Giornata di Studio Organizzata nell'ambito del Progetto PRIN 2022 – ENVISION
Lake Pollution: Integrating Nature-Based Solutions Into Environmental Urban Planning For Risk Mitigation

Uso delle Nature-based Solutions per la gestione degli allagamenti e per il controllo dell'inquinamento: esperienze a confronto

NBS in Lombardia: a che punto siamo? L'esperienza di ERSAF

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MILANO - 11 SETTEMBRE 2025

ERSAF - Regional Entity for Agriculture and Forestry Services

Born in 2002 from the association of five Lombardy Region entities with agricultural and forestry vocations (Regional Law 31/2008)
Support Lombardy Region for policies and strategies implementation concerning agriculture, forests, biodiversity, mountains and above all water resources

- **CONTRATTI DI FIUME**
- **PIANO DI TUTELA ED USO DELLE ACQUE (PTUA)**
- **DEFLUSSO ECOLOGICO**
- **NBS IMPLEMENTATION AND DE-SEALING**

ERSAF is involved in international projects

- Life IP ClimaxPo https://www.lifeclimaxpo.adbpo.it/
- Horizon Europe PALIMPSEST https://www.palimpsest-project.eu/
- Interreg Italia – Svizzera VISTA TICINO
- RiverLab

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Agreement between entities (local and supra-local authorities, parks, water service managers) who have responsibilities in the management and use of water, in land planning and in environmental protection.

Voluntary instrument for strategic and negotiated planning that pursues the protection, correct management of water resources and the valorization of river territories together with the protection from hydraulic risk, contributing to local development.

- Proposes a new approach aimed at a **multidisciplinary** and shared planning with a **watershed point of view** in contrast with site-specific and sectoral interventions
- Building a **resilient river community** to cooperate for a c**ommon goal**
- Create an **“ownership”** of **river watershed as a precious and common good**
- **Respect and responsibility** towards individual needs
- Promotes **innovative solutions** getting out of “confort zone”
- Relevance of associations and civil society as an integral part of the process

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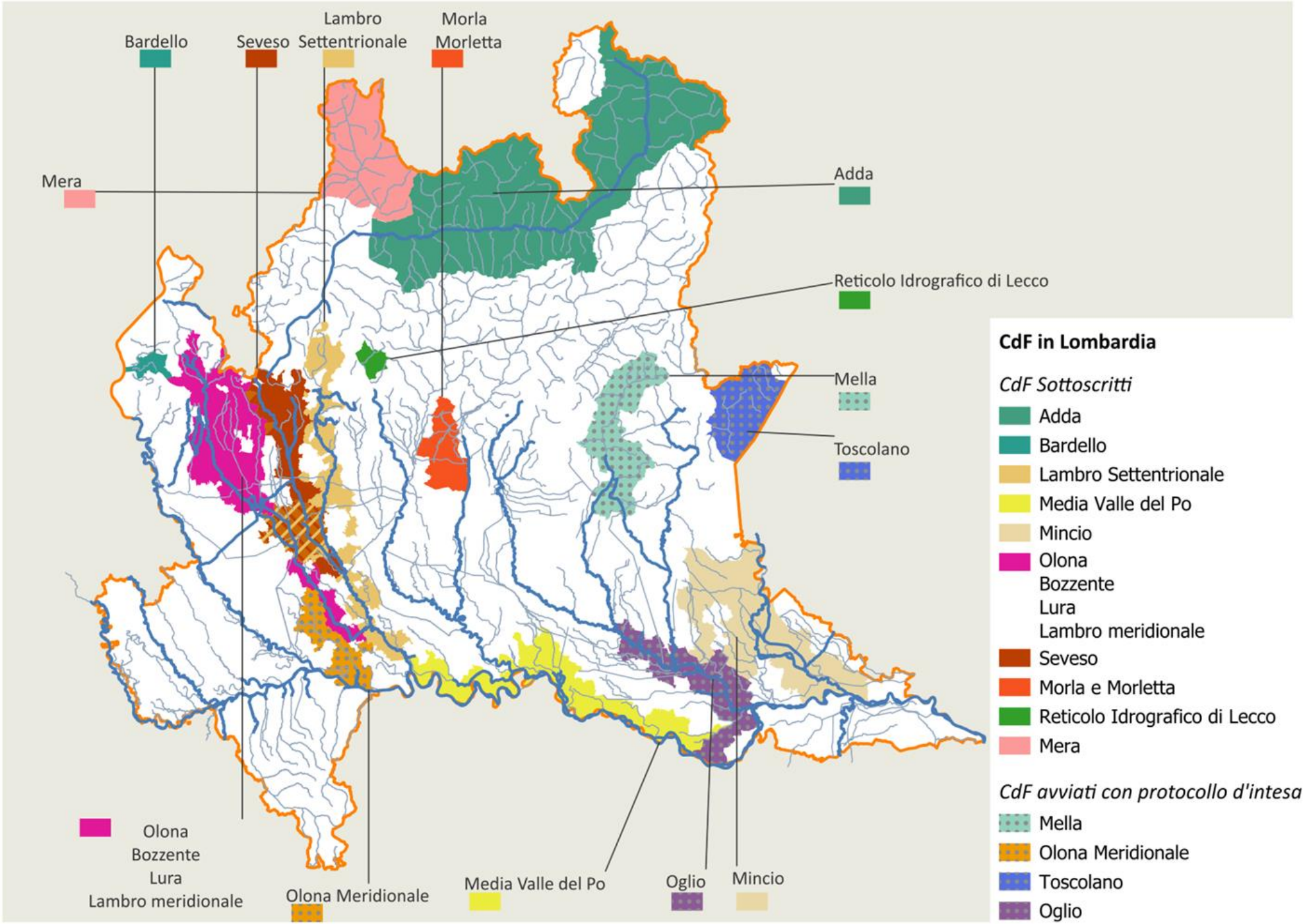
Main goals

