Co-creating Urban resilience: The Role of Rain Gardens in Lublin's NatureScape T-Labs

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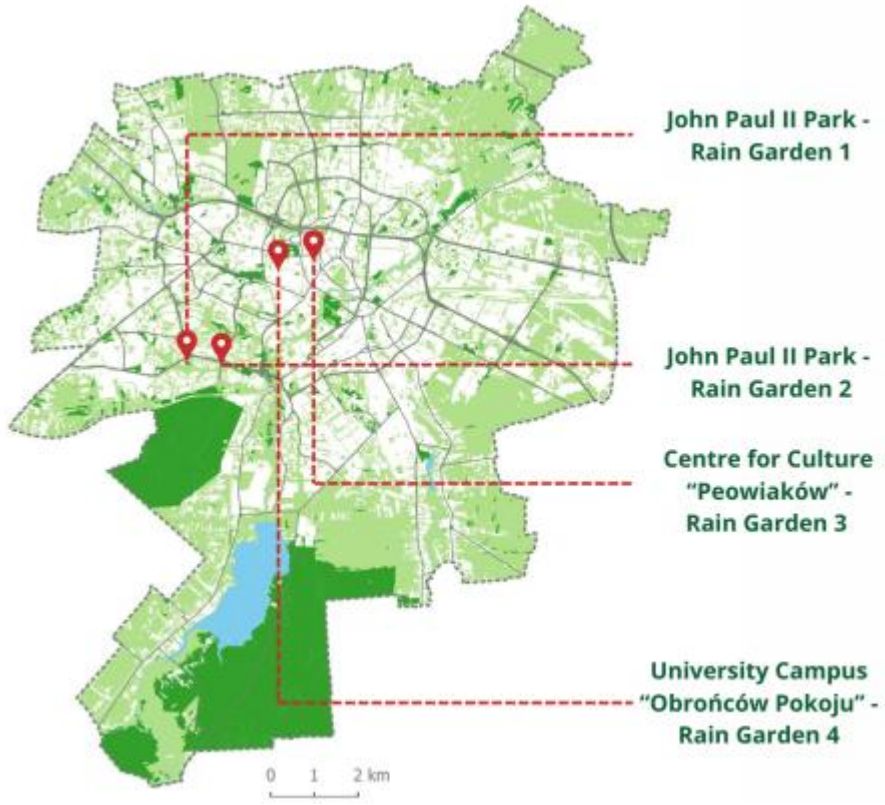

Area characterisation:

As part of the **NatureScape project**, four existing rain gardens in Lublin have been selected as pilot sites for establishment of the Transformation Labs (T-Labs). As they are implemented since 2021 by the Lublin City Office, these gardens exemplify multifunctional nature-based solutions (NBS) that support stormwater management, biodiversity enhancement, and community engagement.

NatureScape project is a transdisciplinary European initiative aimed at advancing the integration and long-term stewardship of Nature-Based Solutions (NBS) in urban environments. The project focuses on the **post-implementation phase** of NBS, emphasizing adaptive governance, community engagement, and ecological resilience. Through the establishment of **Transformation Labs (T-Labs)**, NatureScape fosters experimental and participatory approaches to managing green infrastructure, including rain gardens, green roofs, living walls, and urban gardens.

NatureScape is being implemented across seven diverse European cities: Oslo, Dublin, Riga, Milan, Lisbon, Lublin, and Saint-Gallen. Each city contributes unique socio-ecological contexts and NBS typologies. In **Lublin**, four (4) rain gardens serve as foundational platforms for co-creation, monitoring, and educational outreach as the T-Labs are to be established.

The selected rain gardens are situated in diverse urban contexts:

- **John Paul II Park – Rain Garden 1** Located in South Czuby, this 28.3 m^2 infiltration garden captures runoff from a 500 m^2 paved catchment area. It enhances local biodiversity with native moisture-tolerant plants and contributes to stormwater management by allowing gradual infiltration into the soil.
- **John Paul II Park – Rain Garden 2** Situated beneath the Filaretów Street viaduct, this 46.8 m^2 garden features a dry stream, sealed basin, and infiltration zone. It collects water from the viaduct and surrounding paths, transforming an underutilized space into a vibrant ecological and retention site.
- **Centre for Culture "Peowiaków" – Rain Garden 3** Positioned at Lech Kaczyński Square near historic architecture, this 37.2 m^2 infiltration garden captures roof runoff and enhances the aesthetic and ecological value of the area. It supports water purification and highlights the cultural landscape through thoughtful planting.
- **University Campus "Obrońców Pokoju" – Rain Garden 4** Spread across roadside lawns, five small gardens totaling 49.8 m^2 retain rainwater and reduce street runoff. Designed for infiltration, they improve habitat conditions and support urban greenery with resilient plant species.

