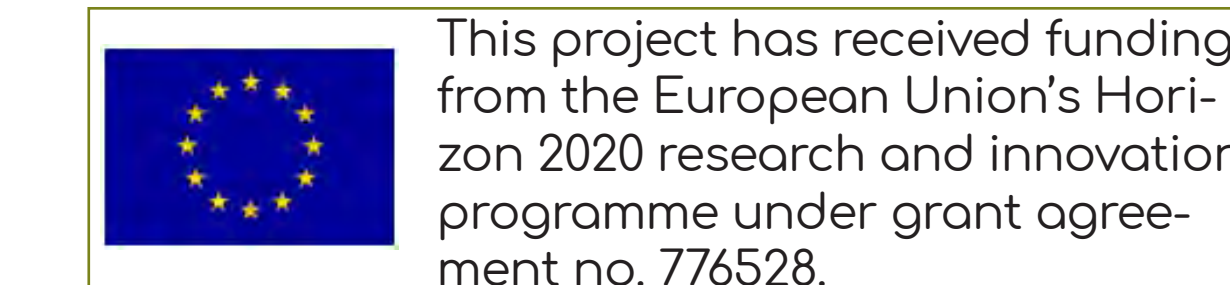
Colour palette

-  Parchi/aree verdi
parks/green spaces
-  Zone boschive
Forest
-  Fiumi/laghi
waterways/lakes
-  Costruito
built up areas
-  Aree industriali
industrial areas
-  Confini del Living Lab
Living Lab area boundary

Scale: 1: 10000

Map by Politecnico di Torino, Dep. Architecture and Design

Productive Green Infrastructure for post-industrial urban regeneration (proGReg)
 Email: progereg@la.rwth-aachen.de
 Website: www.proGReg.eu



This work was financially supported by the National Key Research and Development Program of China (2017YFE0119000).

Ciljevi Living Laba
Living Lab goals

Gradovi se sve više suočavaju s posljedicama klimatskih promjena te se u Europi i svijetu sve više prepoznaje važnost zelene infrastrukture kao sredstva za ublažavanje ekstreme u gradovima. Grad Zagreb zajedno s Dortmundom, Torinom i Ningbom kroz projekt proGReg (produktivna zelena infrastruktura za urbanu obnovu) radi na podizanju kvalitete života lokalne zajednice uvođenjem rješenja temeljenih na prirodi uzimajući u obzir potrebu za produktivnošću.

Cities are increasingly facing the effects of climate changes so the importance of green infrastructures is being recognized in Europe and in the world as a means of mitigating extremes in the cities. City of Zagreb together with Dortmund, Turin and Ningbo through the proGReg project (productive green infrastructure for urban regeneration) works to raise the quality of life of the local communities by introducing nature-based solutions considering the need for productivity.

NBS 7: Uvođenje NBS-a u regulativu
NBS 7: Introducing NBS into regulation

* nove smjernice za planiranje niskougljičnog razvoja, koje podrazumijevaju postupak izrade i donošenja prostornih planova kroz rani participativni proces, te zaokret prema niskougljičnom razvoju
* new guidelines for low-carbon development planning, implying procedure for development and adoption of spatial plan through early participatory process, and a turn towards low-carbon development.

