MULTISOURCE

ModULar Tools for Integrating enhanced natural treatment SOlutions in URban water CyclEs

NBS as a new way of intervening in a large urbanised territory: Metropolitan City of Milan Sponge City Project

Metropolitan City of Milan
Environment and Territory Protection Department
Sustainable Development and Decision Support Systems Service

This project has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101003527.

MULTISOURCE

www.multisource.eu

METROPOLITAN CITY OF MILAN IN NUMBERS

Size: **1575 km2**
Municipalities: **133**
Population: **3.434.658**
Density: **2.053 Inh/km2**

Territory:

- **41%** bulit-up areas and infrastructures
- **50%** agricultural areas
- **8%** forests

(Source: Corine Land Cover 2015).

FROM CHALLENGES TO SOLUTIONS

A new approach

In a context such as the Metropolitan City of Milan, the amount of impermeable areas has increasingly become a constant in settlement patterns. This conformation together with the intensifying consequences of climate change has generated:

1. constant consumption of soil, with related loss of biodiversity and water infiltration capacity (**runoff**);
2. increasingly sensitive and widespread increase in **urban heat islands**.

In the past, these problems were underestimated and possibly addressed with the same solutions, the same technologies already known and used.
Over the past eight years, CMM has started to consider a new approach in contrast to the traditional grey approach: the **Sustainable Urban Drainage** (Sustainable Drainage Systems) strongly founded on the use of so-called Natural Solutions (**NBS**).

CLIMATE CHANGE ADAPTATION MEASURES

How the authority can affect the territory?

Climate problems typical of metropolitan areas:

- heat waves and urban heat islands
- local floods

Need for shared actions and development of common governance across local authorities to generate an effective response

Possible spaces for intervention:

- Knowledge
- Metropolitan Territorial Plan (MTP)
- Urban planning tools of the municipalities of the Metropolitan City of Milan
- National and international funds (ex. Next Gen EU)

MULTISOURCE

www.multisource.eu

2016

Horizon 2020 NATURE4CITIES
NBS impact studies

2017

CALL FOR PROPOSALS
Climate change and territory

2018

LIFE METRO ADAPT
Climate change adaptation project

2019

CALL FOR PROPOSALS
Adaptation to climate change and improvement of public spaces and productive areas in the peri-urban area of Milan

2020

TERRITORI RESILIENTI
one-stop shop for the resilient transition of territories

2021

Horizon 2020 MULTISOURCE
ModULar Tools for Integrating enhanced natural treatment SOlutions in URban water CyclEs

2022

METROPOLITAN URBAN AGENDA
Tool enabling change towards a more sustainable future

NOW

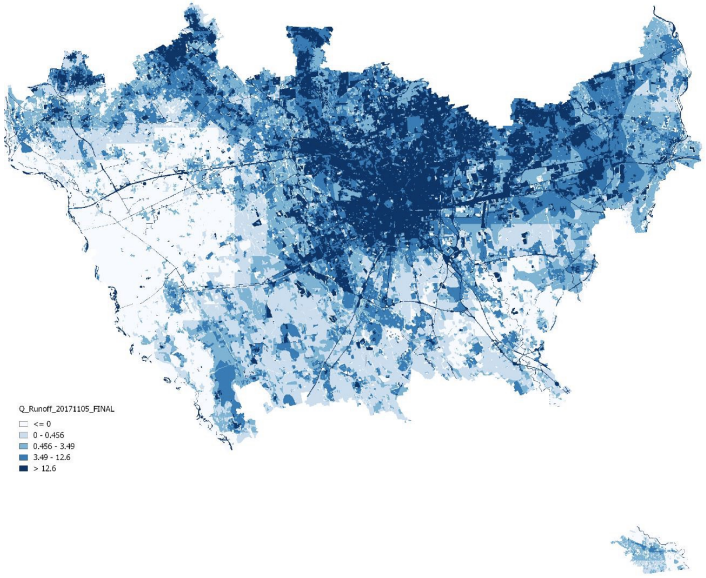
SPONGE CITY PROJECT

WATER4ALL
Water security for the planet by supporting adaptation and resilience of natural and man-made ecosystems

