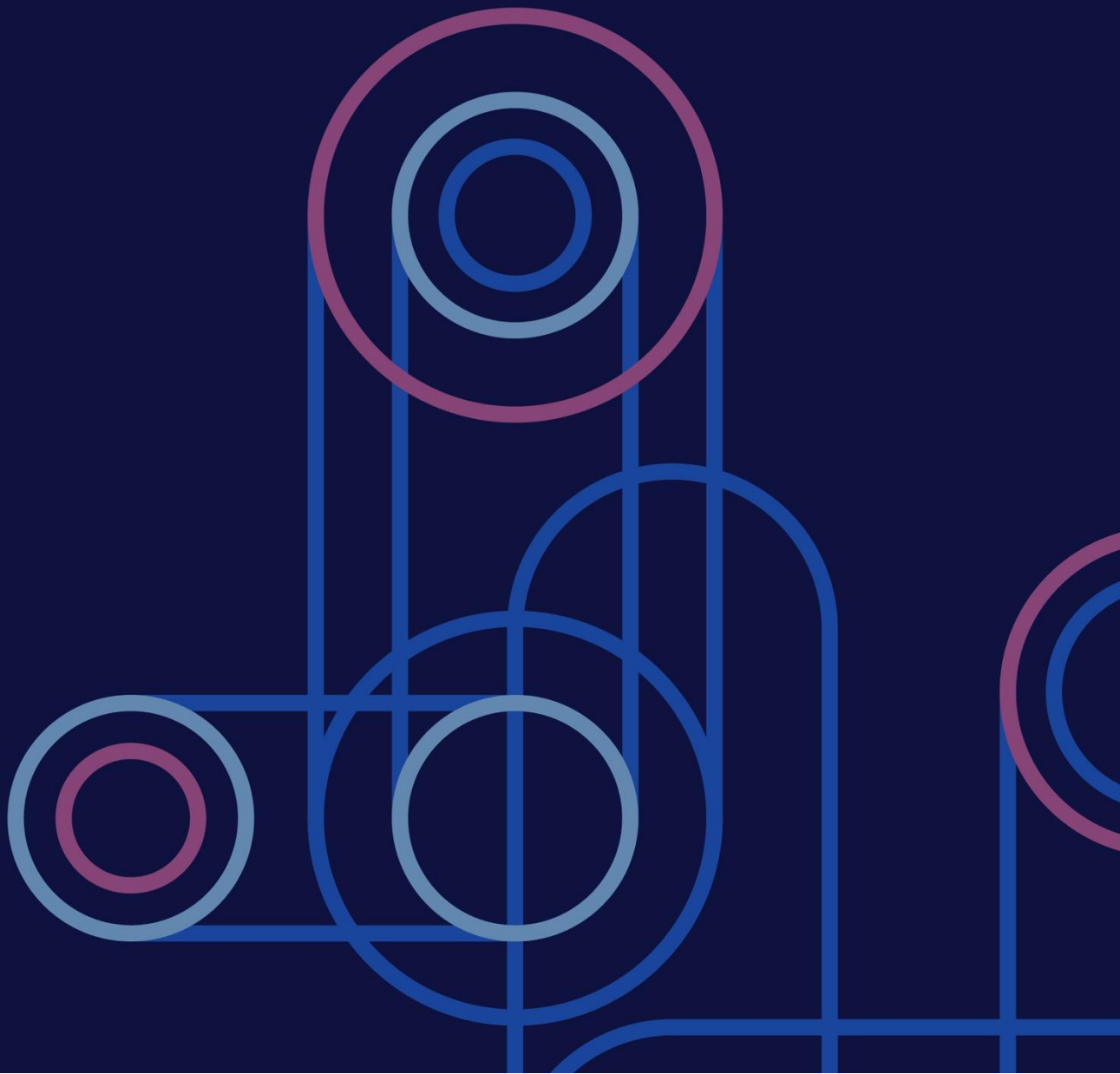
World Health Organization

CASE STUDY

SPIRE: Smart Post-Industrial Regenerative Ecosystem

2025



Basic information	
WHO Region	EURO
City or Country	Baia Mare, Romania
Timeline	2020-2024
Type of intervention	Policy; infrastructure
Primary level of implementation	City
Primary sectors involved	Environment; health; innovation; urban planning
Primary health outcomes or challenges	Pollution remediation; heavy-metal exposures; community well-being

Case description

Baia Mare, a municipality in north-western Romania, has long been shaped by its metallurgical past. Centuries of mining and smelting left over 600 hectares of land contaminated by heavy metals such as lead, zinc and copper – levels exceeding safety thresholds by a factor of five. This environmental legacy posed a direct threat to ecosystems and public health, undermining the city's transition toward a sustainable development model.