HYDRAULIC RISK	WATER QUALITY	ECOSYSTEM SERVICES	BIODIVERSITY	FRUITION	...

Topics often addressed in a sectoral way by politics and local authorities

Contratti di Fiume proposes a new approach aimed at a multidisciplinary and shared planning with a watershed point of view



498 Comuni coinvolti (su 1506)

5.504.341 abitanti (su 9.981.554)

9.704 Km^2 di territorio (su 23.868 km^2)

1981 – First experiences in France

2004 – First Contratto di Fiume in Italy (Olona River)

2007 – Beginning of National Meetings of Contratti di Fiume

2016 – National regulatory recognition (D.Lgs 152/2006)

2018 – Birth of Contratti di Fiume Observatory within the Environment Ministry

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Regulatory context

- **Water Framework Directive**(2000/60/CE)

For water resources sustainable use and quality and quantity safeguard --> CdF consitutes a measure of water protection and usa plan (Piano di Tutela ed Uso delle Acque – PTUA)

- **Flood Risk Directive** (2007/60/CE)

For the evaluation of risks regarding human safety, environment, economic activities and cultural heritage

- **Habitat Direttiva** (92/43/CEE)

To safeguard and protect habitat and biodiversity

- **Agenda 2030**

Acion Plan of sustainable development

- **National Strategy for Climate Change Adaptation**

To enhance resilience of territories through population involvement and active participation

- **Soil Sealing Regulations**

Contratti di Fiume – NBS relationship

NBS are multidisciplinary **strategies** with multiple achievable goals/benefits requiring multiple skills to build a resilient territories in terms of climate change adaptation and mitigation (heat island reduction, hydraulic risk mitigation, water quality enhancement, fruition, …)

CdF is the technical and political **process** for NBS implementation resulting from building the cooperation among different stakeholders with a watershed perspective

CALL4IDEAS FOR DE-SEALING AND PUBLIC AREAS RE-GREENING PROJECTS FOR CLIMATE CHANGE ADAPTATION AND MITIGATION

AIM:
to promote and disseminate SUDS – Sustainable Drainage System and NBS – Nature Based Solutions as reliable systems to climate change adaptation and mitigation

To encourage Municipalities to adopt NBS sistematically in future projects

To represent an example fo future similar financing (**first example in italy**)

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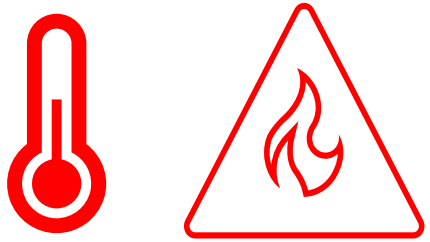
Infiltration

-

Heat islands



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Support Biodiversity

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CRITERIA/MINIMUM REQUIREMENTS

- Not only hydraulic risk mitigation and not only through infiltration wells
- Give priority to vegetated NBS
- Consider more plant types (grass, shrubs and trees)
- Ensure appropriate water treatment depending on drained surface
- Provide for rainwater harvest and reuse
- Use materials with high Reflectance Index for non-vegetated suerfaces
- innovative urban green areas (public parks, tree box, …)

NO

- interventions for the treatment/lamination of flood spillways
- single-objective technical solutions that only involve the use of “grey infrastructures” (tanks, infiltration wells, lamination areas)

