CONEXUS
Valorization
case studies

CONEXUS
Urban nature connects us

Independencia Greenbelt Regeneration

Contact: **Taícia H. N. Marques and Víctor L. Peña G.** – Universidad Nacional Agraria La Molina;
Yamile Sánchez, Naty Luque and Anna Zucchetti – Asociación Ciudad Viva;
Eric Rendon Schneir – FAO/ Municipalidad Distrital de Independencia

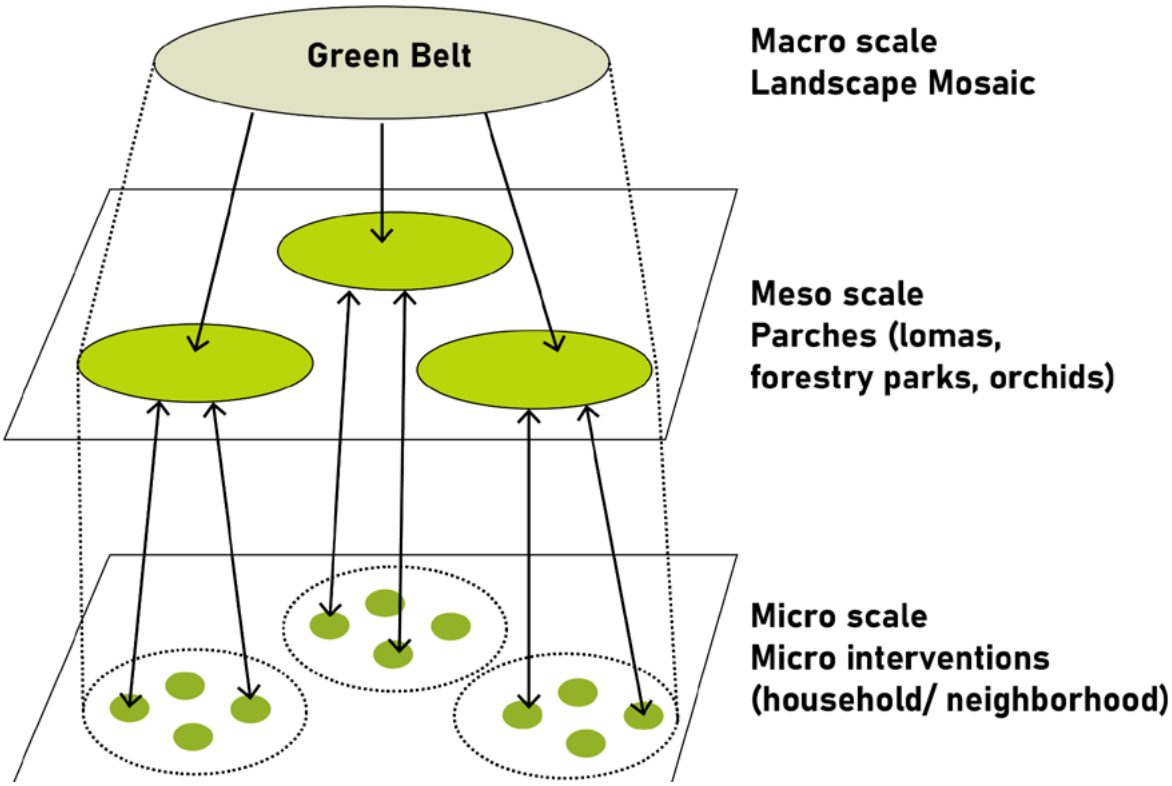
Task: T5.3

Location: Lima, Peru

Background (Step 1)

In Independencia, Lima, Peru, high housing demand and poor planning have led to uncontrolled urban sprawl. About 42% of the population (nearly 100,000 people) live in informal settlements on the hills, risking landslides and endangering the nearby lomas (fog oases) ecosystem. Residents live in highly vulnerable conditions, with limited access to public services (water, sewage, sustainable mobility), green spaces and recreational facilities.