In 2020, the municipality launched the Smart Post-Industrial Regenerative Ecosystem (SPIRE) under the European Union's Urban Innovative Actions (UIA) programme. The initiative sought to regenerate post-industrial spaces through phytoremediation – the use of plants to extract, stabilise, or degrade pollutants – and to embed these techniques within city planning. Five pilot sites across the metropolitan area were selected for experimentation and demonstration.

Scientific trials tested multiple species and techniques, assessing their capacity to remove heavy metals, improve air quality and create usable biomass. A smart iGIS platform was used to aggregate field measurements, satellite imagery and AI-based modelling to visualise pollution levels and monitor progress at each site. Over four years, the approach demonstrated feasibility and replicability, providing a living laboratory for urban environmental restoration.

Remediated SPIRE project site. Baia Mare, Romania. © SPIRE project.

SPIRE also sought to promote health and sustainability more broadly through an interconnected set of innovative activities, combining scientific experimentation with broad civic participation. For example:

- citizen engagement was pursued through “Plantathlons,” mass planting events that mobilised volunteers to re-naturalise degraded areas.
- in the five pilot sites, a co-creation process involving surveys, workshops, consultations and public events engaged citizens in prioritizing health-promoting infrastructure. Participants expressed a desire for pedestrian and cycling paths, public spaces for socializing and events, and playgrounds, among other micro-interventions.

- an innovative digital-reward system (iLEU) offered redeemable tokens for environmentally positive actions such as cycling, walking to work, or participating in hub events.
- to anchor local innovation, one of Baia Mare's historic buildings was converted into the SPIRE Hub and Maker Space, hosting workshops, mentoring programmes and exhibitions that encourage reuse of phytoremediation biomass in eco-design and bio-based products. Youth and entrepreneurs were especially targeted, linking environmental recovery to economic opportunity.

Implementation of this complex project required adaptive governance. SPIRE operated through a multi-stakeholder framework linking municipal departments, universities, private partners and citizens. The programme's holistic perspective connected environmental health, climate action and economic resilience. Lessons included the need for accessible communication tools – such as illustrated community guides – and new administrative procedures to accommodate experimentation.

At the metropolitan scale, outcomes are feeding into the Bio-based Strategy and Master Plan 2050 for Circular Communities, designed to replicate SPIRE's nature-based and participatory methods in other polluted areas. The project has also gained recognition for sustainable innovation across Europe, illustrating how creative governance and community engagement can transform long-standing environmental burdens into platforms for healthier urban futures.

Strategic Highlight

SPIRE gives a vivid demonstration of how local governments can cultivate an innovation ecosystem for urban health. Rather than addressing pollution solely as a technical problem, Baia Mare reframed it as an opportunity for experimentation, civic learning and entrepreneurship. The municipality created institutional and physical spaces that convene multiple actors and motivate public participation, generating benefits beyond the remediation of specific pilot sites.

Effective governance arrangements were pivotal for the success of SPIRE. By embedding risk-tolerant, cross-sectoral collaboration in official planning frameworks, the city reduced bureaucratic barriers to testing promising – yet unproven – nature-based solutions. Partnerships with researchers and the UIA programme ensured technical rigour, while civic incentives through the iLEU system and visible events like Plantathlons built community motivation and fostered trust.

The project shows that innovation for urban health requires not only new technologies but also adaptive governance: mechanisms for experimentation, monitoring and scale-up that link environmental, economic and social benefits. As a result of such measures, SPIRE contributed to measurable environmental recovery, broadened public awareness of health–environment linkages, and laid the groundwork for future regenerative initiatives throughout the region.

Further Information

- Smart Post-Industrial Regenerative Ecosystem: SPIRE
- Baia Mare: Sustainable use of land and nature based solutions
- SPIRE Zoom In: Plantathlon and phytoremediation in Baia Mare
- Urban soil decontamination for citizens' health
- Baia Mare: Community in action
- Reducing the burden of pollution-related diseases in cities
- iLEU whitepaper