Evaluation criteria

CRITERIA	ATTRIBUTES	SUB-ATTRIBUTES	INDICATORS [unit of measurement]
Hydraulic	Low intensity stormwater events interception		Rainfall height infiltrated [mm]
	Invarianza Idrologica ed Idraulica (RR7/2017)*	Surface lamination volume	Lamination volume/waterproof hectare [m3/ha imp]
		Sub-surface lamination volume	Lamination volume/waterproof hectare [m3/ha imp]
	Rainwater harvest and reuse		% rainfall harvest and reuse [%]
	De-sealing priority		Hydraulic criticity class (RR7/2017)
			Antropization Index [%]

*Regolamento recante criteri e metodi per il rispetto del principio dell'invarianza idraulica ed idrologica ai sensi dell'articolo 58 bis della legge regionale 11 marzo 2005, n. 12 (Legge per il governo del territorio)

CRITERIA	ATTRIBUTES	SUB-ATTRIBUTES	INDICATORS [unit of measurement]
Water Quality	Pollutant volume intercepted		Rainfall height intercepted and treated [mm]
	Removal efficiency		Type of treatment
	Pollution risk		Type of drained surface

CRITERIA	ATTRIBUTES	SUB-ATTRIBUTES	INDICATORS [unit of measurement]
Biodiversity	Grass		Surface [m2]
	Shrubs		Surface [m2]
	Trees		Surface [m2]
	Wetlands		Surface [m2]

CRITERIA	ATTRIBUTES	SUB-ATTRIBUTES	INDICATORS [unit of measurement]
Urban restoration and citizenship	Aesthetics, health, recreation and well-being values	N° of inhabitants who can benefit of a new urban park	N° of inhabitants within a 500 meters diameter from the interventions site
		N° of inhabitants who can benefit of an urban area with aesthetic improvement and/or regreening	N° of inhabitants within a 500 meters diameter from the interventions site
		N° of inhabitants who can benefit of new sports/fitness/trekking areas or new soft mobility	N° of inhabitants within a 500 meters diameter from the interventions site
		Degraded areas redevelopment	
	Heat Islands reduction	NBS with trees	Surface [m2]
		NBS without trees	Surface [m2]
		Wetlands	Surface [m2]
		Green Roofs	Surface [m2]
	Traffic calming		

CRITERIA	ATTRIBUTES	SUB-ATTRIBUTES	INDICATORS [unit of measurement]
Climate Change Mitigation	CO2 sequestration		New trees [n°]
	CO2 reduction	Waste Water Treatment Plant energy consumption reduction	Rainfall height infiltrated [mm]
		Sewer system energy consumption reduction	Rainfall height infiltrated [mm]
		Water supply energy consumption reduction	% rainfall harvest and reuse [%]
		Car use reduction	

CRITERIA	ATTRIBUTES	SUB-ATTRIBUTES	INDICATORS [unit of measurement]
Administrative	More municipality involved		
	Municiaplity involved in Contratti di Fiume		

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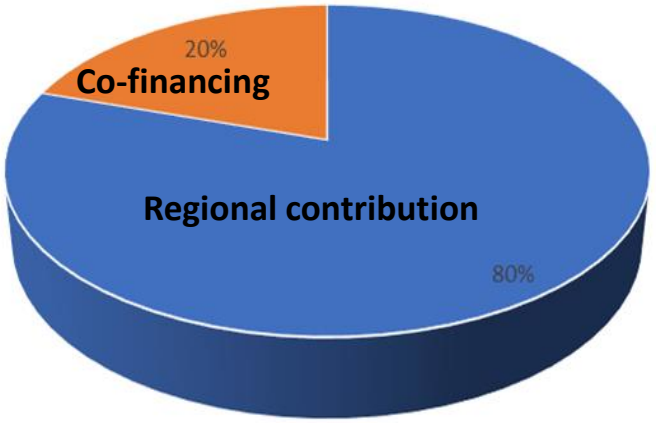
Results