Since 2015, the municipality has promoted a multi-purpose urban Greenbelt to address some of these challenges, improve health and well-being. Almost 400 hectares of hilly landscape, comprising small-scale forests, the lomas ecosystem and patches of coastal desert, were designated as public land. Small forest parks were planted to reduce disaster risk, prevent informal urban expansion and improve environmental quality. Local community involvement was crucial for the development and maintenance of the greenbelt, and support from private and international funds was key to make it a reality. Effective control of informal urban growth and financing the greenbelt are key issues that still need to be addressed to further develop the Greenbelt and make it sustainable.



Core Vision Statement (Step 2)

By 2030, the Independencia Greenbelt will comprise a protected lomas ecosystem, seven sustainable ecotourism forest parks and a network of nature-based solutions (NbS) micro-interventions at the household level. An effective public-private collaborative governance model will ensure GreenBelt sustainability and gradually implement the six GreenBelt Master Plan strategies. A funding mechanism that, apart from public funding, leverages private interest to offset carbon and water footprints, will enable its maintenance and gradual implementation.

Leyenda

- Límites distritales
- Lomas Payet, Amancaes y La Bella Durmiente
- Zonas de forestación (2018)
- Zonas de forestación (2022)
- Acciones identificadas
- Sítios Arqueologicos
- Zonas desierto
- Zona depredada
- Rutas del Cinturón Verde

NBS details (Step 3)

The Independencia Greenbelt is an urban green corridor designed to address multiple urban and environmental challenges. It can be connected to a more extensive green network across the district and the metropolitan area. On the landscape (macro) scale, it currently integrates seven urban forest parks (meso scale), designed with components such as trees, viewpoints, xerophytic gardens, ecotourism routes, green stairs, murals, and children's play areas. At the household scale (micro), small interventions such as biogardens, pocket forests and orchards are included. Being located in a very arid area on poor soil, its greening strategies require organic soil enrichment, drip irrigation systems and recycling of gray waters, as well as the use of native species with low water requirements.

Easy access to forest parks is key for community involvement. Local forest park committees facilitate its maintenance (irrigation, pruning, cleaning, pest control), control informal expansion and promote community education.

Community engagement is fostered through various community-driven activities promoted by local ''green heroes'', such as educational workshops on urban forests and gardens, circular economy practices, and green entrepreneurship.

By integrating ecological restoration with ecosystem creation in the desert slopes, with community participation and a collaborative model that involves the municipal government and private companies, this NbS addresses urban environmental challenges while fostering social and economic benefits, enhancing the overall sustainability and resilience of the Independencia district.

Value Proposition

Environmental

- Increase in biodiversity, Improved air quality and climate change mitigation

Social

- Increase access to green and natural areas, spaces for recreation and environmental education and improved social cohesion

Health

- Better physical and mental health, decreased risk of developing chronic diseases

Economic

- Reduces the cost of disaster risk management
- Increase in the hedonic value of homes near the Green Belt
- Promotion of local businesses, generates jobs and increases income

Key Activities

- Constitution and consolidation of the governance model
- Update of the financing model
- Implementation of the forest parks and household scale NbS, promoting access and connectivity
- Improvement of the wastewater treatment system for water recycling
- Implementation of Urban and Environmental education and empowerment plan (EDUCCA)
- Monitoring to measure impacts and feedback; evidence generation

Key Resources

Meso scale: US$ 5,108,734 (installation of 7 forestry parks);
US$ 483,840 (maintenance of 7 forest parks)

- Municipal budget
- Budget Program No. 0144 of the Ministry of Economy and Finance
- Investment resources of the Metropolitan Municipality of Lima
- 400 hectares of land (Municipality Cadastre and National Superintendence of State Assets), Boca de Sapo Forest Park and other existing interventions, with their irrigation systems
- Resources for tourism promotion.

Micro interventions

- US$ 1,500 (at household scale) and US$ 10,000-20,000 (neighborhood scale)
- Private investment for Corporate Social Responsibility (carbon or water footprint compensation)
- Inputs for the implementation of micro interventions (substrate, trees, plant material, cement, wood, stones, panels, paint, etc.)