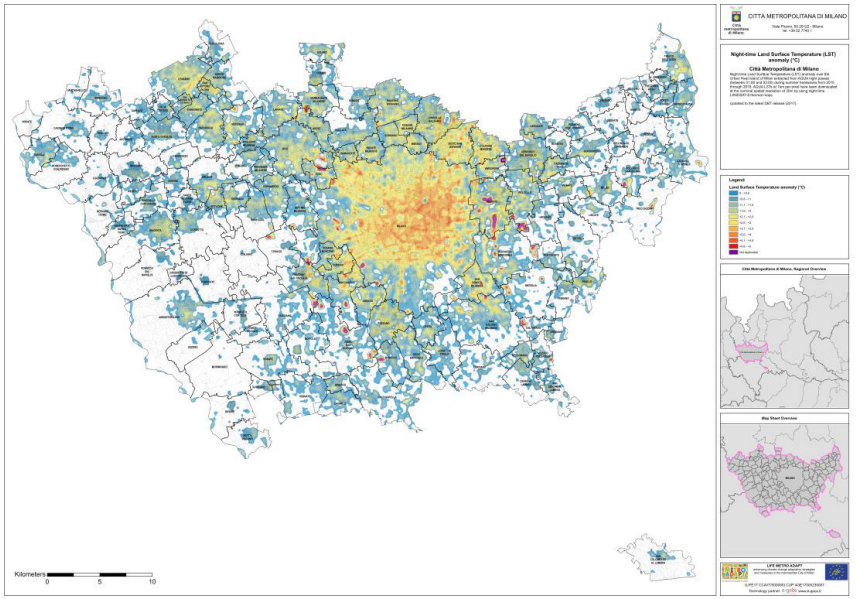
RESULTS OF STUDIES CARRIED OUT

Conformation of the territory with respect to phenomena

RUNOFF



UHI



Find all the data at → http://desk.cittametropolitana.mi.it/superset/dashboard/life/