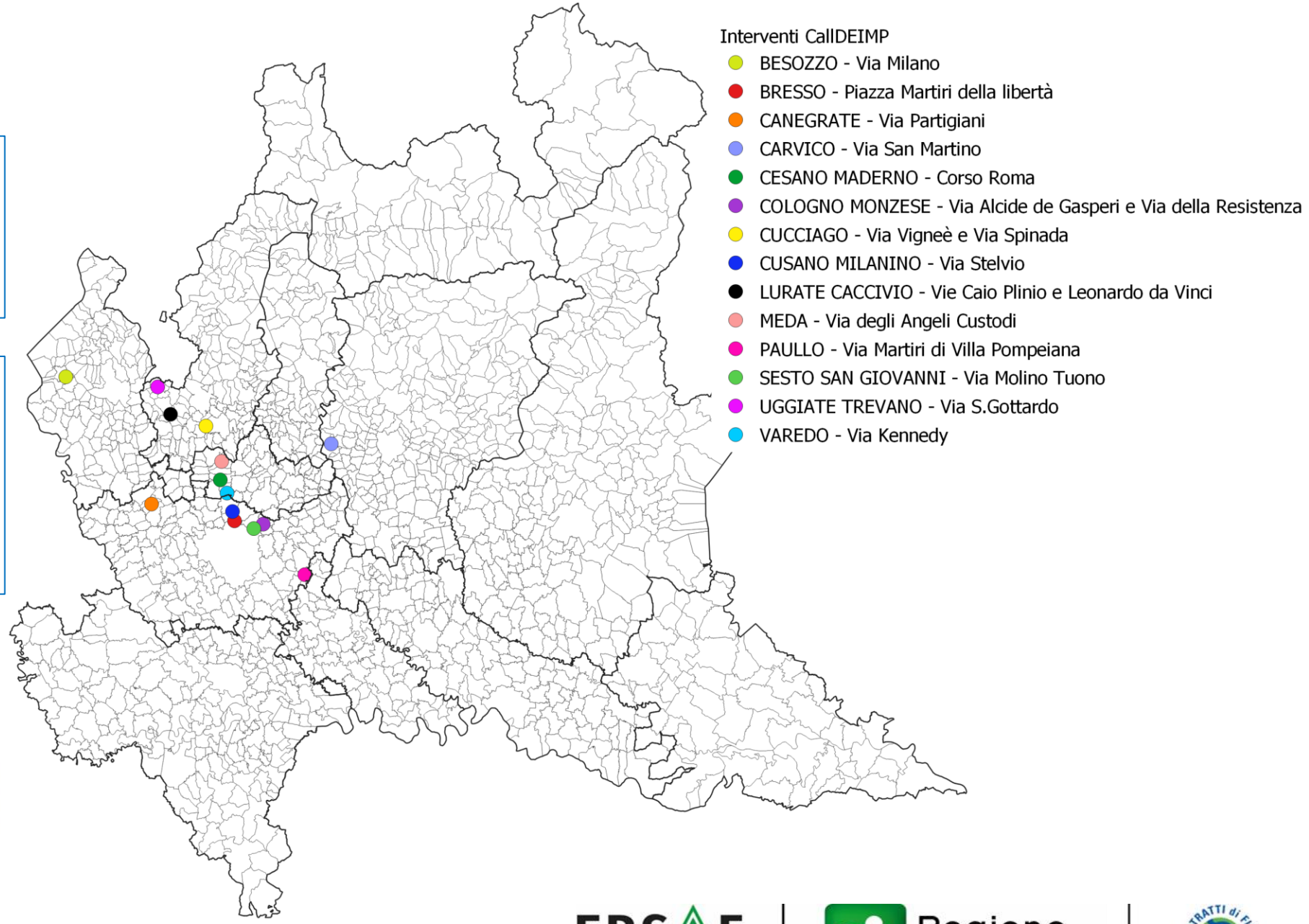
Presented projects: 23

Funded projects: 14

Total value: € 6.036.985

Regional contribution: € 4.839.458





