LAND

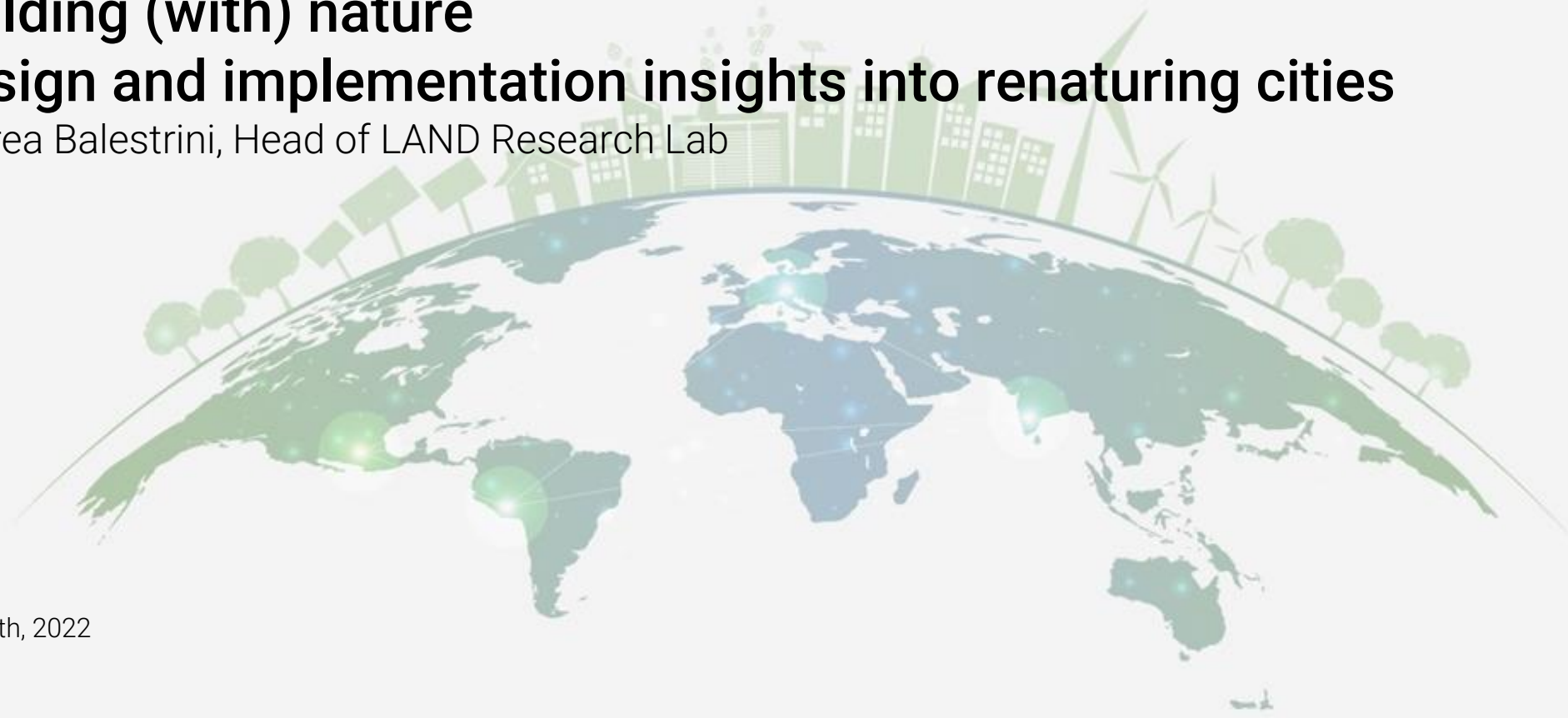
LANDSCAPE ARCHITECTURE NATURE DEVELOPMENT

MORGENSTADT GLOBAL SMART CITIES INITIATIVE

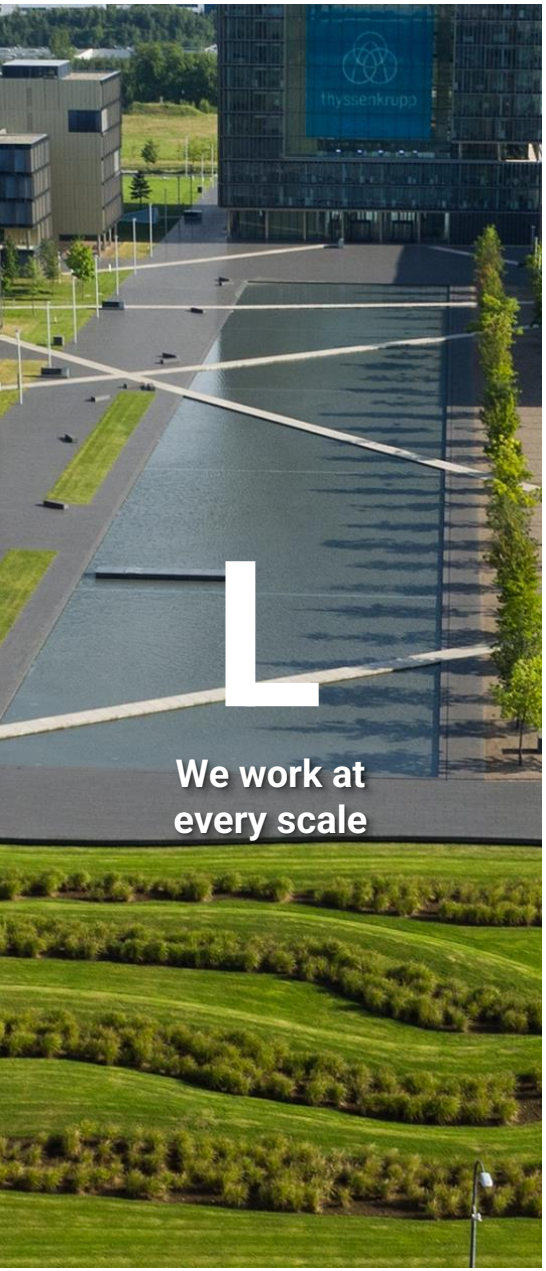
GLOBAL APPROACH – LOCAL SOLUTIONS

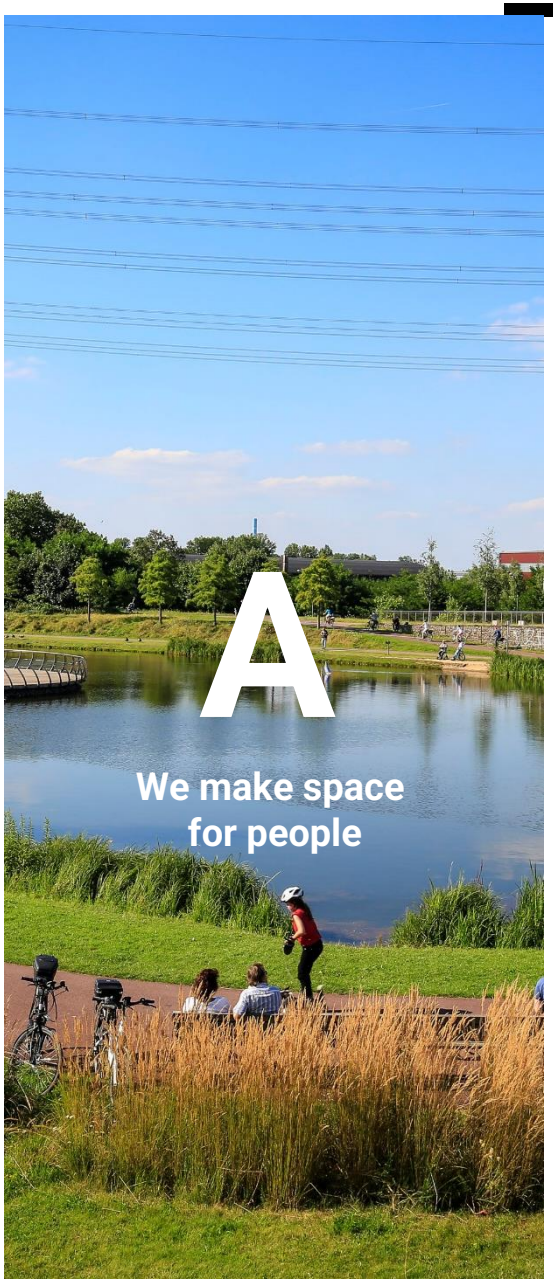
Building (with) nature
Design and implementation insights into renaturing cities

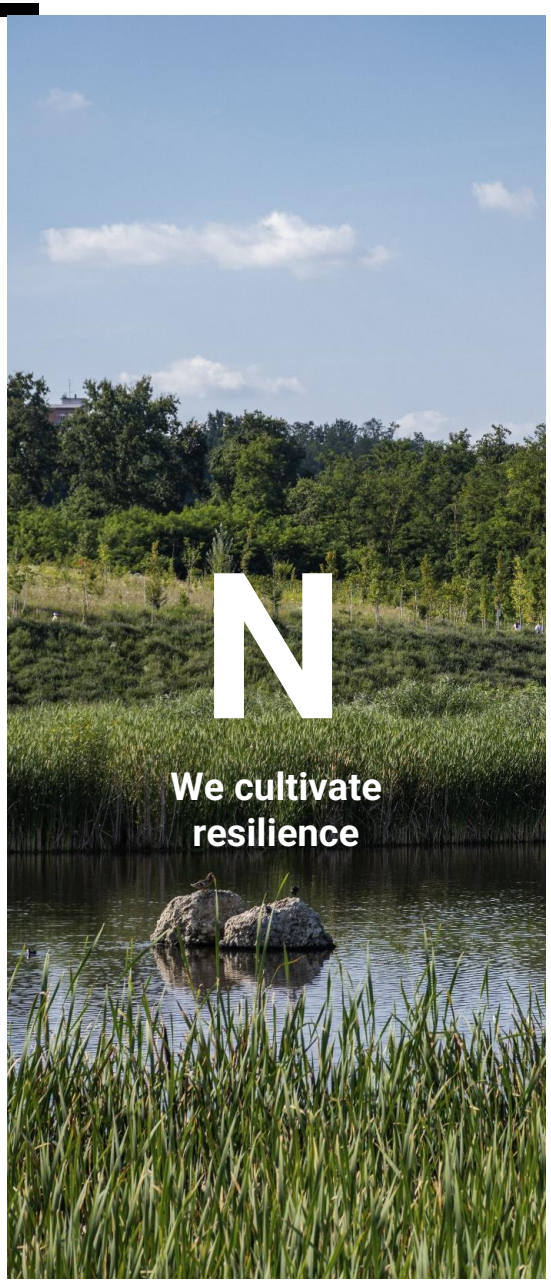
Andrea Balestrini, Head of LAND Research Lab