Other

- Social engagement, support from the International Technical Cooperation, payments for environmental services

Key Partners

Main partners

- District Municipality of Independencia
- National Superintendency of National Assets / Ministry of Housing, Construction and Sanitation
- Neighboring District Municipality of Rímac, San Juan de Lurigancho, Comas
- Metropolitan Municipality of Lima
- Ministry of the Environment - MINAM
- Citizen organizations: Mesa de Lomas, Forest Park Committees, Human Settlements Committee

Other partners

- National Forestry and Wildlife Service - SERFOR
- International Technical Cooperation
- Universities
- Private companies
- Lima Parks Service- SERPAR

Key Beneficiaries

Key Beneficiaries

- Communities surrounding the Green Belt (direct): ~90,000 inhabitants exposed to conditions of physical and social vulnerability, 18,900 (7887 households) from them living in the "front line of risks".
- Other citizens of Independencia (121,360 persons), and from boarders districts Rímac, San Juan de Lurigancho, Comas (indirect); environmental and cultural organizations of the districts.
- District Municipality of Independencia
- BESCO (adjacent real estate investment that benefits from encroachment control and landscape improvement)
- Visitors and students from Lima and outsiders
- Metropolitan Municipality of Lima (sustainable model for urban hills to be replicable along the metropolitan region)
- Police and Prosecutor's Office (better collective control of invasions)

Governance

The governance of the Green Belt is collaborative, with the District Municipality and the communities as main actors. Two main governance groups should be created:

- Greenbelt Technical Group within the Metropolitan Environmental Commission* with the role of promoting and monitoring: it includes the Independencia District Municipality, Mesa de Lomas, Forest Parks Committees, Lima Parks Service- SERPAR, Red de Lomas del Peru, Local Police, Metropolitan Municipality of Lima
- Greenbelt Promotion Committee, with the role of planning and executing: Independencia District Municipality (Urban Development Management, Tourism, Environment, Education, Inspection, Participation), Forest Parks, NGOs and grassroots organizations.

*The Commission was installed on November 17, 2022, for the period 2022-2024. It is the instance of coordination and agreement between the private, public and civil sectors for the implementation of the National Environmental Policy at the local level.

Cost Structure

Planning and design: pre-operational stage, mainly the previous studies, as well as the costs associated with the procedures for the authorization of the Green Belt.

Meso scale

- Preparation of a Comprehensive Plan for the Green Belt by 2030: US$ 180,000
- Specific studies (disaster risk assessment, survey of pre-existing conditions, type and conditions of soil, access to water): US$ 200,000
- Urban-landscape design of Forest Parks: US$ 140,000
- Technical files of Forest Parks: US$ 300,000
- Management plan for the seven forest parks: US$ 70,000

Micro scale (700 micro actions; 100 x forest park)

- Design/Proposal of micro-actions and preparation of a detailed budget: between US$ 500 and US$ 10,000 for each micro-action.

a) **Capital Investment:** the stage of land preparation, purchase of materials and equipment, installation of irrigation systems, planting vegetation and installation of street furniture.

Meso scale (installation of 7 forest parks) - US$ 5,108,734

Micro scale (700 micro actions; 100 x forest park)

- Inputs, materials and labor for installation of the intervention: US$ 1,500- US$10,000

b) **Operational costs:** They are variable and may include the labor and supplies necessary for the Green Belt to function, in addition to fixed costs that may include administrative staff, who do not work directly in the field.

Meso scale (7 forestry parks) - US$ 483,840

- Personal cost: US$ 81,053
- Water and energy cost: US$ 396.648
- Operation and maintenance of roads, overlooks and vegetation: US$ 1,939
- Monitoring and generation of evidence (2 x year): US$ 42,000

Micro scale (700 micro interventions)

- Inputs, materials and labor for installation of the intervention: US$ 1,500- US$10,000

Cost Reduction

Some strategies to reduce the costs of implementation and operation of the Green Belt can be mentioned, as follow:

- Social capital ("faenas" or communal labor for installation and maintenance):
  - Active participation of neighbors and local leaders throughout the entire Green Belt
  - Voluntary network support of local institutions such as Church, health posts, market association and Micro and small businesses, etc.
- Donation of trees from the Lima Parks Service- SERPAR
- Donation of construction materials by private companies
- Prioritization of xerophytic species adapted to the soil, water and climate conditions of the Green Belt
- Adoption of micro interventions by the residents of the Green Belt (responsible for its care and maintenance)
- Application of small and large scale techniques for the use of treated wastewater and greywater for irrigation
- Participatory monitoring with a virtual app.