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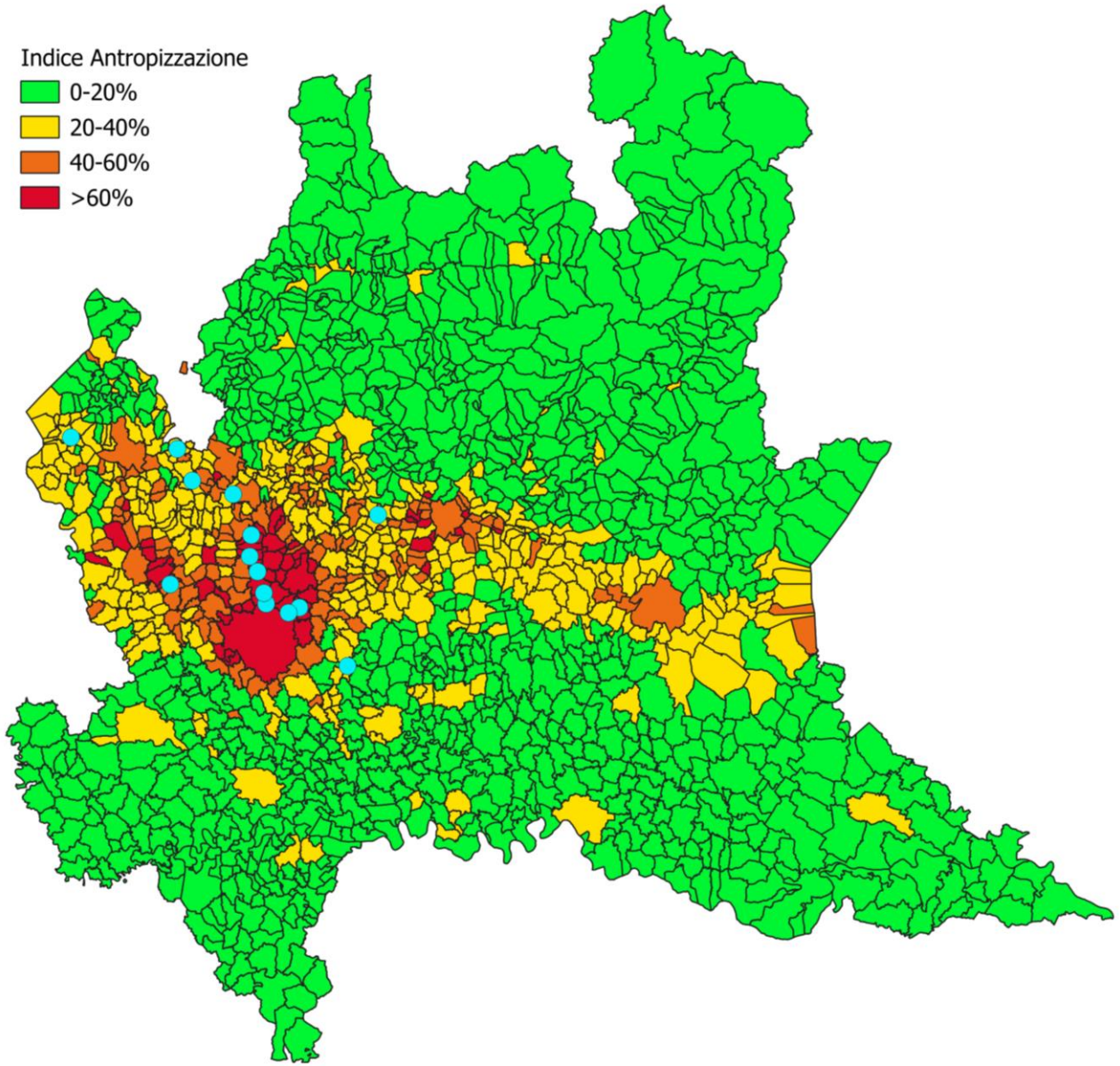
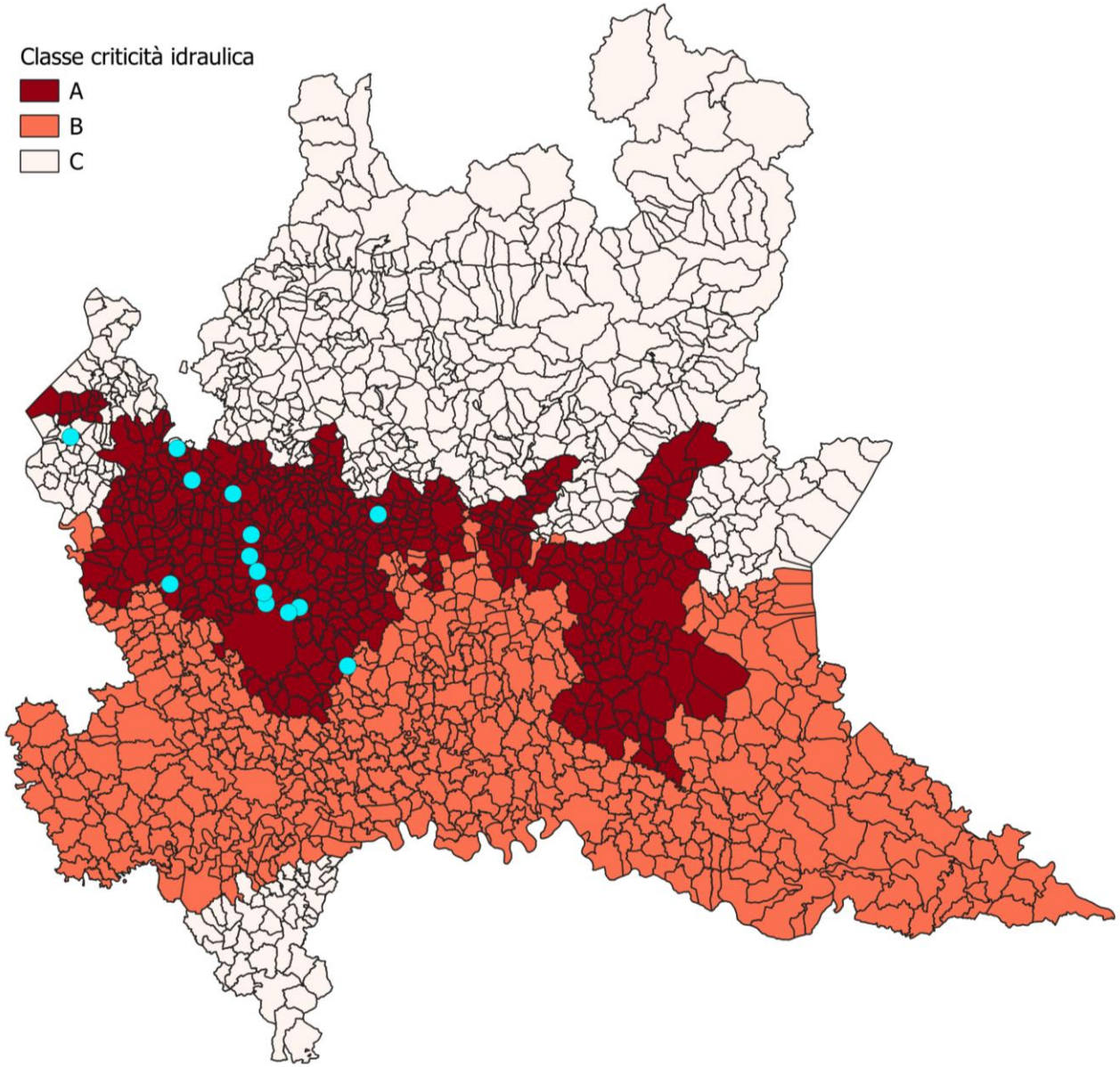
Anthropization Index