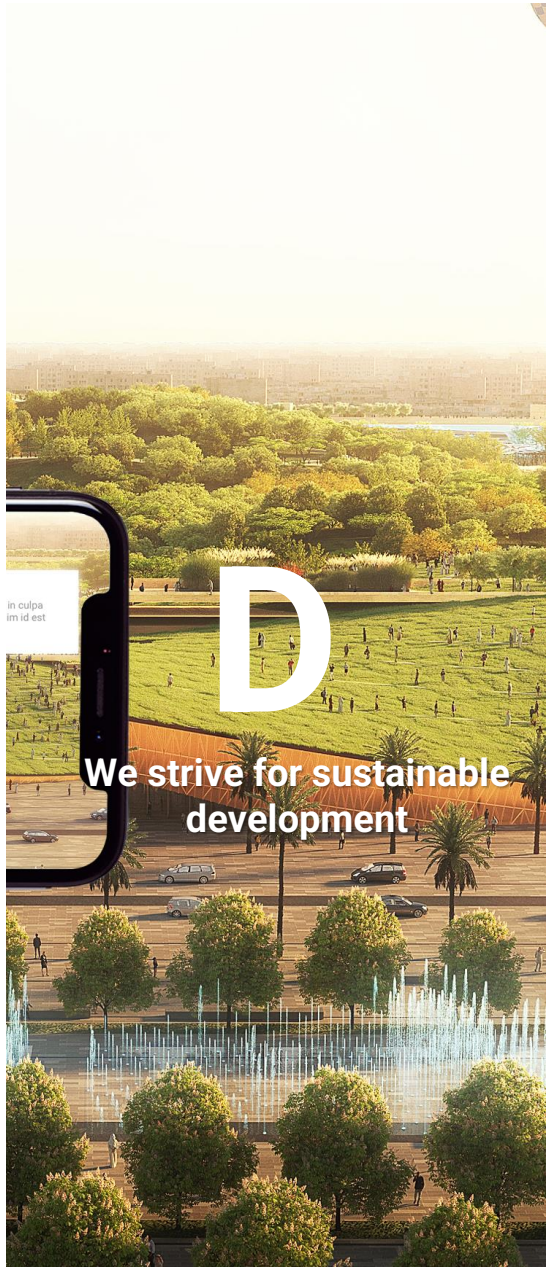


May 13th, 2022


L
We work at
every scale

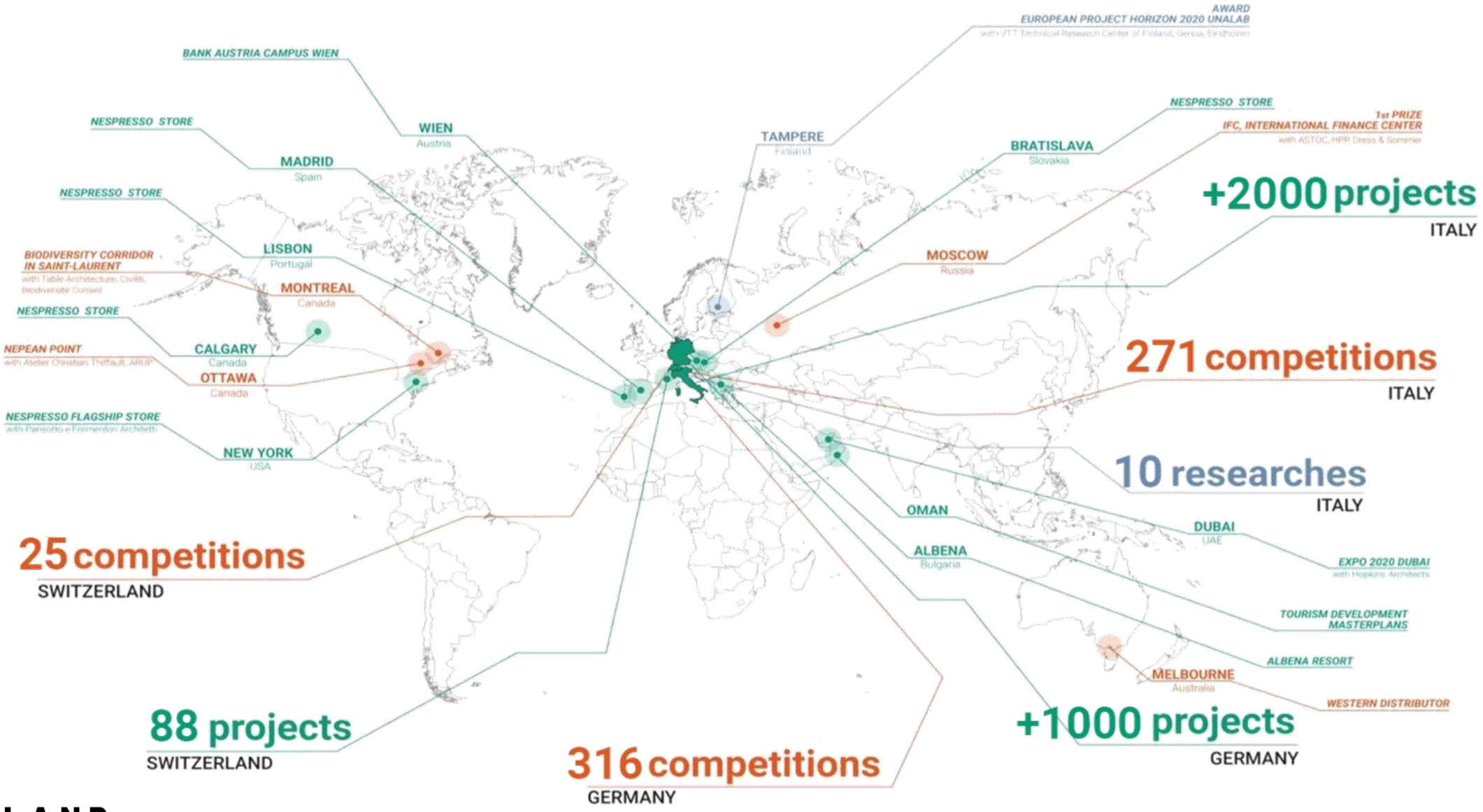

A
We make space
for people


N
We cultivate
resilience


D
We strive for sustainable
development

3 Countries – 30 Years – 1 Mission

Reconnecting people with nature



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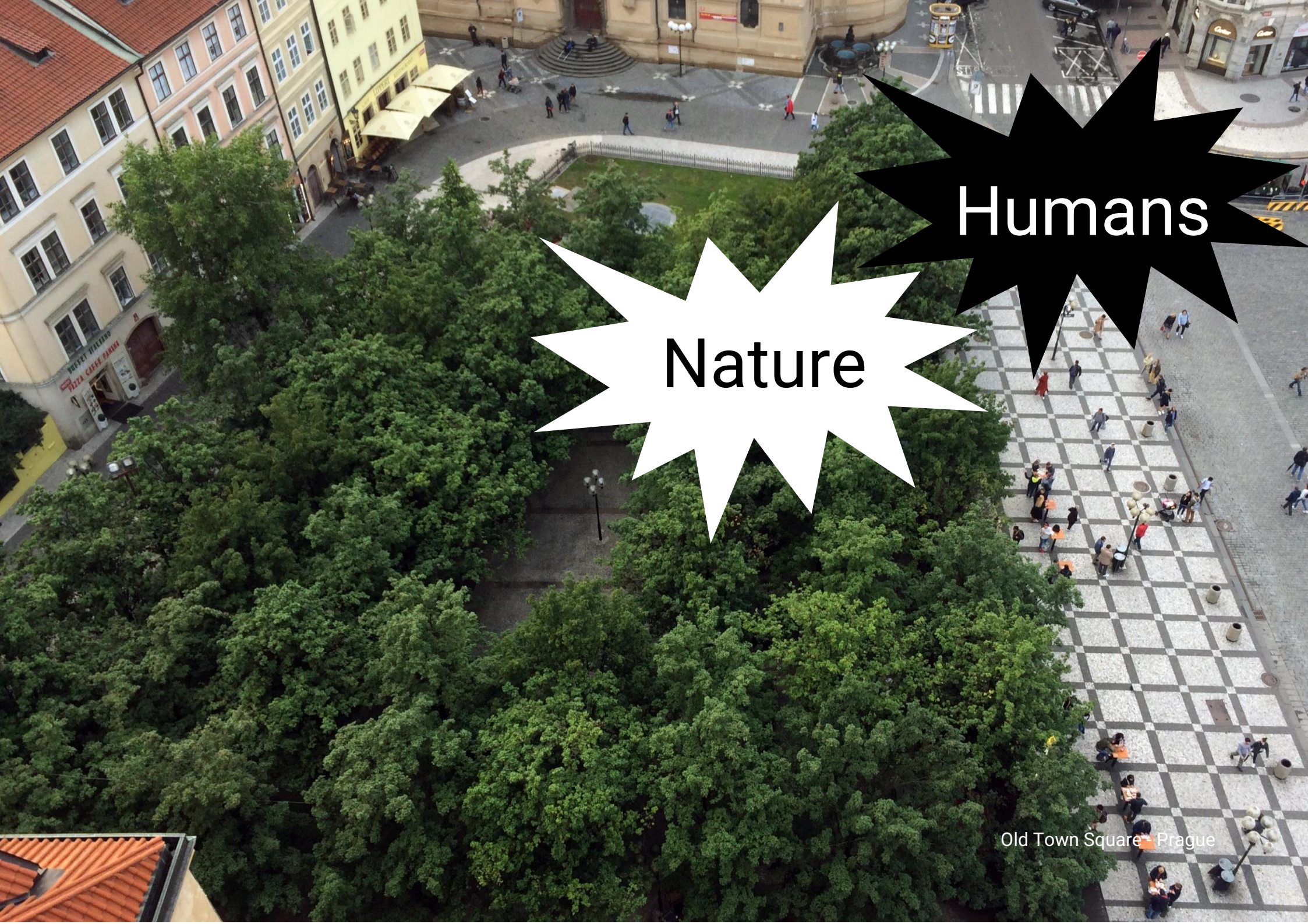

Humans
Nature
Old Town Square – Prague

A new normal?

Climate change

Rheinland and NRW, July 2021

Como lake, August 2021

Turkey, August 2021

LAND

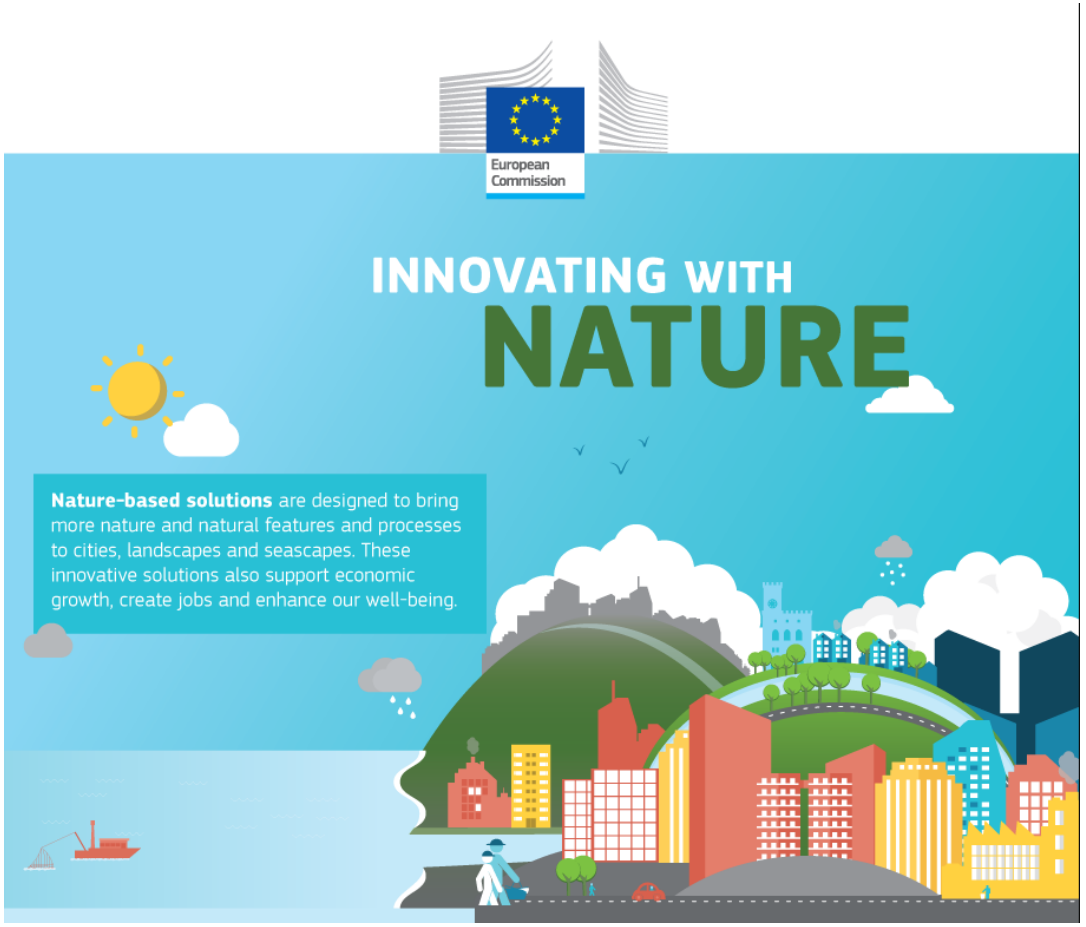
It’s time to act!

LAND

The European measures for a green transition

Green Infrastructure and Nature Based Solutions

2013



2015

LAND

Investing in a Climate-Neutral and Circular Economy

The European Green Deal

European Commission

"Coloro che agiscono per primi e più velocemente saranno anche quelli che coglieranno le opportunità dalla transizione ecologica. [...] Ma le finanze pubbliche da sole non saranno sufficienti. Dobbiamo attingere agli investimenti privati mettendo i finanziamenti verdi e sostenibili al centro della nostra catena di investimenti e del nostro sistema finanziario"

Presidente Ursula von der Leyen, Political Guidelines, 16 Luglio 2019

Source: Green Deal, European Commission

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LAND Research Lab

We innovate with nature

LAND RESEARCH LAB®

LAND Research Lab is a **research&innovation** think tank of LAND Group on emerging trends and technologies for **landscape development**.
The Lab aims to identify **collaborative procedures** and **data-driven methodologies** to make cities and rural areas **more liveable**, climate-proof and resource-efficient by reconnecting people with nature.

LAND


IO LIBERO
35 °

European Commission

Horizon 2020
European Union funding
for Research & Innovation

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www.unalab.eu

2017-2022 | 29 partners | 13 mln € by H2020 programme

UNaLab will develop, via co-creation with stakeholders and implementation of 'living lab' demonstration areas, a robust evidence base and European framework of innovative, replicable, and locally-attuned nature-based solutions to enhance the climate and water resilience of cities.

UNaLab is leading one of the EU-wide task forces among the 17 running NBS Horizon projects.

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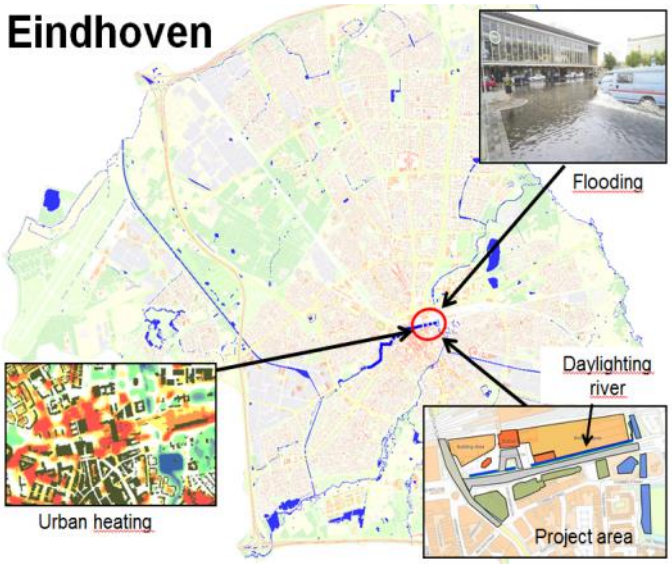
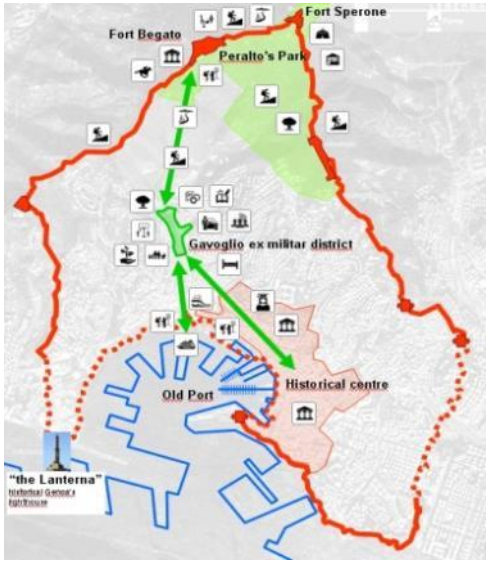
10 cities, 29 partners

UNALAB Consortium



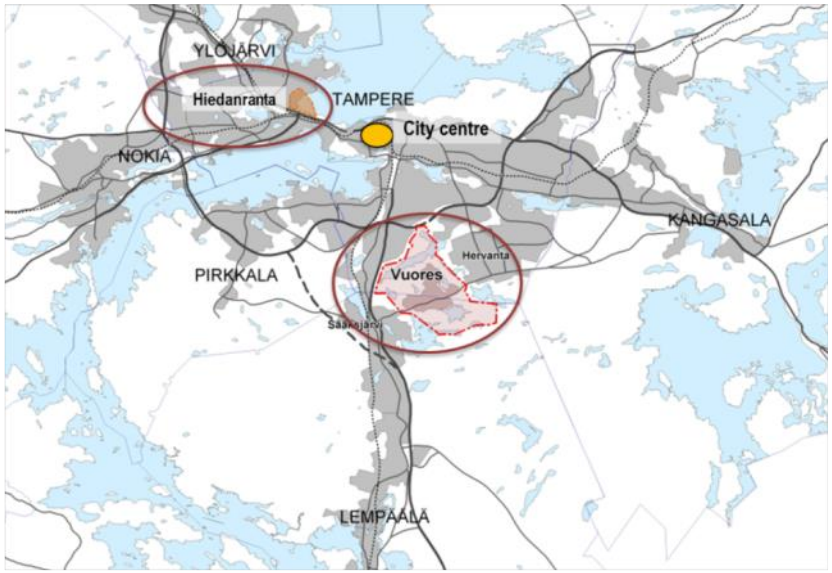
Eindhoven

Square of central station



Genova

Public park on former Lagaccio military barrack



Tampere

New urban developments of Hiedanranta and Vuores

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Genova Mediterranean metropolis