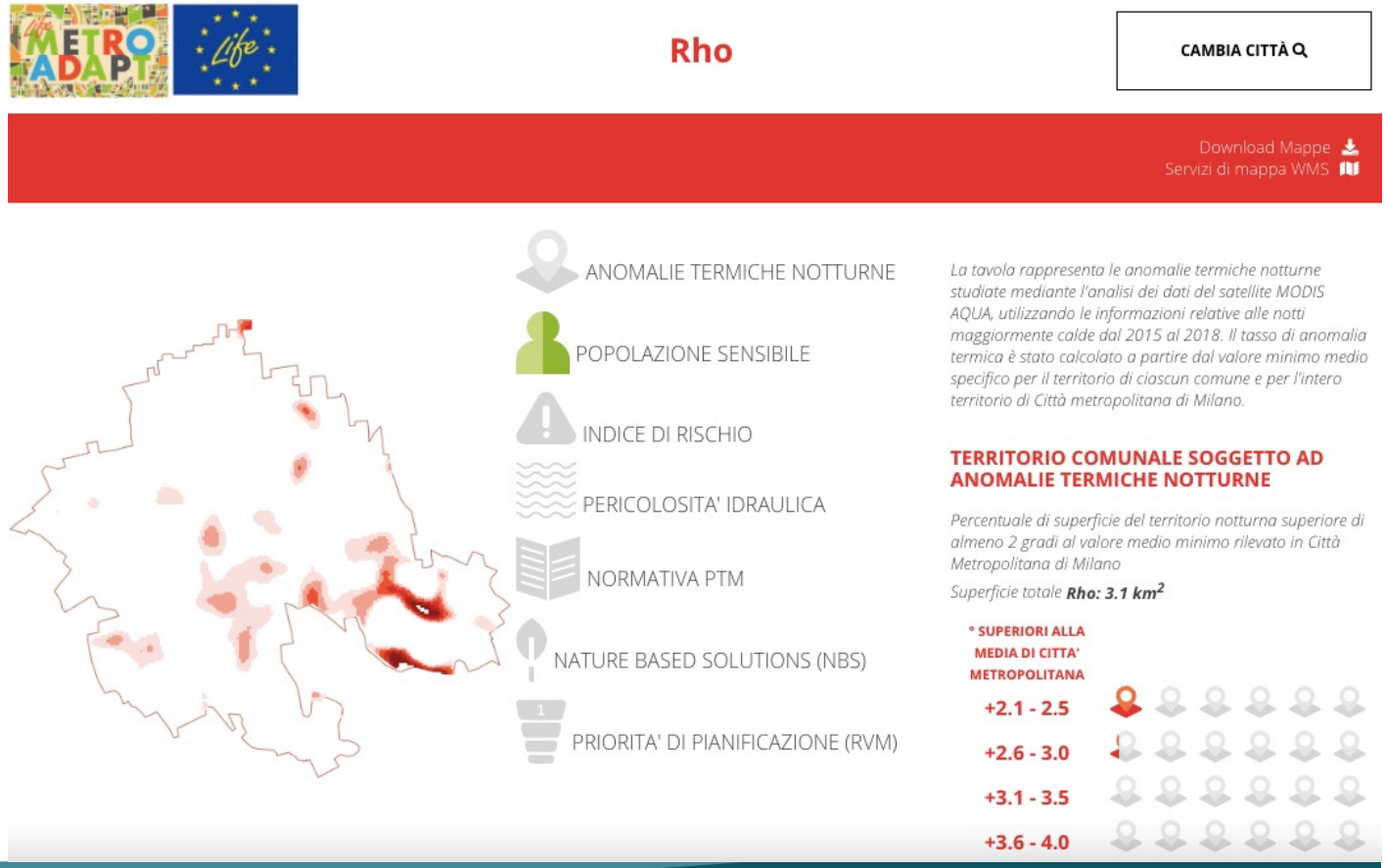
RESULTS OF STUDIES CARRIED OUT

Services for the municipalities

Through the LIFE Metro Adapt project, a **service** was also developed for each of the 133 municipalities that make up the metropolitan city, providing and making easily accessible all data on **climatological phenomena** and **spatial data**

all this with an intuitive **graphical representation**

http://95.110.222.198/life/



METROPOLITAN URBAN AGENDA: RESILIENT TRAJECTORY

from study to strategy definition

The RESILIENT TRAJECTORY: make the **metropolitan territory capable of absorbing extreme climatic events** through the implementation of widespread and technologically advanced interventions, paying attention to the impact not only on the environment but also on social vulnerability

→ NBS included in the metropolitan territorial plan (PTM) as a planning instrument

→Metropolitan City of Milan as a **Sponge City** through the implementation of NBS water treatment

WHY? NBS also work on other aspects besides plumbing such as heat islands, use of public spaces, reduction of energy costs for water cycle management, creation of new green jobs

HOW? through NextGenerationEU funds, declined at national level by the Recovery and Resilience Plan (PNRR), we were able to initiate this strategic vision

MULTISOURCE

PROJECT: METROPOLITAN CITY OF MILAN SPONGE

The idea and the numbers

As we face drought, intense and concentrated rainfall and urban heat phenomena the Sponge city concept was the one that could meet the most needs→ implemented through the use of NBS (Natural Based Solution) for a less fragile and vulnerable soil for their ability to be multi-objective, thus able, with a single intervention, to achieve multiple objectives in addition to the main one of 'hydraulically' managing rainwater

NUMBERS

- **90** climate impact mitigation interventions
- **32** municipalities in the metropolitan area
- total square metres regenerated **529.248 m²** (53 ha)
- **12** tonnes of oil equivalent **saved** per year (TEP) - **125.775 KW/h** per year
- **€ 50,194,049.66** fundings

Città metropolitana di Milano

Città metropolitana Spugna

GRUPPO CAP

PROJECT: METROPOLITAN CITY OF MILAN SPONGE

Method used to identify areas of intervention

In 2019, the «Territori resilienti» platform was developed, which processed and made available a series of information on the **urban heat phenomenon** within the metropolitan territory (view next slide).

With this informations **cross-referenced** with the territory's needs related to **water runoff phenomena**, we were able to develop a project that would **intervene on various problems** encountered in the metropolitan area.

This **top-down analysis** made it possible to identify which areas within the municipality were **most at risk**, so that interventions could be as targeted as possible, and could mitigate the problems related to heat islands.

The selection of interventions did not only follow a top-down process, but also a **bottom-up** one: 11 municipalities out of the 32 involved were selected on the basis of project proposals submitted by the municipalities themselves, as part of a Call for Proposals promoted by CMM for this purpose.