Hydraulic criticity class



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REALIZED PROJECTS

CUCCIAGO – Parking de-waterproofing (via Vigneè – via Spinada) with permeable pavements and rain garden

BESOZZO – Parking de-waterproofing (via Milano) and park redevelopment through SuDS

VAREDO – De-waterproofing project involving the school of via Kennedy

SESTO SAN GIOVANNI – Skatepark de-waterproofing (Via Molino Tuono)

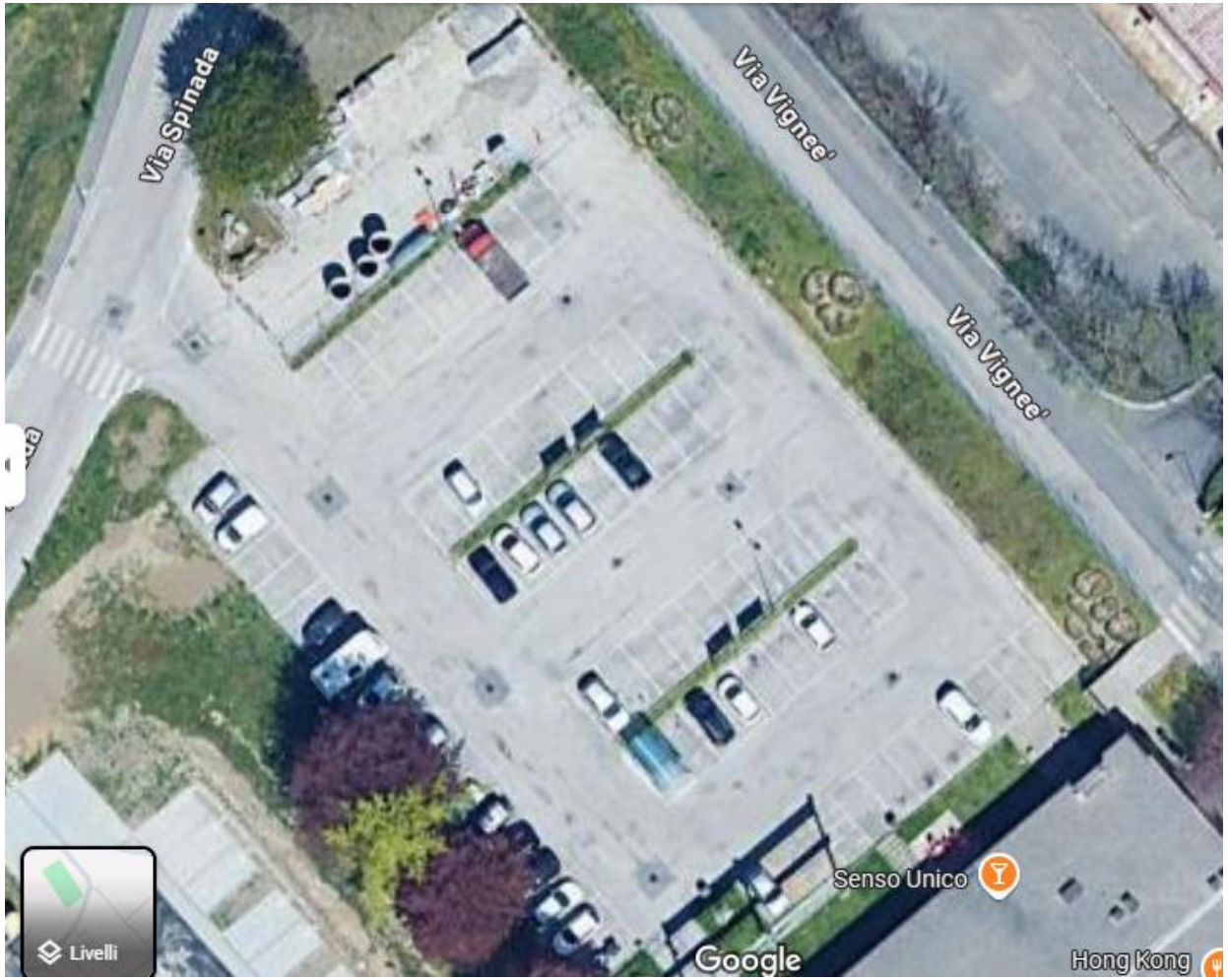
PAULLO – Parking area redevelopment and sewer system improvements (via Martiri di Villa Pompeiana)