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Urban challenges

Topography + **Density** + **Climate change**

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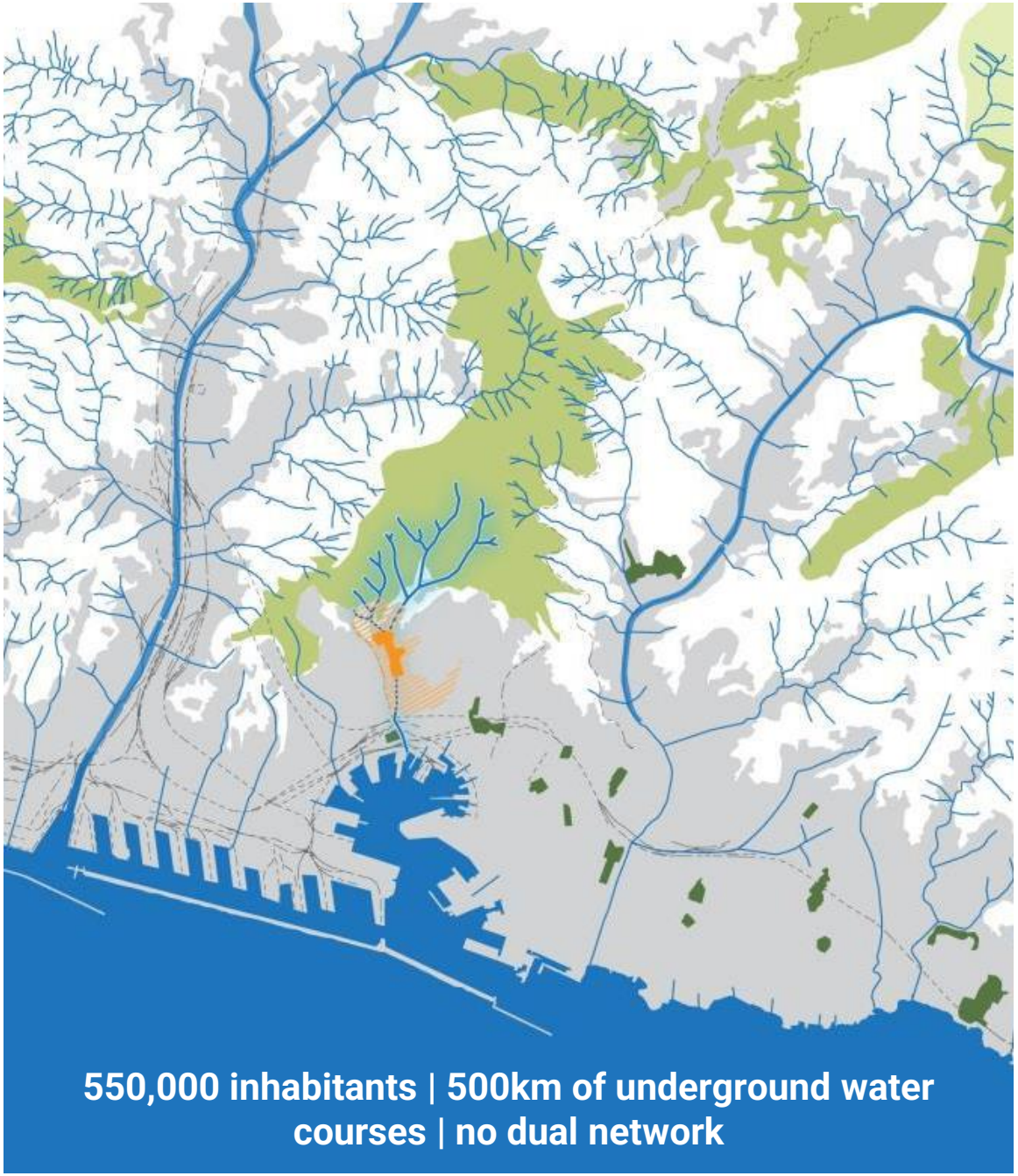

Flooding 2019

Flooding 2014

Flooding 2011

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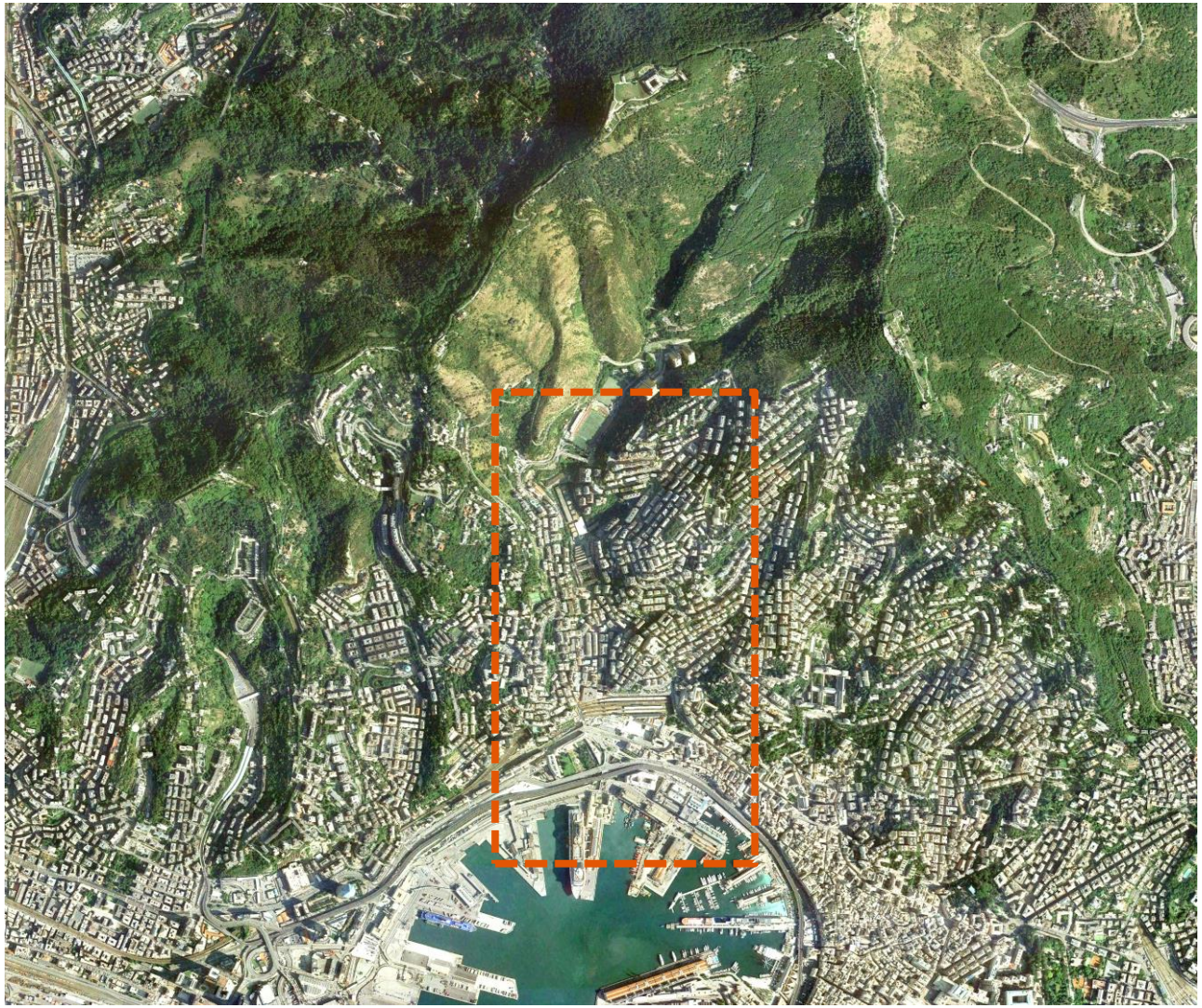
Lagaccio neighborhood



PARCO DELLE MURA E IL SISTEMA DEI FORTI

IL DENSO TESSUTO EDILIZIO

IL WATERFRONT

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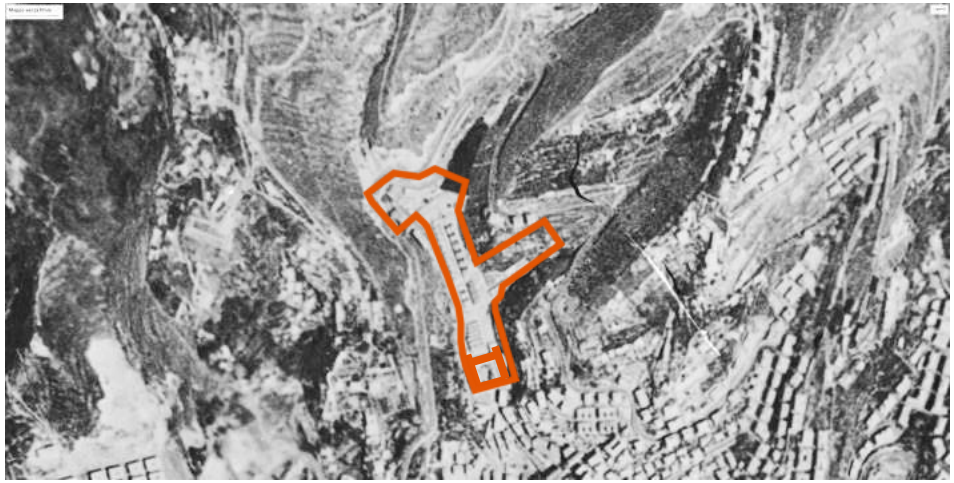
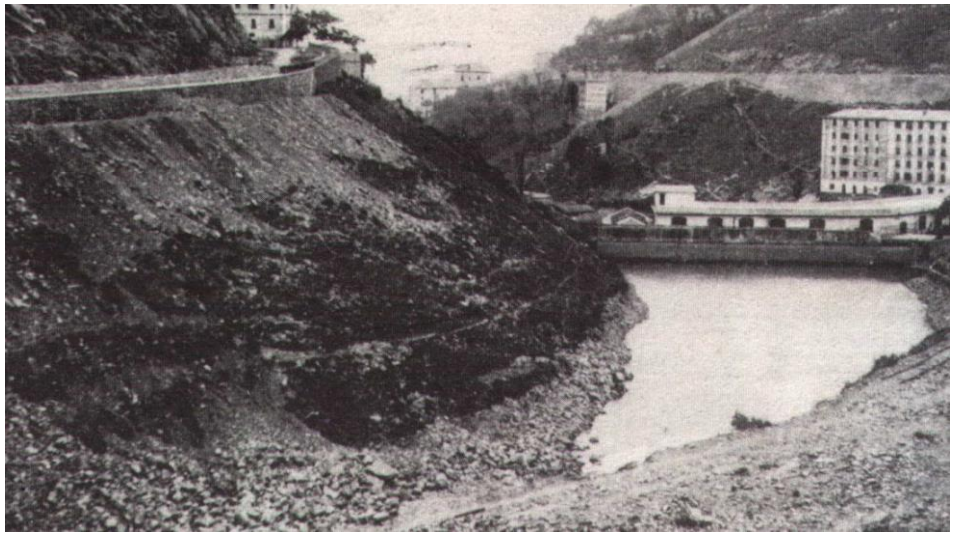
Urbanisation process

1943





2017

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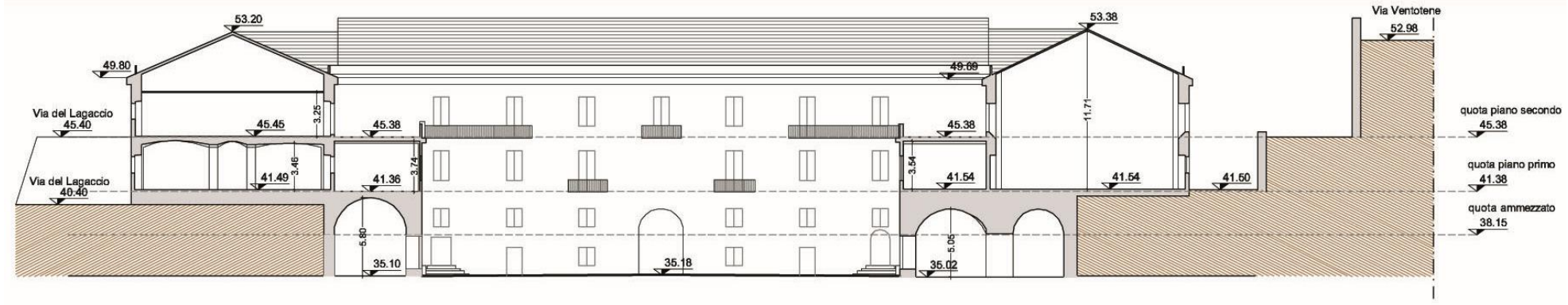
Gavoglio Barracks



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- 3 underground rivers

Rio Lagaccio
Rio Granarolo
Rio Cinque Santi

- Mixed water management

- High sealing rate within the watershed

Urban Living Lab

La metodologia

Living Labs are real-life test and experimentation environments that foster co-creation and open innovation among the main actors of the Quadruple Helix Model, namely:

- Citizens
- Government
- Industry
- Academia

European Network of Living Labs

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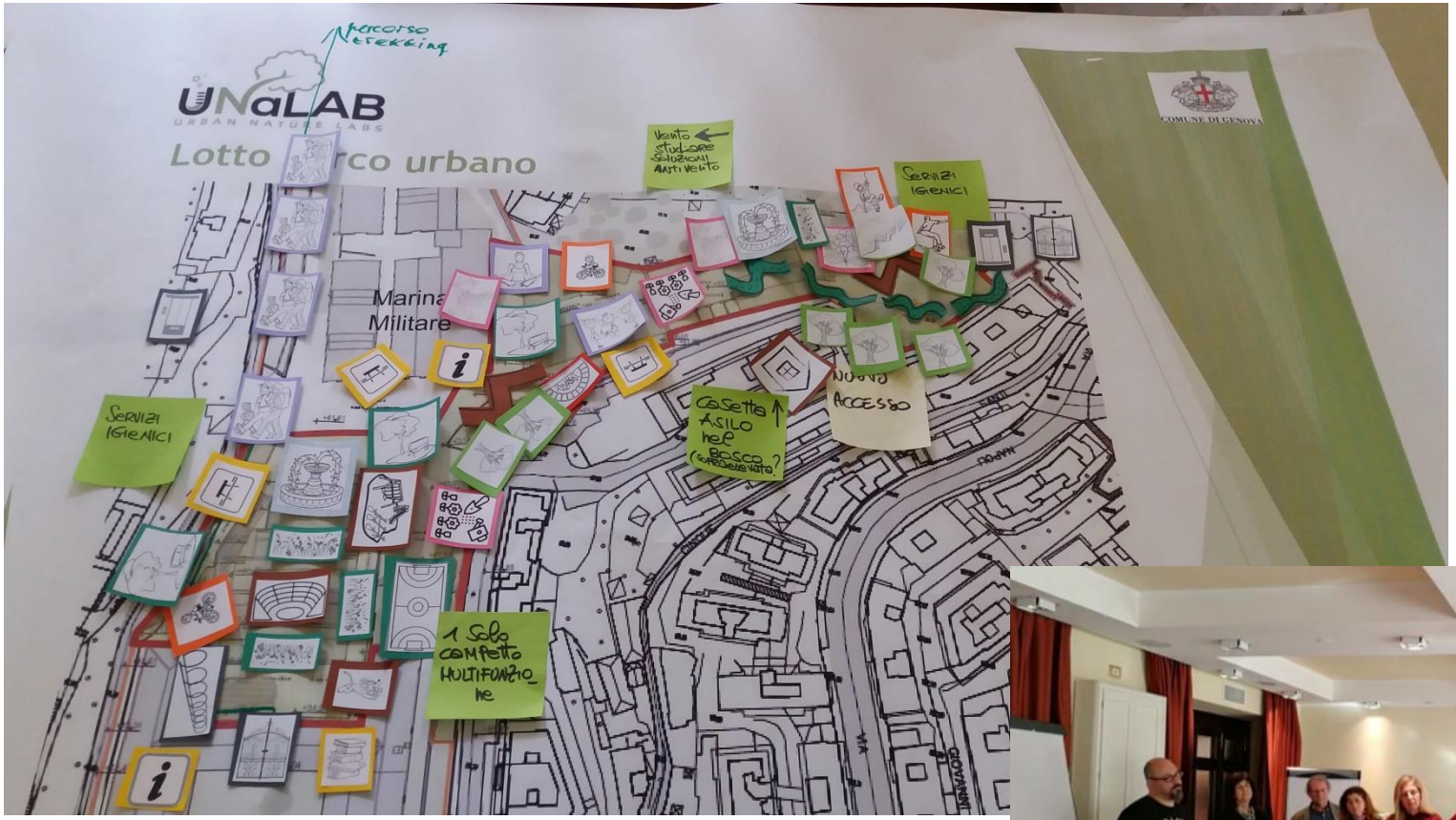
Co-creation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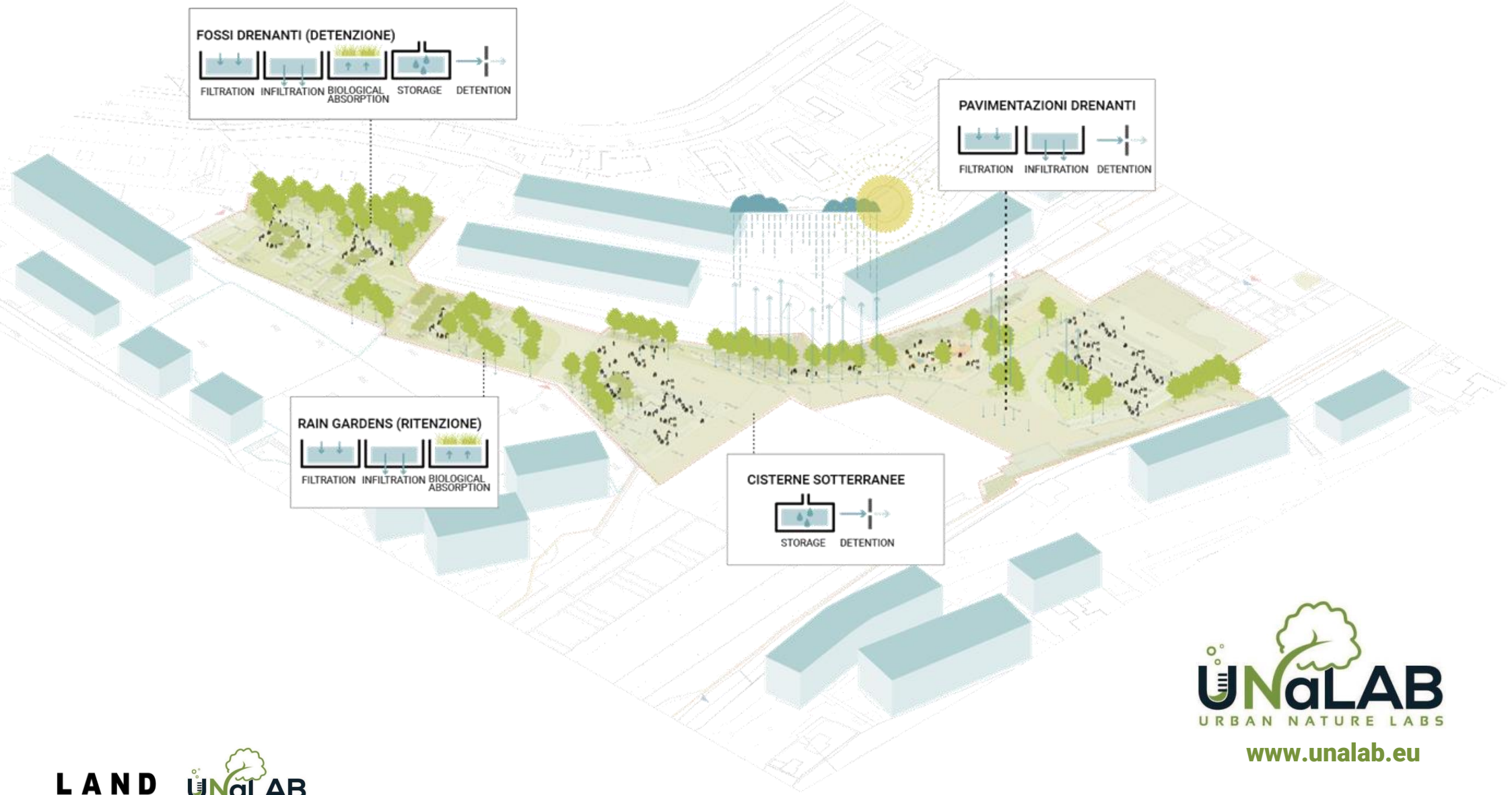
URBAN NATURE LABS
Lotto
rco urbano
Marina
Militare
COMUNE DI GENOVA
SERVIZI IGIENICI
ACCESSO
1 Solo COMPLETO MULTIFUNZIONE

UNaLab NBS demonstrator



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PIAZZALE SANTA CHIARA
PIAZZALE ITALIA
LARGO PAPACINO D'ANTONI
BARI
VIA
VENTOTENE
NAPOLI
CASARTELLI
GIOVANNI
CINQUE
SANTI
VIA DELLA CAPRA
SALITA

Nature-based solutions

Back to nature

Permeable paving

Natural playgrounds

Circular materials

Green gabions

Water harvesting

Rainwater infiltration

Natural meadows

Tree groups

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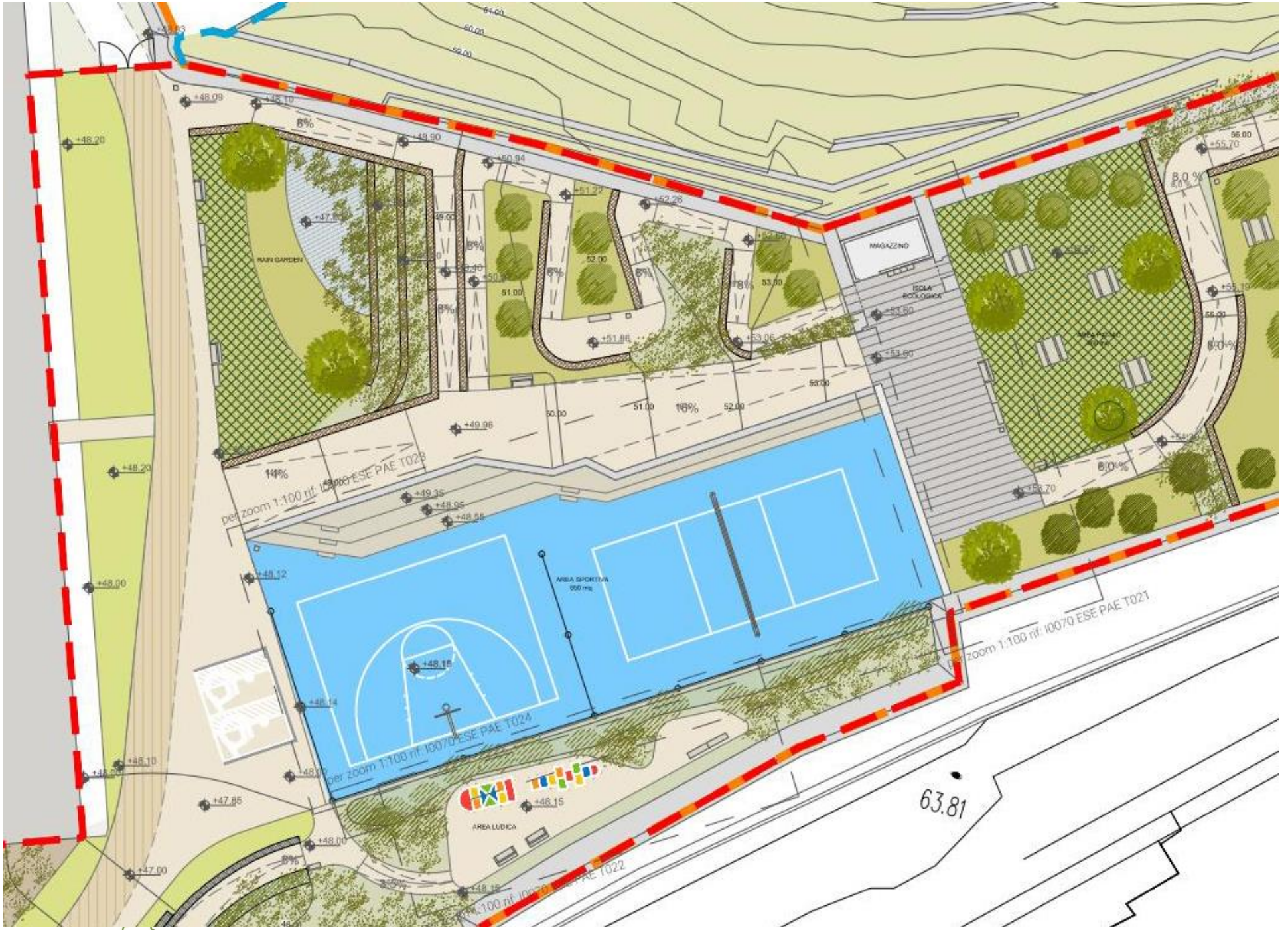
JCB



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KOMATSU

NBs deployed

Nr	NBS	Quantity
1	Demolitions: - Buildings and structures - Impermeable pavings	 - 3’225 mc - 828 mc
2	Permeable pavings - Resin bound paving - Stabilized soil - Stone paving	 - 2982 mq - 982 mq - 922 mq
3	Sand playground	26.5 mq
4	Rain garden	122 mq
5	Infiltration basin	108 mq
6	Bioswales	125 mq
7	Green areas: - Trees - Shrubbery zones - Community gardens - Lawns	 - 124 pz - 5’660 pz - 2’025 mq - 1’522 mq
8	Log crib wall	1’255 mc
9	Gabions	1’227 mc
10	Water tank	30’000 lt

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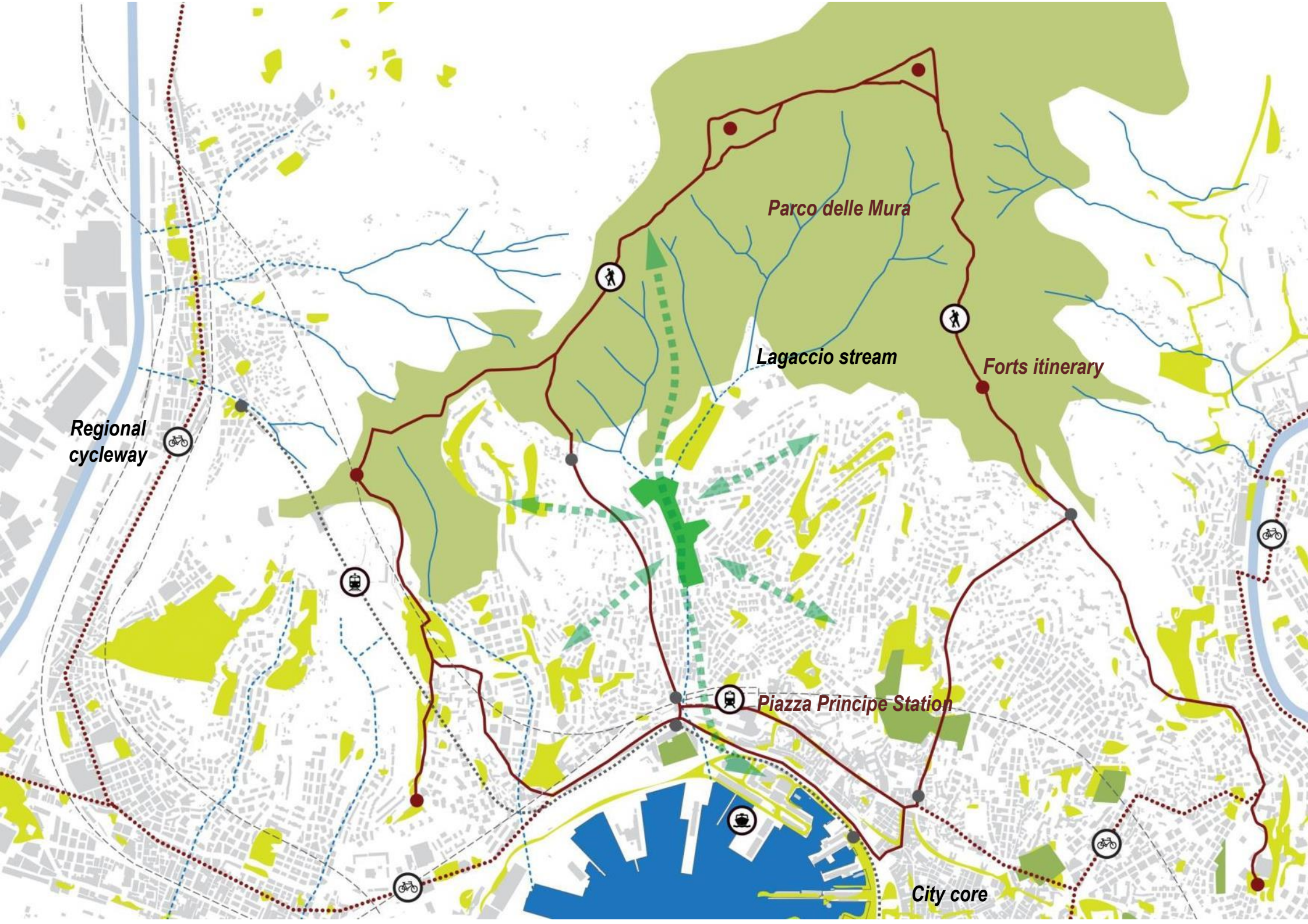
Istituto
Comprensivo
Lagaccio
PARCO
URBANO
GAVOGLIO
Caserma
Gavoglio
Salita
Cinque Santi
Parrocchia
San Giuseppe


Parco delle Mura
Lagaccio stream
Forts itinerary
Regional cycleway
Piazza Principe Station
City core

https://www.unalab.eu/documents/nbs-technical-handbook

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 |
Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions

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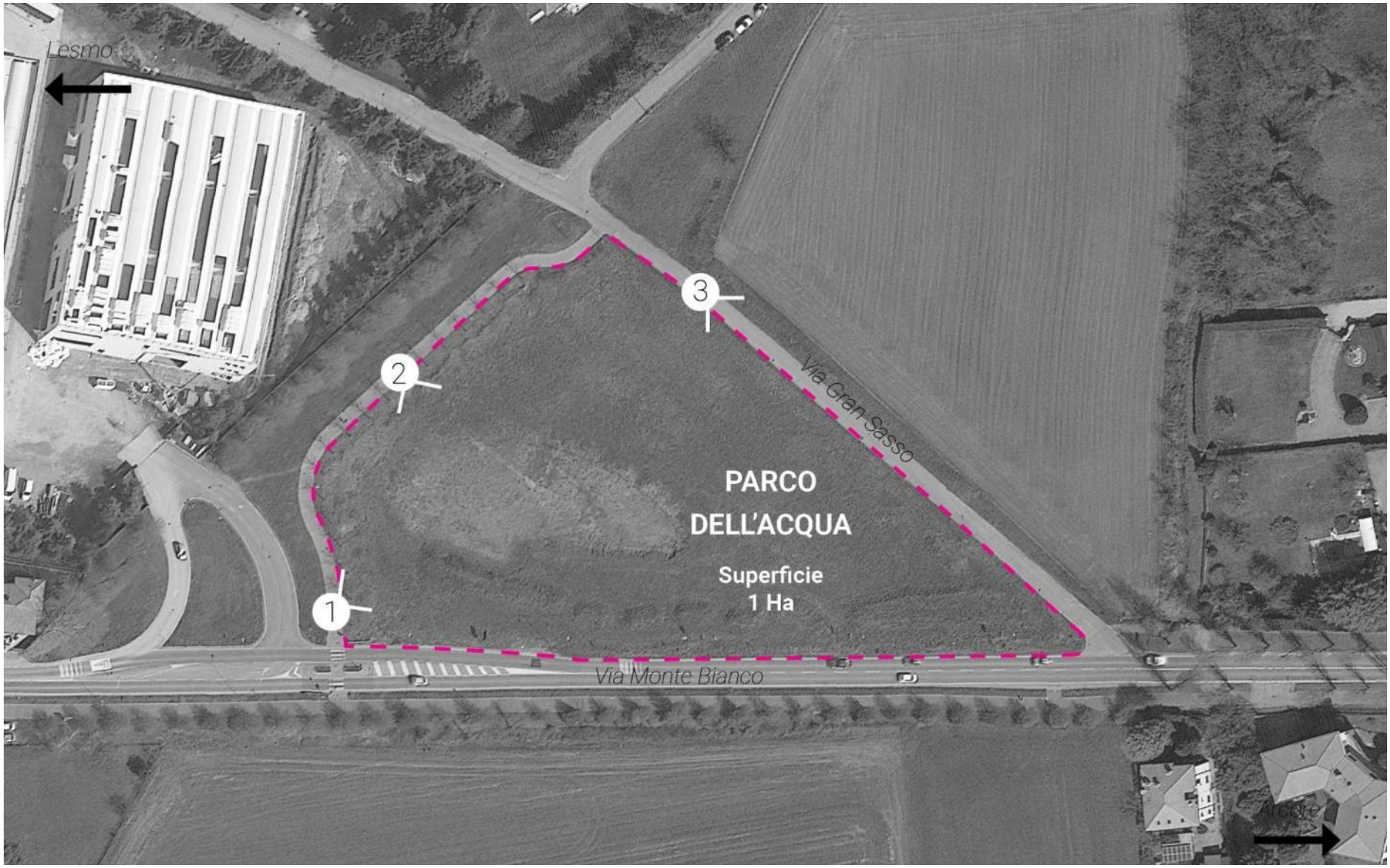
Arcore Water park

Milan, Italy

LAND

Current state



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Design


Surface area
1 Ha
Area sosta
Area gioco
Via Gran Sasso
Orti
Bacino di infiltrazione
View point
Via Monte Bianco

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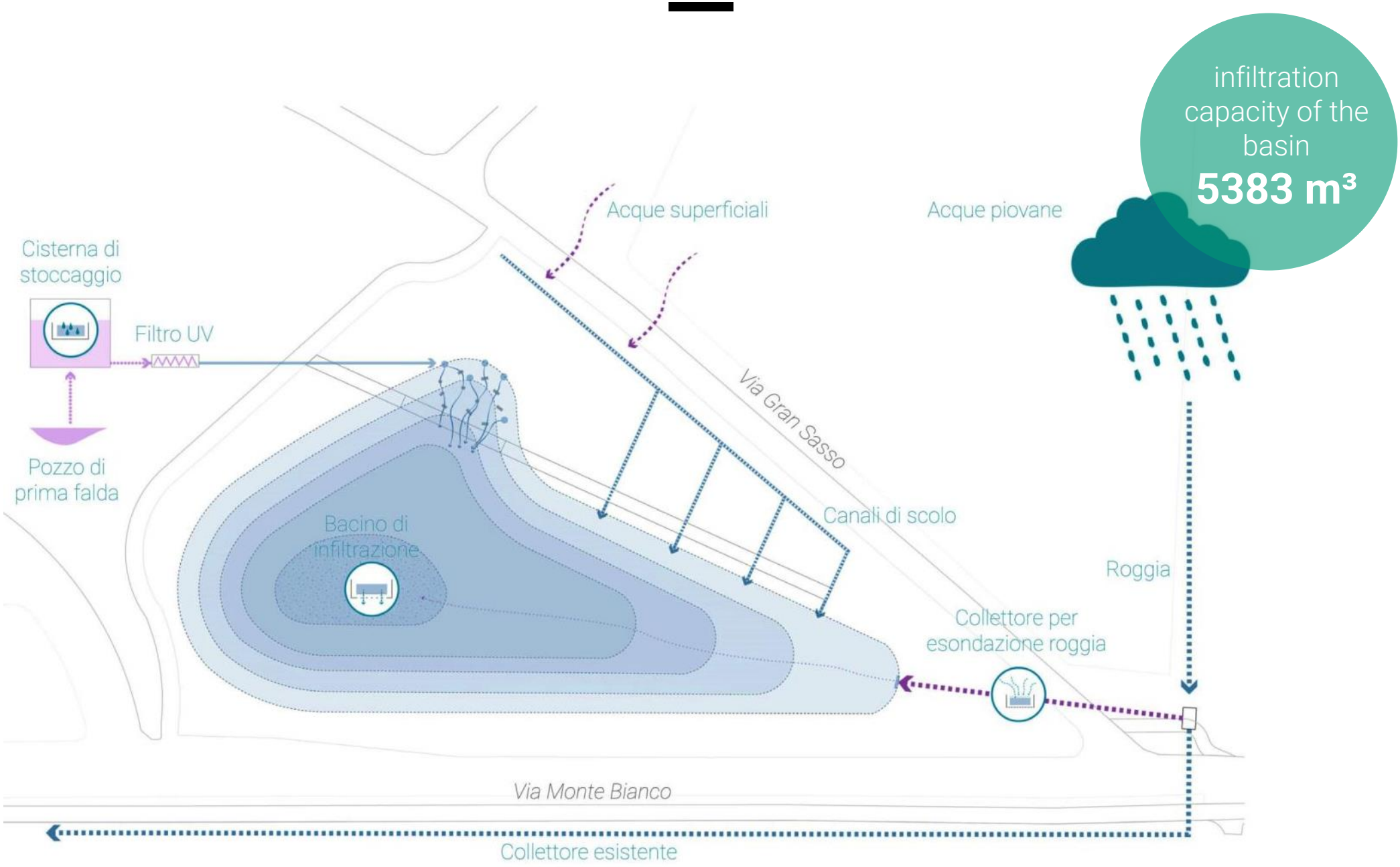
The water system



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Leading with LANDscape

Thank you for your attention

landsrl.com

ITALIA SUISSE GERMANY

Towards Climate Resilience – Measuring the Impacts of NBS

Dr. Laura Wendling
VTT Technical Research Centre of Finland

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 | **Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions**

Why Evaluate NBS Performance and Impact?

- NBS can simultaneously address several societal challenges in terms of primary benefits and co-benefits
  - Environmental, social & economic benefits derived from natural capital → **ecosystem services**
- NBS can support high-level objectives related to climate change adaptation and mitigation, ecosystem and biodiversity conservation and restoration, sustainable development, etc.
- At present, widespread adoption of NBS and their incorporation within multi-level policy instruments is hindered by the fragmented and largely discipline-specific nature of existing evidence of NBS performance and impact

Evaluating the impacts of NBS provides evidence of their effectiveness

Image source: Sgrigna et al. 2021. Chapter 1, *Evaluating the Impact of Nature-based Solutions: A Handbook for Practitioners*

How? An Integrated NBS Assessment Framework

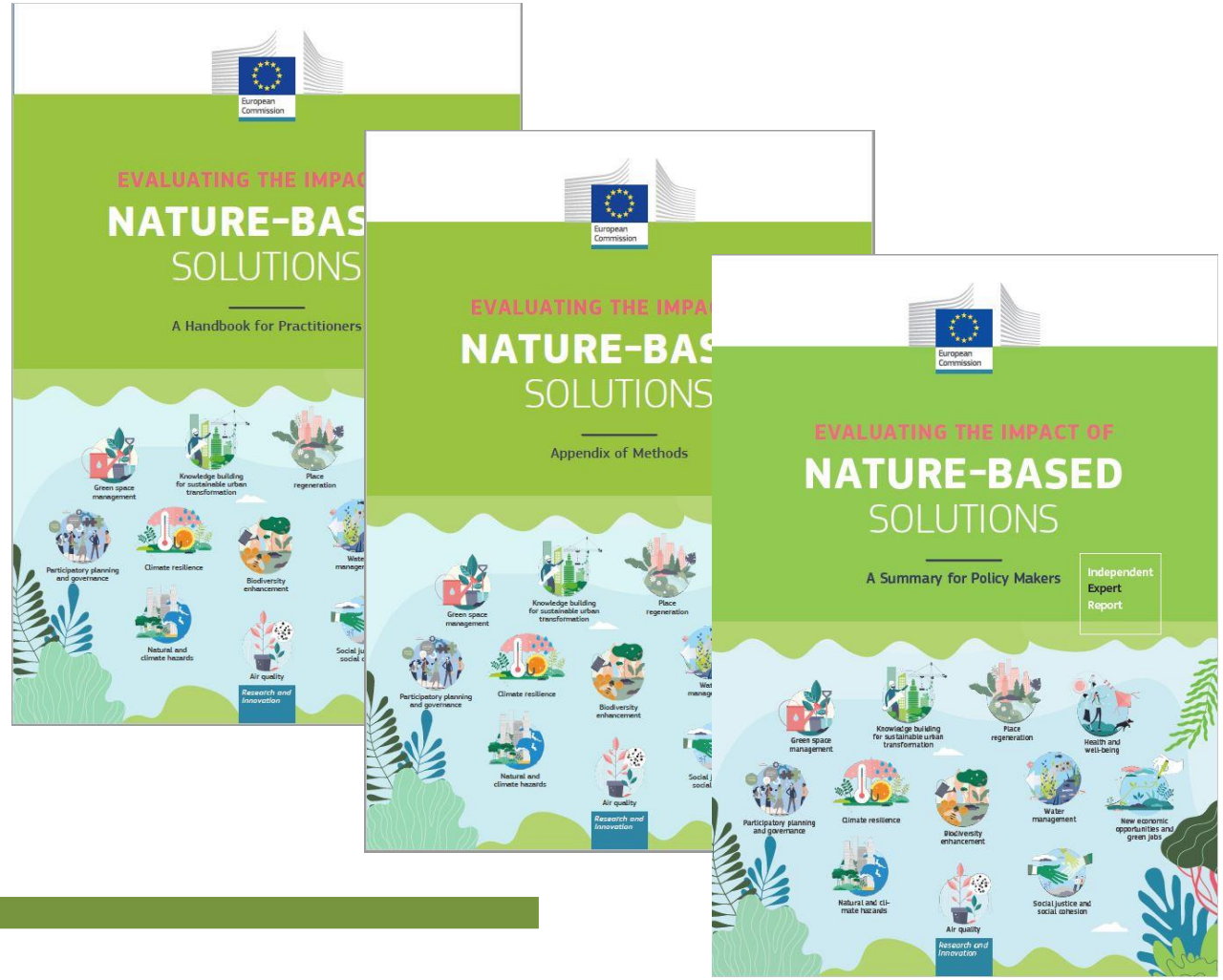
- Collaboration between 17 EU-funded projects and related programmes to develop *Evaluating the Impact of Nature-based Solutions: A Handbook for Practitioners* & *Appendix of Methods*, + *Summary for Policymakers*

The *Handbook* serves as a guide to development and implementation of scientifically-valid monitoring and evaluation plans for the evaluation of NBS impacts

The *Appendix of Methods* provides a brief description of each method, along with guidance about the appropriateness, advantages and drawbacks of each in different contexts

Framework of common indicators and methods for assessing the performance and impact of diverse types of NBS:

- A reference for relevant EU policies and activities
- Orients practitioners in developing robust impact evaluation frameworks for NBS at different scales
- Comprehensive set of indicators and methodologies
- Key points highlighted in *Summary for Policymakers*



Why is it important to evaluate the impacts of NBS?

chapter 01
- Overall framing; Global context
- Policy context
- Value of NBS

What constitutes NBS monitoring?

How do I develop a robust NBS monitoring plan?

How can I execute monitoring and impact assessment activities?

What indicators of NBS impact can I use?

How do I select appropriate indicators of NBS impact?

chapter 02
- Purpose and main principles of NBS monitoring

chapter 03
- A step-by-step approach to developing robust monitoring and evaluation plans
- NBS impact assessment best practices from EU H2020 projects

chapter 04
- Indicators of NBS performance and impact

chapter 05
- Illustration of NBS impact indicator selection and application

How can I ensure NBS work for Disaster Risk Reduction?