MULTISOURCE

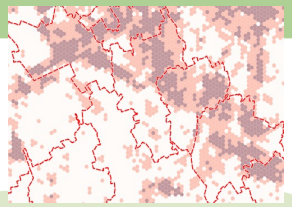
www.multisource.eu

Local Climate Zone (LCZ)

Knowing the territory through a standardised selection of urban sites with respect to UHI intensities in relation to homogeneous characteristics in terms of urban morphology and urban materials.

DSS Service

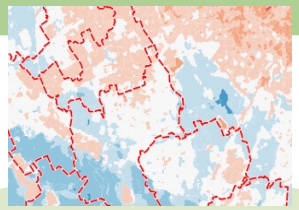
Vulnerability of territories



Please refer to the map for information on the vulnerability of territories to heat:
- Ordinary temperature
-Heat wave

MAP Service

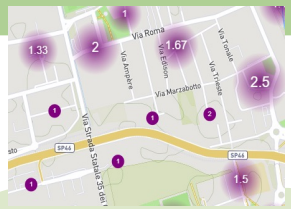
Heat Focus



- Daytime temperature extremes
- Night temperature extremes
- Daytime UHI intensity
- Nighttime UHI intensity
- Day-night temperature difference

MAP Service

Riks



Risk index, this index relates the susceptible population to the presence of heat anomalies.

DSS Service

Fondazione CARIPLO

DECIMETRO SISTEMA DECISIONALE CITTÀ METROPOLITANA DI MILANO

Fondazione CARIPLO

DECIMETRO SISTEMA DECISIONALE CITTÀ METROPOLITANA DI MILANO

Fondazione CARIPLO

DECIMETRO SISTEMA DECISIONALE CITTÀ METROPOLITANA DI MILANO

Life METRO ADAPT

Strategie e misure di adattamento al cambiamento climatico nella Città Metropolitana di Milano

DECIMETRO SISTEMA DECISIONALE CITTÀ METROPOLITANA DI MILANO

PROJECT: METROPOLITAN CITY OF MILAN SPONGE

Method used to identify areas of intervention : further details on the process

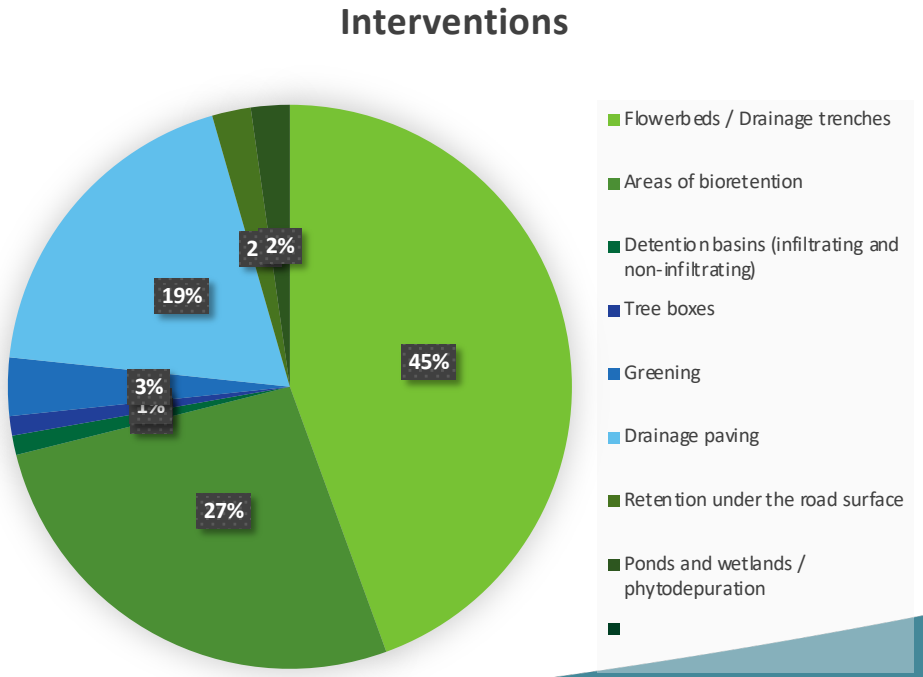
The objective was to carry out the selection according to rational and effective criteria such that the selection could be justified against a number of possibilities of interventions. Therefore the study started with:

1. The construction of the so-called LCZs, a concept that combines the morphological aspect of the territory with that of heat fenomena → http://desk.cittametropolitana.mi.it/lm/index.php/view/map/?repository=cariplo&project=progetto_cariplo_v3_2-8
2. We went on to collect the categories of adaptation measures most suitable for the type of phenomenon to be mitigated
3. We proceeded to select from these measures those that had the greatest impact with respect to the various LCZs → https://www.cittametropolitana.mi.it/export/sites/default/Territori_resilienti/adattamento/3_Abaco_Suds.pdf
4. Finally, a ranking was produced of the interventions proposed on the basis of a hydraulic risk study and on the basis of the problems encountered in the area choosing which interventions would have the greatest impact on the two phenomena of runoff and heat islands

PROJECT: METROPOLITAN CITY OF MILAN SPONGE

Details of the interventions

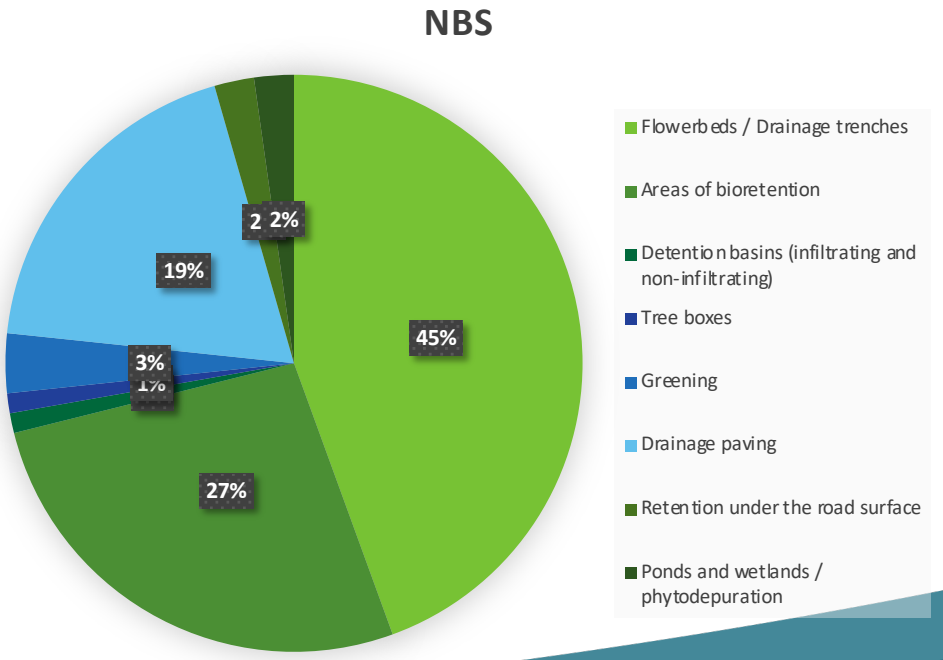
Type of intervention	Number	Amounts QE
Sports Facility	2	1.919.944,76 €
New usable green area	2	1.070.408,23 €
New Square	3	5.080.961,66 €
Re-functioning Square	11	6.350.496,99 €
Redevelopment Parking	21	11.068.263,47 €
Parking and new green areas	3	1.256.806,62 €
Parking and road	13	6.595.230,63 €
Road	32	12.775.463,63 €
Green area, parking and road	3	4.076.473,67 €
Overall total	90	50.194.049,66 €



PROJECT: METROPOLITAN CITY OF MILAN SPONGE

Inverventions - NBS

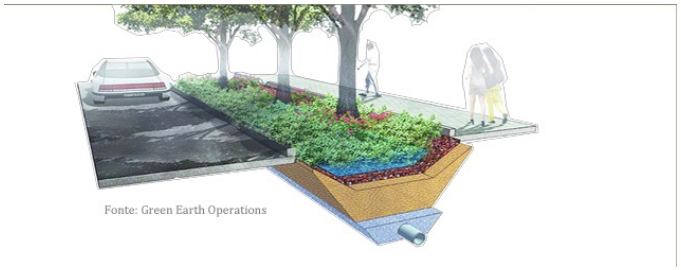
NBS Prevalent	Interventions
Flowerbeds / Drainage trenches	40
Areas of bioretention	24
Detention basins (infiltrating and non-infiltrating)	1
Tree boxes	1
Greening	3
Drainage paving	17
Retention under the road surface	2
Ponds and wetlands / phytodepuration	2
Overall total	90