CANEGRATE – Parking area redevelopment and sewer system improvements (via dei Partigiani)

CESANO MADERNO – Redevelopment of Corso Roma through SuDS

Cucciago

Objective: two-levels parking redevelopment to store and infiltrate rainwater locally instead of conveying to the sewer system



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Works:
Permeable pavements made of self-locking vibrated concrete with a high percentage of voids filled with soil and grass;

Rrain-garden in the central part of the parking higher level to retain, treat and infiltrate excess rainwater from permeable pavements

10 new trees

Infiltration Trenches

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TYPE OF NBS	SURFACE [m^2]	DRAINED SURFACE [m^2]	STORAGE VOLUME [m^3]
Permeable Pavements	1771	946	198
rain garden	623	2717	221

GRASS SURFACE [m^2]	SHRUBS SURFACE [m^2]	TREES SURFACE [m^2]	NEW TREES
469	269	230	10

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New pluviometric station

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Before

After

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Besozzo

Objective: divert, collect and treat part of the rainwater from via Milano and alongside parkings (1190 m^2) conveying to Bardello river

Photo: Comune di Besozzo

Photo: Comune di Besozzo

Works:
Parking and park access area de-waterproofing (700 m^2) with permeable pavements to store rainwater and convey to a dry pond

Dry pond flooding controlled (196 m^2) and bio-retention area (70 m^2)

Wet pond (259 m^2) with small permanent portion (70 m^2)

Tanks (2 of 25 m^3) to harvest rainwater (5-8%) form ex Sonnino factory green roof and reuse for irrigation

Photo: Comune di Besozzo

Photo: Comune di Besozzo

Works:

3 rows of shrubs (22 m^2 each one), to mark the boundaries between the park area and the parking

A mixed row of trees and shrubs with a surface of 34 m^2 close to the wet pond

2 large areas of flowery meadows, 157 m^2 and 189 m^2

TYPE OF NBS	SURFACE [m^2]	DRAINED SURFACE [m^2]	STORAGE VOLUME [m^3]
Permeable Pavements	700	1190	
Dry pond	196		131.5
Wet pond	259		92

Photo: Comune di Besozzo

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Photo: Comune di Besozzo

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Varedo

Objective: divert rainwater from the mixed sewer system and reuse it for non-potable purposes, parking and the school entrance redevelopment

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Works:
Bio-retention area (154.5 m^2) along the parking lot of Via Kennedy

Rain garden (157.5 m^2) to treat rainwater from school roof (currently discharged into the mixed sewer system)

40 m^3 storage tank to harvest and reuse 2-3% of school roof runoff volume

Shrub area (287 m^2)