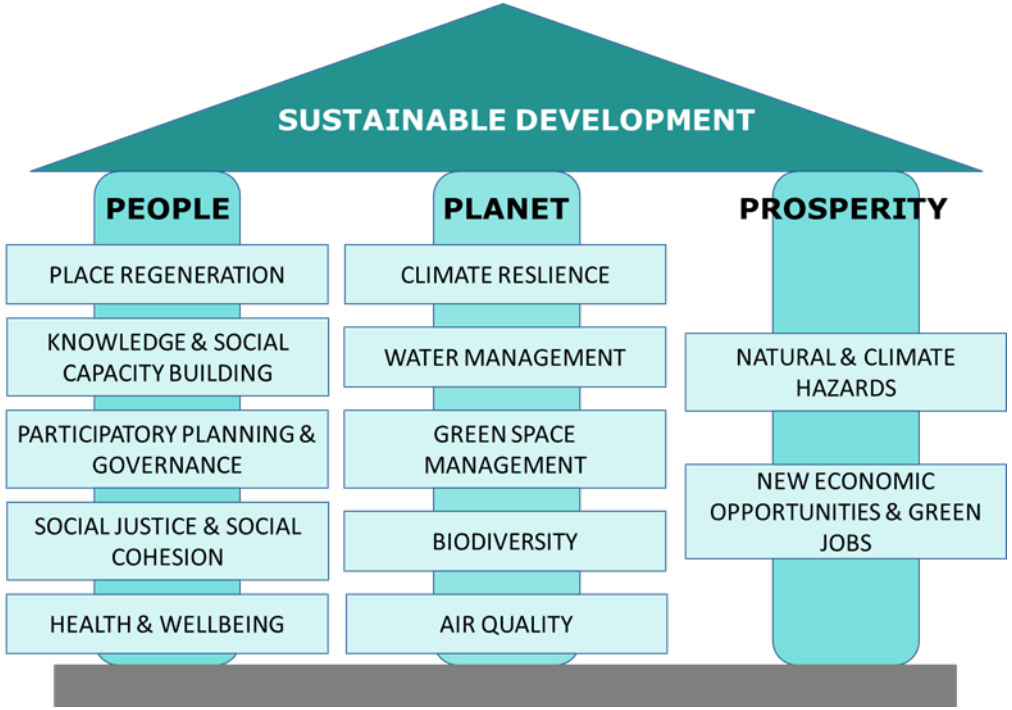
chapter 06
- Risk assessment for DRR
- Illustration of monitoring and assessment of NBS for DRR

What kinds of NBS monitoring data can I gather, and how should I manage these data?

chapter 07
- Main data types, data sources, and data generation techniques
- Data gaps, biases and ways to address them

Appendix of Methods
- Evaluating the Impact of Nature-based Solutions

Indicators of NBS Performance and Impact



12 societal challenge areas that can be addressed by NBS mapped against the UN Sustainability Development Goals' People-Planet-Prosperity triad

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Key indicators of NBS performance & impact provide information about their relative effectiveness in comparison with defined objectives

- Selection of indicators can occur at any time during the NBS adaptive management cycle
  - Initial monitoring and assessment plan identifies "must have" outcomes that can be linked to specific indicators
  - Review of planned NBS impact indicators during co-creation process can help to identify potential additional benefits and inform NBS design
  - Indicators can be added or replaced at any time in response to observed changes or new challenges (adaptive monitoring)
- Handbook presents **446 possible indicators across 12 societal challenge areas**
  - **73 Recommended** indicators of performance or impact that are central to the assessment of main expected outcomes
  - **373 Additional** useful indicators of performance or impact that may be necessary to evaluate specific targets, or desirable when additional resources are available for monitoring and evaluation

Getting Started with Indicator Selection

PRINCIPLES

Impact evaluation plans and indicators must:

- **Be scientifically sound** - measuring the impact of an NBS should follow anappropriate methodology that is capable of assessing the Key Performance Indicators (or KPIs)
- **Be practical and straight-forward** - Define scope of expected impacts, specific site or target group(s), & reliable, feasible plan for data collection
- **Use reference conditions and baseline assessment** - ensure a clear link between challenges addressed and indicators selected
- **Align with policy principles and reporting obligations** - seek alignment with key policy objectives
- **Be based on a transdisciplinary approach** - combine knowledge from societal actors with knowledge and methods from different disciplines

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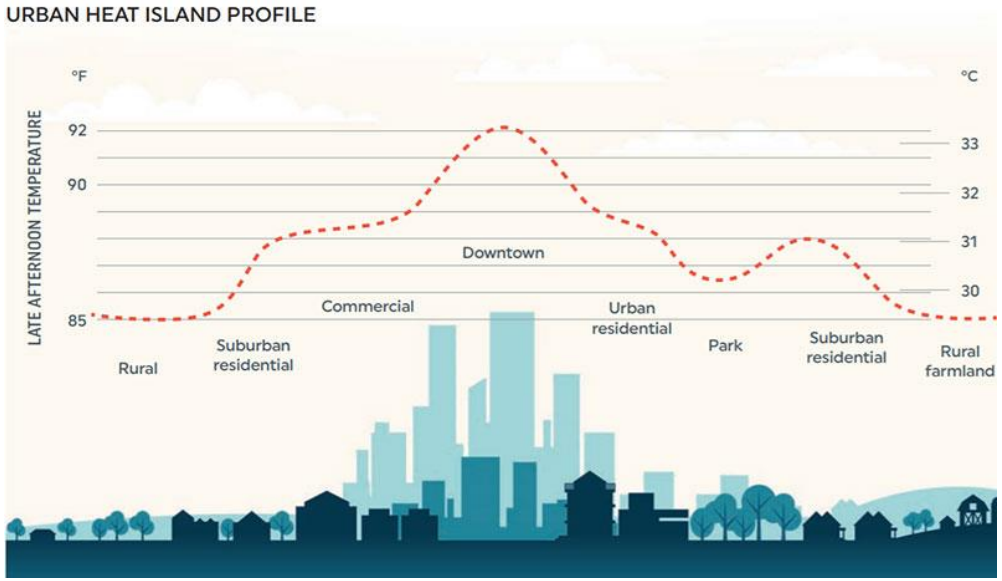
Challenge → Objective → Target

EXAMPLE: It's getting hot in here

- Citizens of Summer City have noted that some parts of the city are excessively warm. Data show an increase in heat-related illness & mortality. Long-term, regional temperature measurements show that the city centre is up to 5˚C warmer than the surrounding countryside on hot days.
- Co-innovation with stakeholders identified NBS as a preferred option to address urban heating.
- An NBS action was proposed including depaving of an area in the city centre and planting of trees and biodiverse greenery, and implemention of green facades on the buildings surrounding the new public green space.
- According to the NBS literature, these solutions can address heat stress, air pollution, climate driven health issues, habitat loss or fragmentation, and biodiversity loss.



- **Challenge or problem:** Excessive heat in city centre during warm months
- **Objective of NBS action:** Reduce urban heating and increase resilience to future climate warming
- **Target:** Reduce air temperature in city centre by at least 2˚C on hot days

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Indicators to measure NBS Performance and Impact

Challenge Categories

1. Climate Resilience
2. Water Management
3. Natural and Climate Hazards
4. Green Space Management
5. Biodiversity Enhancement
6. Air Quality
7. Place Regeneration
8. Knowledge and Social Capacity Building for Sustainable Urban Transformation
9. Participatory Planning and Governance
10. Social Justice and Social Cohesion
11. Health and Wellbeing
12. New Economic Opportunities and Green Jobs

No.	Indicator	Units	Class	Applicability to NBS†		
				Type 1	Type 2	Type 3
RECOMMENDED						
1.1	Total carbon removed or stored in vegetation and soil per unit area per unit time	kg/ha/y	O	●	●	●
1.2	Avoided greenhouse gas emissions from reduced building energy consumption	t CO_2e/y	O		●	●
1.3	Monthly mean value of daily maximum temperature (TX_x)	°C	O	●		●
1.4	Monthly mean value of daily minimum temperature (TN_n)	°C	O	●		●
1.5	Heatwave incidence: Days with temperature >90th percentile, TX90p	No./y	O	●		●
ADDITIONAL						
2.10.1	Urban Heat Island (incidence)	°C	O	●		●
2.10.1	Mean or peak daytime temperature	°C	O	●		●

Mean of daily maximum temperature (TX)	Climate Resilience
Description and justification	Mean of the daily maximum temperatures observed during specific time period, either for a specific year or over a specific period of years[1]. Proposed to detect Tº increment
Definition[2]	Let TX_{ij} be the maximum temperature at day i of period j. Then mean values in period j are given by: $TX_j = \sum_{i=1}^{I} TX_{ij} / I$
Strengths and weaknesses	It is a good indicator together with the mean of daily minimum temperature that can gives an idea of the high temperature effects in urban comfort and human health.
Measurement procedure and tool	Sensors: measuring instruments (measurement stations or manual instruments e.g., TESTO multi-function); thermography camera (e.g., FLIR). The average of the summer period or a hot summer day can be considered from one specific year or range or years Summer is the most common season in which it is assessed (spring and autumn are considered in relatively fewer studies: e.g., Yan H., Wang X., et al. 2012; Shashua-Bar L., Tsiros I.X., Hoffman M.E. 2010) The maximum is the category most employed in the literature, but the average also is relevant and used. For this indicator the average is proposed.
Scale of measurement	It depends on the sensors network coverage; it can be a point or in case there are several localizations it ca be transformed to a grid (through interpolation)

Data source	
Required data	A time series of air Tº data (measured in ºC)
Data input type	Quantitative
Data collection frequency	The sensors can collect the data every 10 minutes. In case the effectiveness of a NBS is analysed this should be measured at least hourly. At midday, the cooling effect reaches its maximum so, for example, the heat effect on health can be analysed; at night, the effectiveness is less, but the effect of the night temperature on sleep disturbance can be analysed. Regardless of the adaptation aim, the best time to measure the higher effect on heat reduction is midday, as this is the hottest time of the day where the cooling effect reaches the maximum (Georgi and Dimitriou, 2010; Shashua-Bar et al., 2012; Tan et al., 2016).
Level of expertise required	The sensors must be calibrated and located in the same place during all the measurement period. Not any sensor is valid
Synergies with other indicators	Synergies with the mean of daily minimum temperature.
Connection with SDGs	SDG 3 Good health and well-being, SDG 11 Sustainable cities and communities, SDG 13 Climate action
Opportunities for participatory data collection	Participatory data collection is feasible with supervision
Additional information	
References	[1] http://glossary.ametsoc.org/wiki/Mean_daily_maximum_temperature_for_a_month [2] https://eca.knmi.nl/indicesextremes/indicesdictionary.php#8

This sounds like a good way to measure longer-term trends, but what if we want to know more specifically about hot days (rather than a monthly average)?

Urban Heat Island (UHI) effect	Climate Resilience Natural and Climate Hazards
Description and justification	The UHI effect is caused by the absorption of sunlight by (stony) materials, reduced evaporation and the emission of heat caused by human activities. The UHI effect is greatest after sunset and reported to reach up to 9°C in some cities, e.g., Rotterdam (Van Hove et al., 2015). Because of the UHI effect, citizens living in urban areas experience more heat stress than those living in the countryside.
Definition	Urban Heat Island (UHI) effect denotes an urban area that is significantly warmer than its rural or undeveloped surrounding areas. Expressed and evaluated as temperature (°C).
Strengths and weaknesses	+ Fairly easy and straightforward assessment of temperature differences - Requires a rather large amount of temperature measurement stations to holistically identify the effect within the urban area - May require modelling expertise
Measurement procedure and tool	1. Identify or install one or more meteorological (temperature) measurement stations within the built environment, and one measurement station outside the city that functions as a reference station. Alternatively, models can be used. 2. Compare the hourly average air temperature measurements of the urban measurement station(s) with the station outside the city (the reference station). 3. Look for the largest temperature difference (hourly average) between urban and countryside areas during the summer months. This temperature difference is an absolute measure of the UHI effect.
Scale of measurement	City to regional scale

Data source	
Required data	Hourly temperature measurements
Data input type	Quantitative
Data collection frequency	Annually; at minimum before and after NBS implementation
Level of expertise required	Low
Synergies with other indicators	Assessed from *Mean or peak daytime temperature* indicator and connected with *Heatwave Risk* indicator
Connection with SDGs	SDG 3 Good health and well-being, SDG 11 Sustainable cities and communities, SDG 13 Climate action
Opportunities for participatory data collection	Participatory data collection is feasible through geographically referenced direct temperature measurements if these are not automated.
Additional information	
References	Van Hove, L.W.A., Jacobs, C.M.J., Heusinkveld, B.G., Elbers, J.A., van Driel, B.L., & Holtslag, A.A.M. (2015). Temporal and spatial variability of urban heat island and thermal comfort within the Rotterdam agglomeration. Building and Environment, 83, 91-103. United States Environmental Protection Agency. (2006). Excessive Heat Events Guidebook. Retrieved from https://www.epa.gov/sites/production/files/2016-03/documents/eheguide_final.pdf

This sounds like it will tell us whether we achieve the target, but does this mean that we also have to measure another indicator?

Mean or peak daytime temperature – Direct measurements	Climate Resilience

Description and justification	Green urban infrastructure can significantly affect climate change adaptation by reducing air and surface temperatures with the help of shading and through increased evapotranspiration. Conversely, green urban infrastructure can also provide insulation from cold and/or shelter from wind, thereby reducing heating requirements (Cheng, Cheung, & Chu, 2010). By moderating the urban microclimate, green infrastructure can support a reduction in energy use and improved thermal comfort (Demuzere et al., 2014). The cooling effect of green space results in lower temperatures in the surrounding built environment. A simulation of the surrounding buildings showed the potential for a 10% decrease in the cooling load due to the presence of the green area in the vicinity (Yu & Hien, 2006).
Definition	Mean or peak daytime local temperature by direct measurement (°C)
Strengths and weaknesses	+ Straightforward assessment of ambient air temperature + Reliable in the long run - Requires a rather large amount of monitoring stations to be installed to monitor various NBS intervention areas
Measurement procedure and tool	Ambient air temperature can be assessed through continuous monitoring of temperature, near the NBS intervention area, and calculation of mean and peak daytime temperature before and after NBS implementation.
Scale of measurement	Plot to district scale

Data source	
Required data	Automated continuous monitoring of ambient air temperature
Data input type	Quantitative
Data collection frequency	Annually; at minimum, before and after NBS implementation
Level of expertise required	Low
Synergies with other indicators	A prerequisite for *Heatwave Risk* and *Urban Heat Island* indicators, and a requirement for *Depth to groundwater* indicator
Connection with SDGs	SDG 3 Good health and well-being, SDG 11 Sustainable cities and communities, SDG 13 Climate action
Opportunities for participatory data collection	Participatory data collection is feasible through direct temperature measurements if these are not automated
Additional information	
References	Cheng, C.Y., Cheung, K.K.S., & Chu, L.M. (2010). Thermal performance of a vegetated cladding system on facade walls. Building and Environment, 45(8), 1779-1787. Demuzere, M., Orru, K., Heidrich, O., Olazabal, E., Geneletti, D., Orru, H., Faehnle, M. (2014). Mitigating and adapting to climate change: Multi-functional and multi-scale assessment of green urban infrastructure. Journal of Environmental Management, 146, 107-115. Yu, C., & Hien, W.N. (2006). Thermal benefits of city parks. Energy and Buildings, 38, 105-120.

Does this measurement tell us whether we have achieved the target?
Do we have the resources and expertise to collect these data?

Measuring the Cooling Effect of NBS

An NBS action was proposed including depaving of an area in the city centre and planting of trees and biodiverse greenery, and implemention of green facades on the buildings surrounding the new public green space.

- Temperature data from measurement stations able to collect data every 10 minutes will provide the information we need for all 3 indicators
- To assess effect of NBS on city temperature we need measurements:
  - In the hot city centre, in close proximity to NBS
  - In the hot city centre, in an area without NBS
- To quantify UHI effect
  - Also need one or more measurement stations in the surrounding countryside

- What do we need to measure?
- What data or data sources are already available?
- How do we get the data (what equipment do we need)?
- Where do we need to take measurements?
- How frequently do we need to take measurements?
- How are the data handled? By whom?
- Do we have the expertise needed to acquire and manage the data?
- Do we have the resources to purchase and maintain necessary equipment?

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Generate a Taolored Portfolio of Indicators

- The impacts of NBS actions have very broad impacts - consult with experts from a range of different disciplines
- First, consider the main objective(s) of the action
  - What are we targeting?
  - What do we need to measure to know if the objectives have been achieved?
- Next, brainstorm possible additional benefits (co-benefits)
  - What other positive outcomes might we obtain?
  - How can we measure these other benefits?

According to the NBS literature, these solutions can address heat stress, air pollution, climate driven health issues, habitat loss or fragmentation, and biodiversity loss

- In the preceding example, we focused on the main objective
- If we were to brainstorm co-benefits, what do you think might be some important things to consider?
  - Hint: all the indicators discussed so far were outcome oriented. What about co-benefits derived from the process of implementing the NBS?