These locations represent varied hydrological and social conditions, making them ideal for testing multifunctionality of these raingardens as suitable urban Nature-Based Solutions.

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Objective:

The primary objectives include:

- **Stormwater Management**: Reducing runoff and improving infiltration.
- **Urban Biodiversity**: Enhancing habitats for flora and fauna.
- **Community Engagement**: Involving citizens in co-creation and stewardship.
- **Educational Value**: Serving as living laboratories for ecological education.
- **Scientific Research**: Supporting data collection and monitoring within the NatureScape framework.

The T-Labs (Transformation Labs) aim to integrate local knowledge, scientific expertise, and participatory governance to co-design and evaluate NBS interventions.

Start/end date:

1 April 2025 - 31 March 2028

Financing:

The NatureScape project is funded through the **Biodiversa+ European Partnership**, which supports transnational research on biodiversity and ecosystem services. In Poland, the financial administration is coordinated by the **National Science Centre (NCN)**. The Lublin T-Labs, including the rain gardens, benefit from this funding stream, enabling interdisciplinary collaboration and local implementation. The Lublin City Office also contributes through its Green Budget and municipal climate adaptation programs.

Potential impacts/benefits:

- **Improved urban water retention and reduced flood risk** The rain gardens intercept runoff from paved surfaces and rooftops, allowing gradual infiltration into the soil and reducing pressure on the municipal drainage system, especially during heavy rainfall events.
- **Enhanced biodiversity and ecological connectivity** Native plant species and structural elements like boulders and logs create microhabitats that support pollinators, insects, and small urban fauna, contributing to ecological corridors within the city.
- **Increased public awareness and environmental education** The gardens serve as outdoor classrooms for local schools, universities and the general public, fostering hands-on learning about climate adaptation, water cycles, and biodiversity.

- **Strengthened community resilience and participation** Citizen involvement in planting and stewardship, especially by secondary school students, builds local ownership and empowers residents to engage in sustainable urban development.
- **Aesthetic enhancement of urban spaces** Strategically placed in parks, cultural squares, and roadside lawns, the gardens transform underutilized or grey areas into vibrant, green public spaces that improve visual appeal and well-being.
- **Data generation for NBS performance evaluation** The gardens provide real-world testbeds for monitoring hydrological performance, plant survival, and social engagement, contributing valuable data to the NatureScape project's cross-site analysis.

Actions:

Selection of four existing rain gardens as pilot sites; stakeholder engagement and co-creation planning for T-Labs; preparation of monitoring protocols for socio-ecological and hydrological performance; integration with municipal green infrastructure strategies; coordination with partner institutions for cross-site learning and citizen science activities.

Lessons learnt:

Although the NatureScape project is still in its early stages, initial observations from the selected rain gardens in Lublin have highlighted their potential for stormwater retention, biodiversity support, and community engagement. These preliminary insights affirm the value of integrating nature-based solutions into urban planning. However, comprehensive understanding of their long-term ecological and social impacts will emerge through the co-creation and monitoring processes within the forthcoming T-Labs. As these living laboratories are established, they will enable deeper assessment of post-implementation outcomes and guide future urban resilience strategies.

Organisations:

Uniwersytet Przyrodniczy w Lublinie (University of Life Sciences in Lublin) - Poland

NatureScape Project Partner Organizations:

- NILU – The Climate and Environmental Research Institute (Norway) *Project Coordinator*
- OST – Eastern Switzerland University of Applied Sciences (Switzerland)
- Uniwersytet Przyrodniczy w Lublinie - University of Life Sciences in Lublin (Poland)
- NUID UCD – University College Dublin, National University of Ireland (Ireland)

- LEN – Lisboa E-Nova, Agência de Energia e Ambiente de Lisboa (Portugal)
- BSC – Baltic Studies Centre (Latvia)
- Polimi – Politecnico di Milano (Italy)

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NBS benefits:

- Increase achievements of biodiversity targets
- Social inclusion
- Social learning about location & importance of NBS
- Reduce flood risk
- Increase communities' sense of ownership
- Increased cultural richness and biodiversity
- Greater ecological connectivity across urban regenerated sites

Further information:

- NatureScape Project Website
- LinkedIn Project Page
- Lublin City Hall - NatureScape Project Highlights