TYPE OF NBS	SURFACE [m^2]	DRAINED SURFACE [m^2]	STORAGE VOLUME [m^3]
Bioretention areas	154.5	1074	150
rain garden	157.5	1830	

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Sesto San Giovanni

Objective: collect and infiltrate rainwater from the Skatepark area (870 m^2)

Works:
Drains, infiltration trench and green wet pond (150 m^2)

21 new trees

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Paullo

Objective: San Tarcisio church parking area redevelopment and de-waterproofing to store and infiltrate rainwater locally instead of conveying to the mixed sewer system

Works:
2 infiltration tranches to store rainwater from parking area and street (992 m^2) conveyng to detention pond

Detention pond (91 m^2)

60 new trees

More than 40% of the initial impervious surface converted to green areas (1290 m^2)

TYPE OF NBS	SURFACE [m^2]	DRAINED SURFACE [m^2]	STORAGE VOLUME [m^3]
Infiltration Trenches	116.45	614	97.45
Detention Pond	91	378	60.26

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Before

Photo: Comune di Paullo

After

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Canegrate

Objective: parking area redevelopment and de-waterproofing to store and infiltrate rainwater locally instead of conveying to the mixed sewer system

Works:
16 tree boxes and a bio-retention area to store rainwater from parking area and via dei Partigiani

Flowerbed to store rainwater from the beginning of via dei Partigiani (184 m^2) and other parking lots along the street (168 m^2)

66 new trees

More than 30% of the initial impervious surface converted to green areas (1565 m^2)

TYPE OF NBS	SURFACE [m^2]	DRAINED SURFACE [m^2]	STORAGE VOLUME [m^3]
Tree Box	160	825.5	57.73
Bio-retention areas	190	776.5	62.38
Flowerbed	110	352	24.75

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Before

After

Cesano Maderno

Objective: sidewalks and pedestrian areas redevelopment

Works:
Bio-retention areas with trees and tree boxes within the sidewalks

Conversion of bus shelter roofs into green roofs

TYPE OF NBS	SURFACE [m^2]	DRAINED SURFACE [m^2]	STORAGE VOLUME [m^3]
Tree Box	104	9300	37.4
Bio-retention areas	462		171
Green Roofs	12		1

GRASS SURFACE [m^2]	SHRUBS SURFACE [m^2]	TREES SURFACE [m^2]	NEW TREES
12	462	101	≈ 100

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Considering all the funded projects:

Total drained surface with SUDS/NBS: **≈ 45000 m²**

Total volume (superficial and sub-superficial) available to storage and infiltrated with SUDS/NBS: **3725 m³**

Biodiversity:

- 6800 m² of grass
- 6300 m² of shrub areas
- 363 new trees

About 68000 people will be able to enjoy a **new urban park or an aesthetic improvement** within a 500 meters diameter from the interventions site

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SUDS/NBS included:

- ≈ 4400 m^2 permeable pavements
- > 2000 m^2 bio-retention areas
- 264 m^2 tree boxes
- > 1300 m^2 rain garden
- 324 m^2 infiltration trenches
- 307 m^2 green roofs
- ≈ 5000 m^2 detention ponds (wet and dry)

Additional benefits:

- Fruition
- Water quality improvement
- CO_2 reductions and energy savings for water treatment
- Water waste reduction from reuse
- Degraded areas redevelopment
- Aesthetic and landscape enhancement
- Heat Islands reduction

Other planned actions

30 de-sealing projects for a total surface of 67000 m² within the Seveso River watershed (included in the Action Plan of **Contratto di Fiume Seveso**)

5 de-sealing projects for a total surface of 25000-30000 m² within the Lambro River watershed (included in the Action Plan of **Contratto di Fiume Lambro**)

Main critical issues

Manteinance problems (Whose responsibility is? How long?)

No enough attention and sensistivity to this topic from technician

Lack of financing (monetizing benefits problems and not immediately tangible)

Lack of monitoring of interventions useful for good practices dissemination and implementation

Difficulty in finding and using suitable plant material (contrast between efficiency and typology of native and non-native species)

USEFUL LINK

ERSAF
https://www.ersaf.lombardia.it/

CONTRATTI DI FIUME
https://www.contrattidifiume.it/it/contratti-di-fiume/

CALL4IDEAS
https://www.contrattidifiume.it/it/blog/Contributi-regionali-per-la-realizzazione-di-progetti-di-de-impermeabilizzazione-presentati-dai-Comuni/

YOUTUBE CHANNEL
https://www.youtube.com/@ContrattidiFiume/videos

URWAN PROJECT NBS CATALOGUE
https://urwan.interreg-euro-med.eu/

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