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Project Partners

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 | **Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions**

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 | **Topic: SCC-2-2016-2017: Smart Cities and Communities Nature based solutions**

Civil Society Organizations and Environmental Actions in the City of Buenos Aires. The case of NBS actions.

Mariángeles Viqueira G.

Beatriz Plata

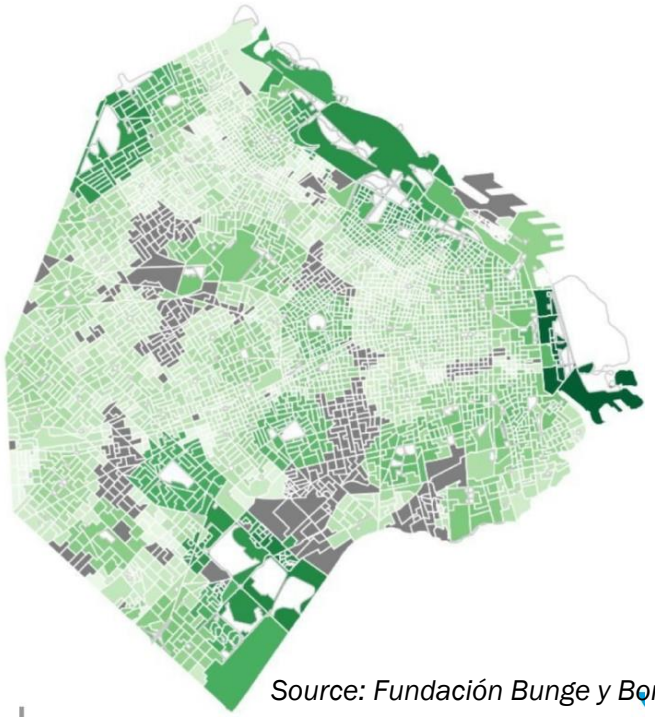
13th May, 2022

Co-funded by the Horizon 2020 Framework Programme of the European Union

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No. 730052 | Topic: SCC-2-2016-2017: Smart Cities and Communities Nature-based Solutions

The City of Buenos Aires

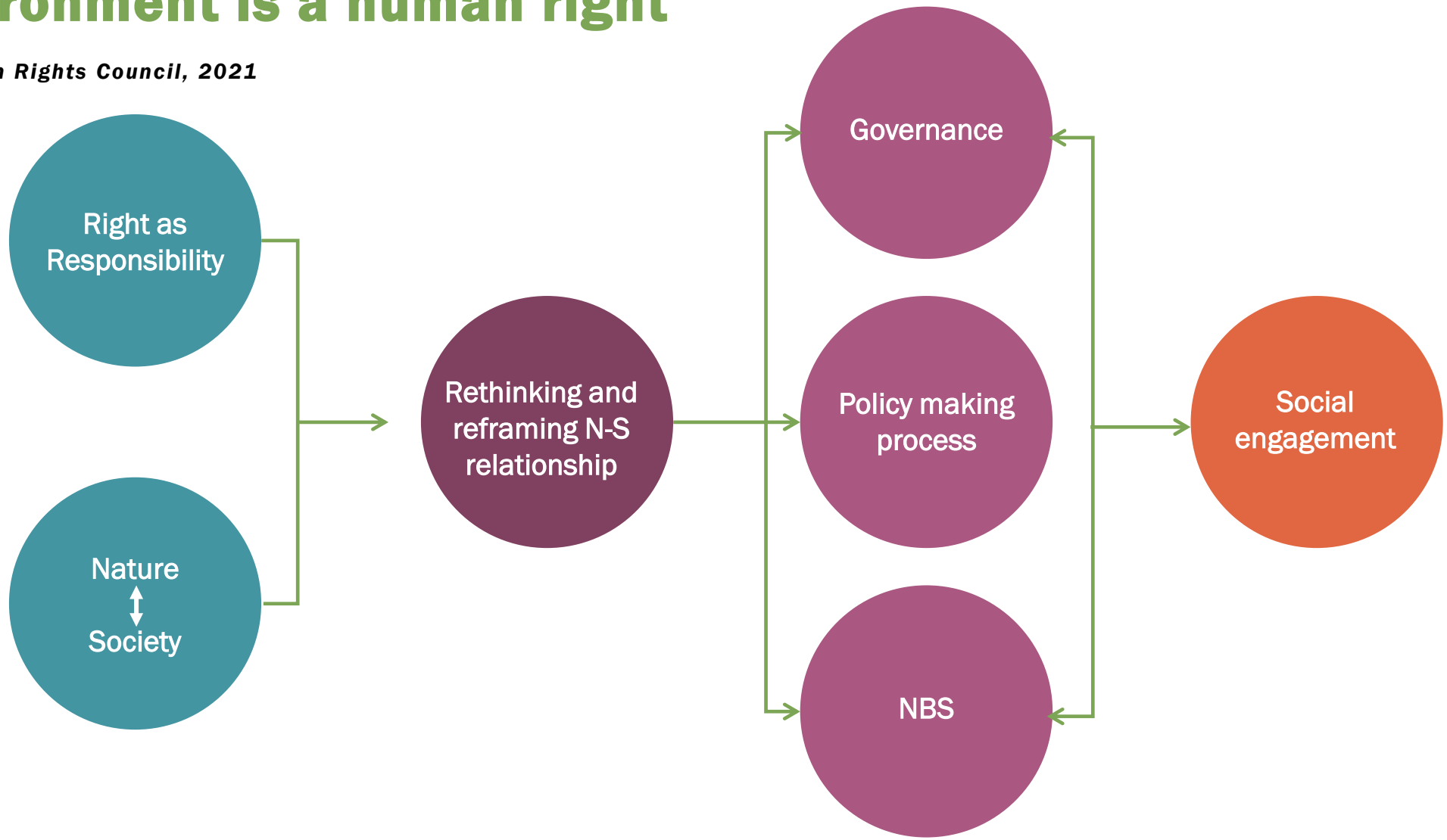
- Capital and largest city of Argentina
- Autonomous district
- Population: 3,000,000 (7% of the country)
- Area: 202 km^2
- Green space: 6.2 m^2/inhabitant
- 15 districts



Source: Fundación Bunge y Born

“Clean, healthy and sustainable environment is a human right”

UN Human Rights Council, 2021



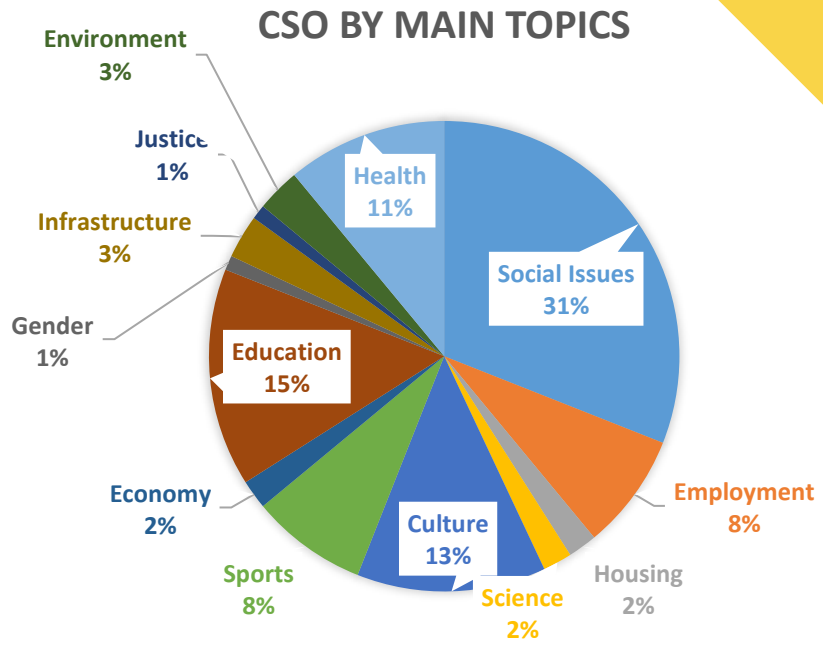
CSO

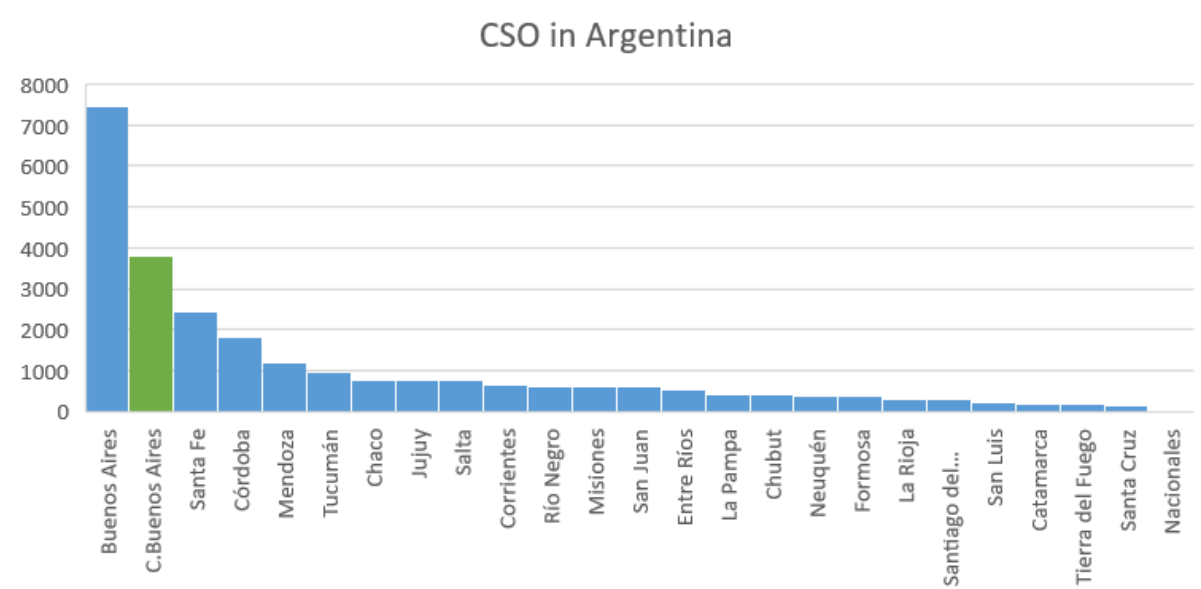
Why

- Community identity
- Voice of vulnerable groups
- Motivating to address challenges
- Experience in legislative process

Buenos Aires - data

- 3,811 CSO, 14.7% of Argentina
- 128 CSO oriented to Environment issues





CSO participation

What / Who

- Target:
  - CSO located in the city of Buenos Aires, oriented to environmental issues.
- Objective:
  - To know the opinion about the current situation of NBS in Buenos Aires
  - To inquire about the vision in order to build a greener city

How

White: information, facts

Black: risks, difficulties, problems.

Yellow: benefits, positive points.

Red: feelings, intuitions.

Green: creativity, possibilities, alternatives, new ideas.

Blue: manage the thinking process

Data collection

Data analysis

Results

* Laws and Constitution: participation and environment issues as priorities.
* COVID-19 pandemic: importance of urban green spaces.

* Experience in co-creation processes.
* Cohesion and articulation between CSO.
* In charge of the protection of green areas.

* More public budget for the "*comunas*".
* Social participation in the different phases of the policy making process.
* Environmental literacy.
* Inclusion of NBS in building projects.

* Socioeconomic situation.
* Excessive bureaucracy to propose and implement NBS projects.
* Insufficient private sector investment.
* Conceptual differences about NBS.
* NBS as greenwashing.

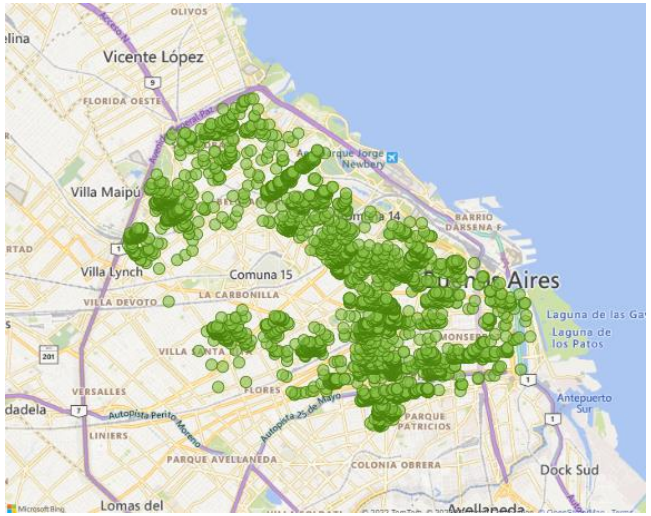
* Need to move from a carbon reduction approach to a global one.
* Establish a real governance.
* Fear of real estate business in green areas.
* NBS is more than a green roof.

* Long-term public policies.
* Transversal communication between stakeholders.
* Large implementation of the law about Environmental Education.
NBS as a priority.

Some initiatives

Meeting streets

100,000 trees - 2025



Green Schools

Thank you!
¡Gracias!