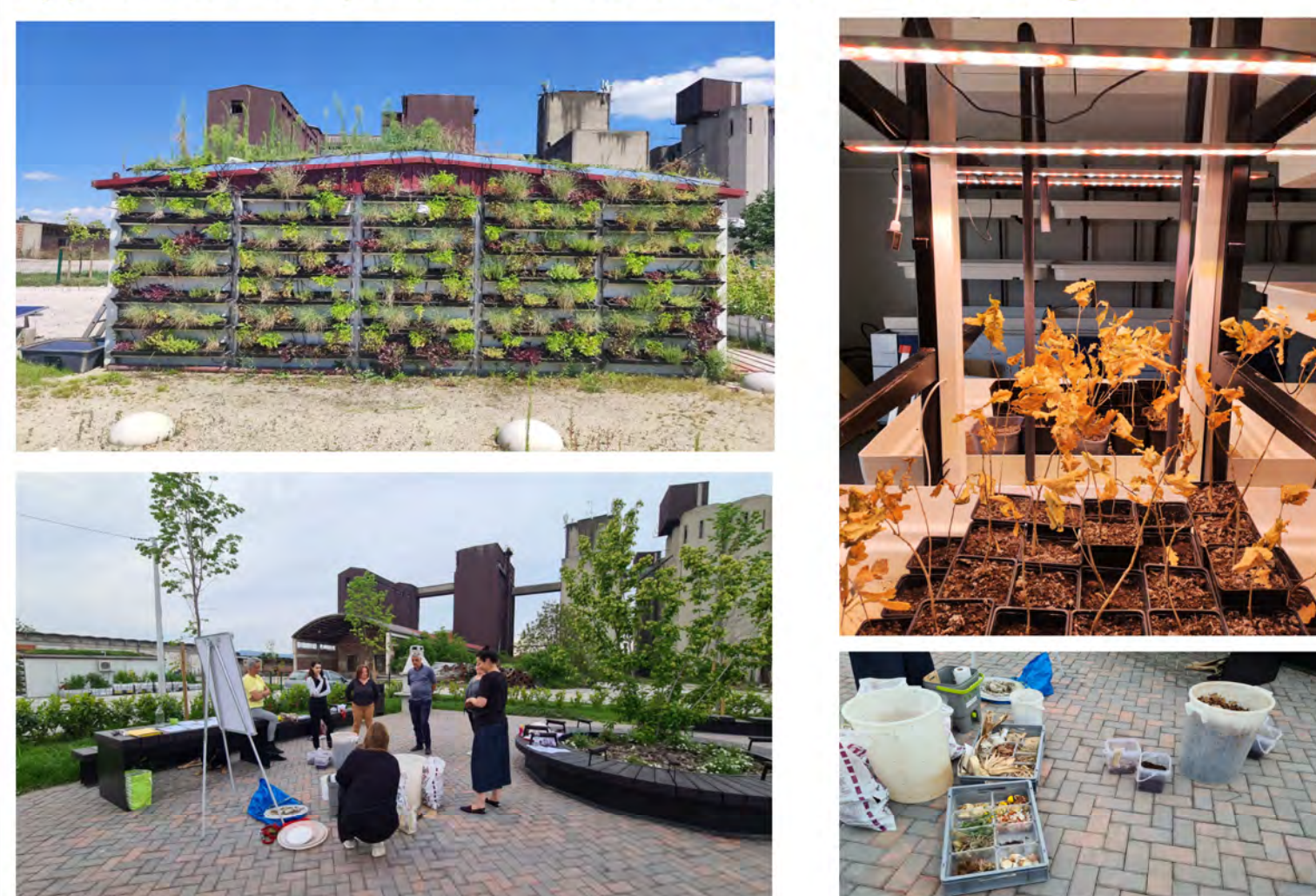
NBS 3: Izgradnja novog terapijskog vrta, modernizacija postojećeg gradskog vrta uz korištenje inovativne tehnologije pročišćavanja podzemnih voda, Info centar projekta

NBS 3: Construction of a new therapeutic garden, modernization of the existing city garden using innovative groundwater treatment technology, project Info point