PROJECT: METROPOLITAN CITY OF MILAN SPONGE

Some examples of NBSs that will be implemented

DRAINAGE TRENCHES



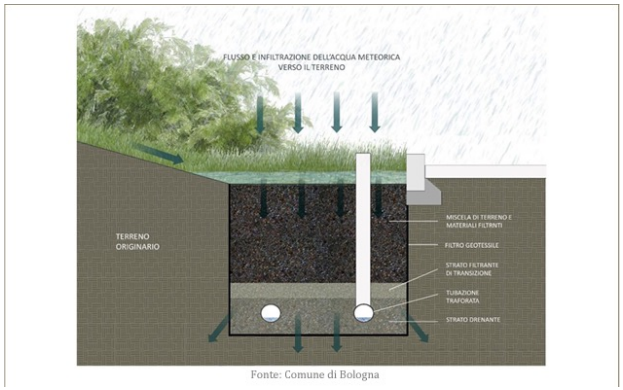
environmental benefits

- Infiltration
- Purification
- Lamination
- Colletion
- biodiversity protection

socio-economic benefits

- healt and wellness
- aesthetic improvement

VEGETATED BIORETENTION AREAS



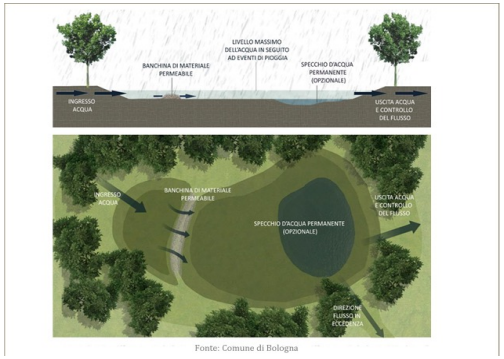
environmental benefits

- Infiltration
- Purification
- Lamination
- Colletion
- biodiversity protection
- Microclimate mitigation

socio-economic benefits

- healt and wellness
- aesthetic improvement

DETENTION BASINS



environmental benefits

- Infiltration
- Purification
- Lamination
- Colletion
- biodiversity protection
- Microclimate mitigation

socio-economic benefits

- healt and wellness
- aesthetic improvement
- Increased sociality

PROJECT: METROPOLITAN CITY OF MILAN SPONGE

Project TimeLine

22 April 2022

Decree approving the financing

By the 31st of November 2022

Conclusion of the final design

By the 30th of July 2023

Adjudication of works

By the 30th of September 2024

At least 30% realised (paid at least 30% of the SAL)

By the 30th of June 2026

Regular execution certificate or acceptance certificate transmitted

FROM A PROJECT TO A TRULY NEW METROPOLITAN CITY

Issues we have faced and continue to face

A. The chain that transforms *strategies* into *administrative practices* is not yet consolidated:
the implementation of the interventions remains something of an innovation as far as the administrative process is concerned. There is no pre-established and clear path, this discourages public and private investment

B. Building a new vision of a metropolis with *funds* that are only *episodic* and *not structural:*
makes it difficult to construct a long-term horizon for the implementation of all the interventions necessary to achieve the transformation sought

C. Spreading the *know-how* of these new approaches to *all levels of governance:*
is a slow process in itself that must be backed by a solid institutional will and supported by adequate investment

20 partners • 9 EEA Countries • 3 International Countries

Individual Municipalities
GIRONA (ES)
OSLO (NO)

Metropolitan Municipalities
CMM (IT)
GLYON (FR)

Small and Medium-sized Enterprises (SME)
ALCN (AT)
IRIDRA (IT)
RIETLAND (BE)

Non-Profit Organizations
FER (SI)
WE (BE)

Non-Profit SME
ICLEI (DE)

Universities
AU (DK)
HCMUT (VT)
INSA (FR)
MSU (US)
UFSC (BR)

Research Institutions
ICRA (ES)
INRAE (FR)
NIVA (NO)
UFZ (DE)

Consultancy
IT (FR)

France

Spain

Belgium

Norway

Italy

Germany

Slovenia

Austria

Denmark

Brazil

USA

Vietnam

THANK YOU

FRANCESCA FRAMBA

f.framba@cittametropolitana.milano.it; francesca.framba@gmail.com

+39 345 9053328

info@multisource.eu www.multisource.eu MultisourceEu

MULTISOURCE
enhanced natural treatment solutions

This project has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101003527.