Capturing Value

Value	Problematic	Benefits of the Green Belt	Indicator (M for monetary*)
Environmental	Heat waves	Trees cool and provide shade (Plant and maintain 5,000 new trees)	Tree cover
	Air contamination	Carbon capture	Monetary price of carbon offset (M) US $ 640,500 (Annual-Current)
	Hilly landscape degradation	Stop the advance of invasions and recover 20% of the occupied areas in the hills	Hectares occupied in the hills x recovered
	Loss of biodiversity	Increase biodiversity net gain	Diversity of fauna and flora species; hectares occupied by forestry parks, desert hills, micro-interventions
	Loss of lomas ecosystem	Strengthen the conservation and restoration of lomas	Hectares recovered
Social	Lack of community and social cohesion	Provides spaces for formal and informal social interaction	Qualitative assessments
	Unsafety	Reduction in crime due to the care and enhancement of the areas that the Green Belt will occupy	Quantitative data and qualitative assessments of crime perception
	Inequity of access to green areas	Increase access to the green areas of the Belt to at least 50% of the neighbors located on the hills in Human Settlements prior to 2020	Distance from households to forestry parks, considering accessibility condition
	Exposure to natural hazards	Risk reduction	Savings on improving households (M) S/2,852 (US$ 750) per home 7,887 homes (13 years Growth period of Greenbelt trees)

Value	Problematic	Benefits of the Green Belt	Indicator (M for monetary*)
	Lack of infrastructure that supports recreation	Increase the recreational value of the hills	Amount of income from entrances payment (M) S/982,327 (US$ 258,507) Annual (6 years Period in which the investment is recovered)
Health	Inequity of access to green areas	Benefits to mental and physical health	Qualitative assessments and quantitative data from health municipal office
	High level of respiratory problems	Increase health regarding respiratory problems	Avoided cost for treatments for acute respiratory diseases (M) US$ 210,485 per year. (Annual- reference of what could potentially stop spending on health due to the implementation of the Greenbelt)
Economic	Informal urban growth	Increase in the hedonic value of homes near the Green Belt and reduction in the risk of disasters in households built in hillside areas	Household value (M)
	Lack of opportunities for local businesses	Promotion of local businesses, generating jobs and increasing income by creating a recreational space where neighbors could install restaurants and tourist services for visitors.	Number of local business per typology; income (M)
		Tara production	Value per hectare (M) US$ 16,058 (7 years Current – corresponds to the 0.7 hectares currently existing)

Lessons Learned:

- The Guide contains many dimensions of analysis and design that can help municipal teams, non-profits or private companies and entrepreneurs in planning and building successful NbS cases. By applying the Guide, **we obtained rich data that, if accompanied by a strong narrative and effective communication strategies focused on particular stakeholders groups, can support the NbS case and its scale up or replication.**
- The canvas is a useful tool for designing investment roadmaps, whilst the results of the assessment can be used by communities to legitimize their demands and requests for intervention (including the design of citizens´campaigns).
- The Green Belt, although designed as a large NbS area, is made up of several pieces at various scales, which complicates the application of the Guide. Even so, the elaboration of the canvas resulted in a very good systematization of the needs, stakeholders, resources, and values at different scales.

This case study applies the valorization framework outlined in the guide "Capturing the Values and Making the Business Case for Nature-Based Solutions" (Konijnendijk et al., 2024). Tested in Turin, Barcelona, Lisbon, Lima, and Buenos Aires, the methodology provides a systematic approach to assess, communicate, and leverage the environmental, economic, social, and health benefits of NbS, ultimately supporting their implementation.

Reference:

Konijnendijk, C., Di Cagno, F., Borelli, S., Wild, T. (2024). Capturing the Values and Making the Business Case for Nature-Based Solutions: A Step-by-Step Guide. Deliverable 5.3, H2020 CONEXUS project.

Photo source, pg 5:
Ciudad Viva, 2021

This project has received funding from the Europeans Union's Horizon 2020 research and innovation programme under grant agreement no. 867564

Learn more at

conexusnbs.com