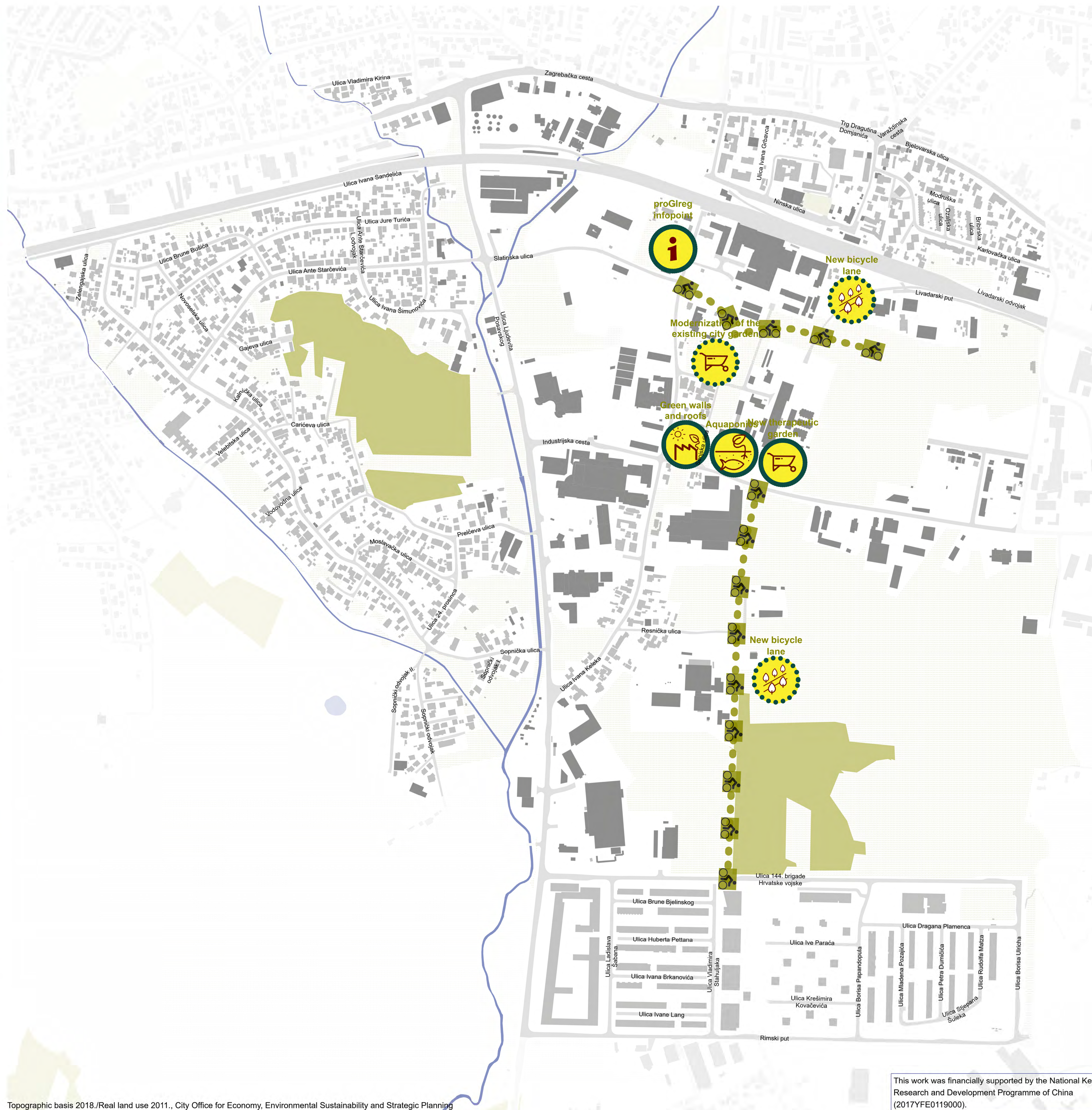
NBS 4/5: Modularna urbana farma koja kombinira NBS 4 (zeleni zidovi i krovovi) i 5 (akvaponika). Farma predstavlja pokazni primjer primjene i praktičnih značajki ovih tehnologija

NBS 4/5: Modular urban farm combining NBS 4 (green walls and roofs) and 5 (aquaponics). The farm provides a showcase for the application and practical features of these technologies



NBS 6: Novi pješačko-biciklistički koridori koji povezuju fragmentirani prostor bivše industrije, gospodarskog prostora i stambenih naselja

NBS 6: New pedestrian-cycling corridors that connect the fragmented space of former industry, commercial space and residential areas



Rješenja temeljena na prirodi
Nature - based solutions

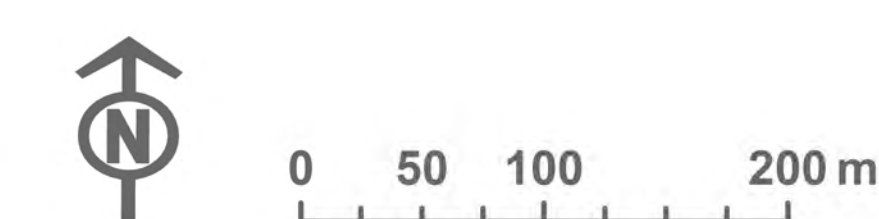
- Modernizacija postojećeg gradskog vrta
NBS 3: Modernization of the existing city garden
- Novi terapijski vrt
NBS 3: New therapeutic garden
- Akvaponika
NBS 4: Aquaponics
- Zeleni zidovi i krovovi
NBS 5: Green walls and roofs
- Nova biciklistička staza
NBS 6: New bicycle lane

Provedbeni status
Implementing status

- Planirano
In planning
- Provedeno
Implemented

proGReg infocentar
proGReg infopoint

- Vodotoci
Waterways
- Park
Park
- Šuma
Forest
- Neuređene zelene površine
Undeveloped green area
- Prometna infrastruktura
Road infrastructure
- Zgrade
Buildings
- Gospodarske zgrade
Commercial buildings



Koordinator lokalnih aktivnosti / Coordinator of local activities:

GRAD ZAGREB
GRADSKI URED ZA GOSPODARSTVO
EKOLOŠKU ODRŽIVOST I
STRATEGIJSKO PLANIRANJE

Lokalni partneri projekta / Local project partners:

ZAVOD ZA PROSTORNO UREĐENJE GRADA ZAGREBA
zelene i plave Sesvete

Productive Green Infrastructure for post-industrial urban regeneration (proGReg)
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