Mariángeles Viqueira

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City Lab Saltillo

Pilot project Restoration and Integration of Blue-Green Infrastructure

University of Stuttgart
Institute for Human Factors and Technology Management IAT

Fraunhofer

Supported by:

Federal Ministry
for the Environment, Nature Conservation and Nuclear Safety

based on a decision of the German Bundestag

13.05.2022

MORGENSTADT GLOBAL SMART CITIES INITIATIVE
GLOBAL APPROACH – LOCAL SOLUTIONS

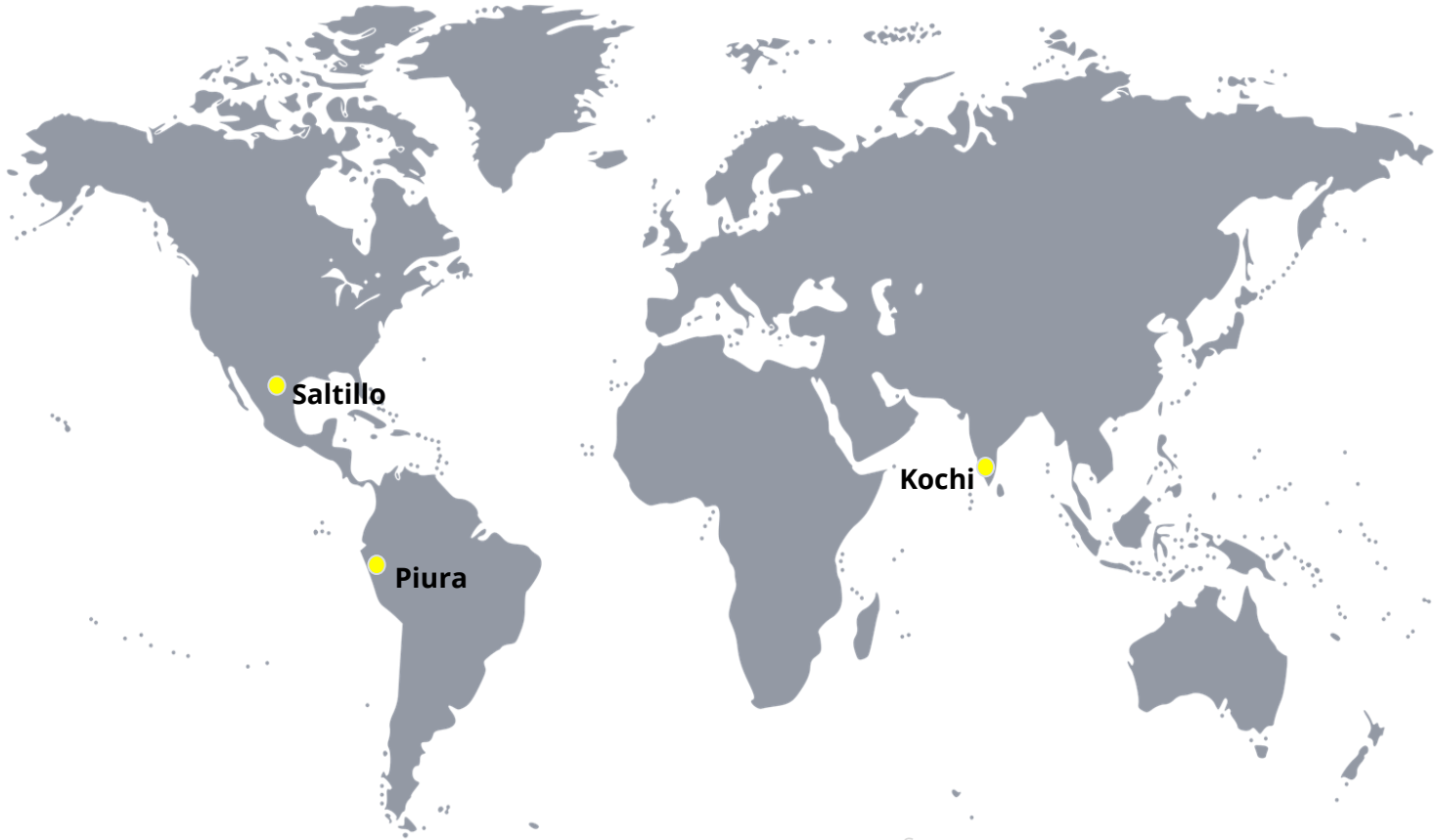
Objectives

Contribution for climate protection:

- Mitigation, adaptation and resilience for climate change.

Contribution for sustainable urban development:

- Long-term and sustainable transformation process leading to replicable and affordable solutions for a resource-efficient, resilient and livable city of tomorrow.



Source: openclipart.

José A. Ordonez; Catalina Díaz; Xanin García; Eduardo Santillán; Marc Beckett; José I. Huertas; María L. Huertas; Shopie Mok; Ricardo Reyes; Sonja Stöffler; Trinidad Fernández; Ana M. Vivas; Roberto Castañeda; Mónica J. Cruz; Gabriela De Valle; José C. García; Juan J. Henao; Antonio Mogro; María Baez; Victor Müller; Martin Pudlik; Oscar Serrano; Carmina Villareal; María J. Gil.

On behalf of
Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
of the Federal Republic of Germany

INTERNATIONAL CLIMATE INITIATIVE (IKI)

Financed by the International Climate Initiative (IKI) of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)

City Lab Saltillo

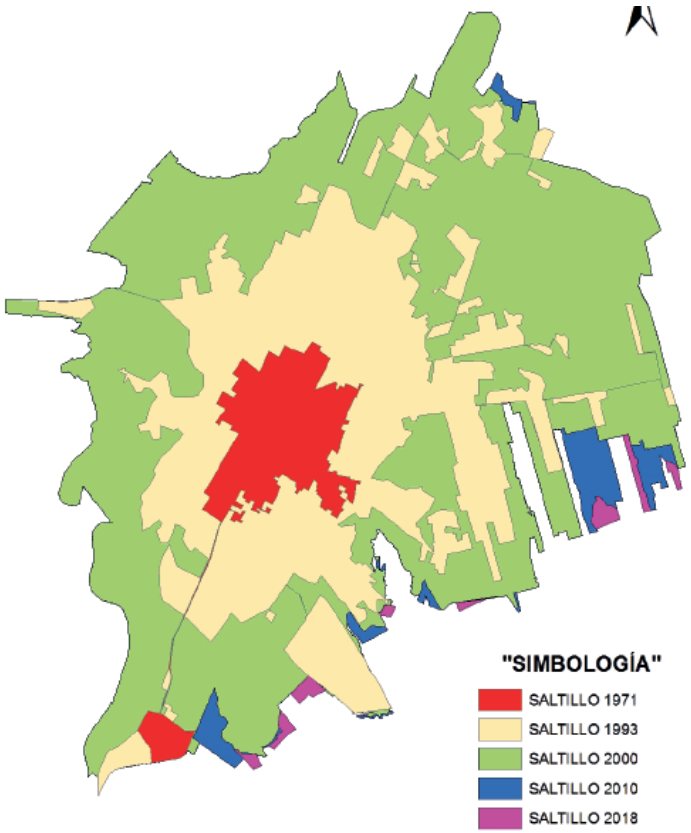
Population: 920k

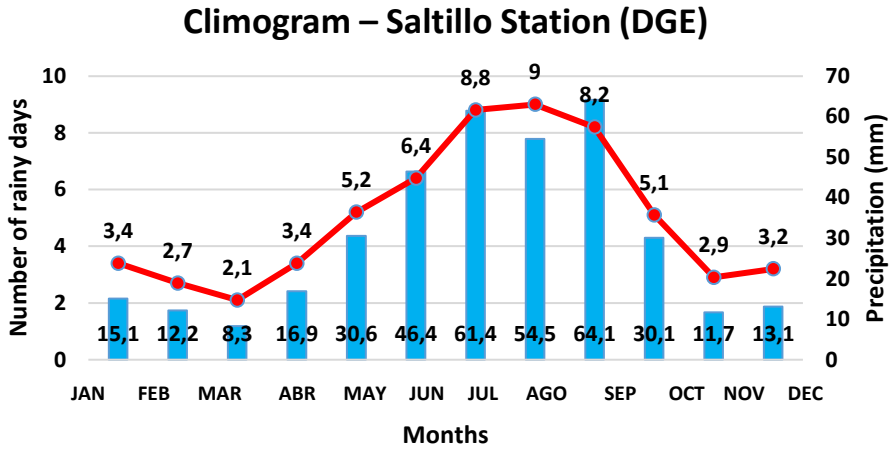
Heart of automobile manufacturing industry (Highly industrialized city).

Arid weather (desierto de Coahuila).

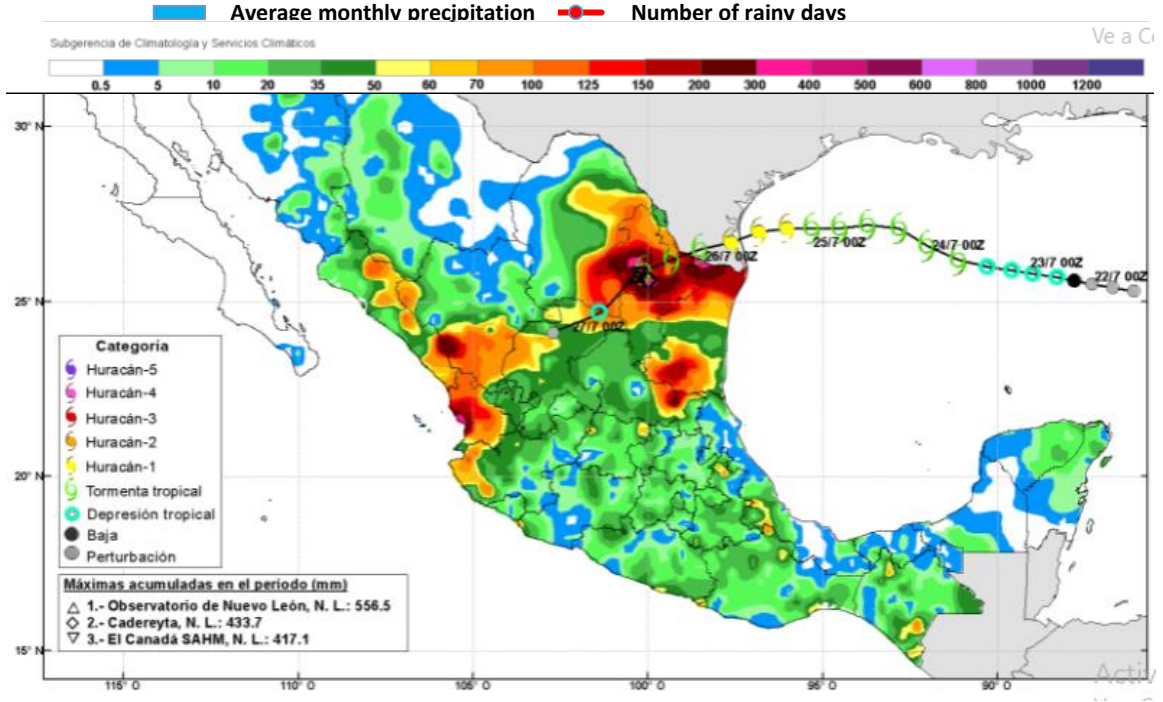
River natural ecosystem in the city.

SALTILLO CITY, MEXICO





Average annual precipitation of 370 mm (Semi-arid region) is lower than the Average annual precipitation of the country of 720 mm.



Acumulative precipitation (mm) from July 25 to 27 by hurricane Hanna

Define the co-creation goal

Co-creation process goal was to define Blue-Green Infrastructure project on steps to get there:

- Sustainable and resilience urban city.
- Identify concrete replicable and affordable solution for a resource-efficient, resilient and livable city of tomorrow (Sponge city).

CHALLENGES
- Absolute water shortage
- Dependence on overexploited aquifiers
- Flooding and lack of rainwater drainage
- Rivers in bad condition

Defining the pilot project

Blue-Green infrastructure

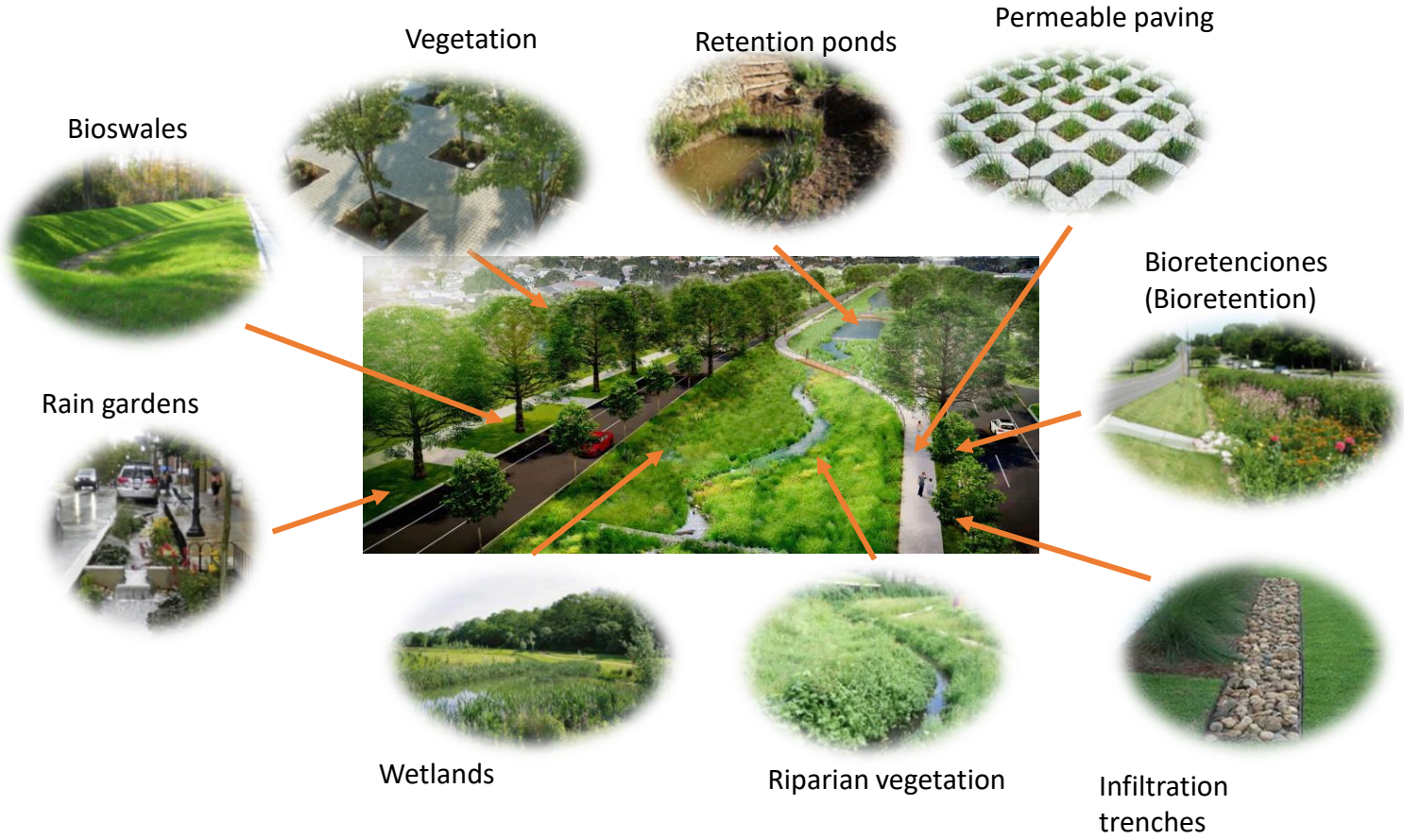
Pilot project

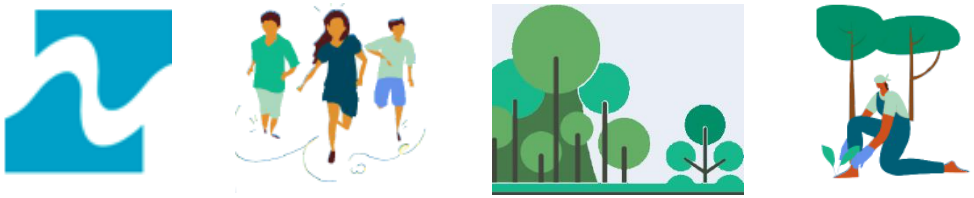
Thematic exes of Blue-Green Infrastructure

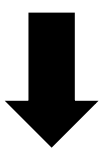
OFF Grid solutions

Fluvial ecosystem healthy

Defining techniques of Blue-green infrastructure







- Sustainable and resilience urban city.
- Identify concrete replicable and affordable solution for a resource-efficient, resilient and livable city of tomorrow (Sponge city).

Incorporating Blue-Green infraestructura in public space

Rain gardens

Vegetation

Infiltration basins

Permeable paving

Thank you

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Centro del Agua para América Latina y el Caribe
FUNDACIÓN FEMSA · Tecnológico de Monterrey · BID

NED NÚCLEO ESTRATÉGICO DE DECISIONES

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