Genoa
detailed information & replication conditions for the
NBS: retention basins, draining areas

COMUNE DI GENOVA

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*

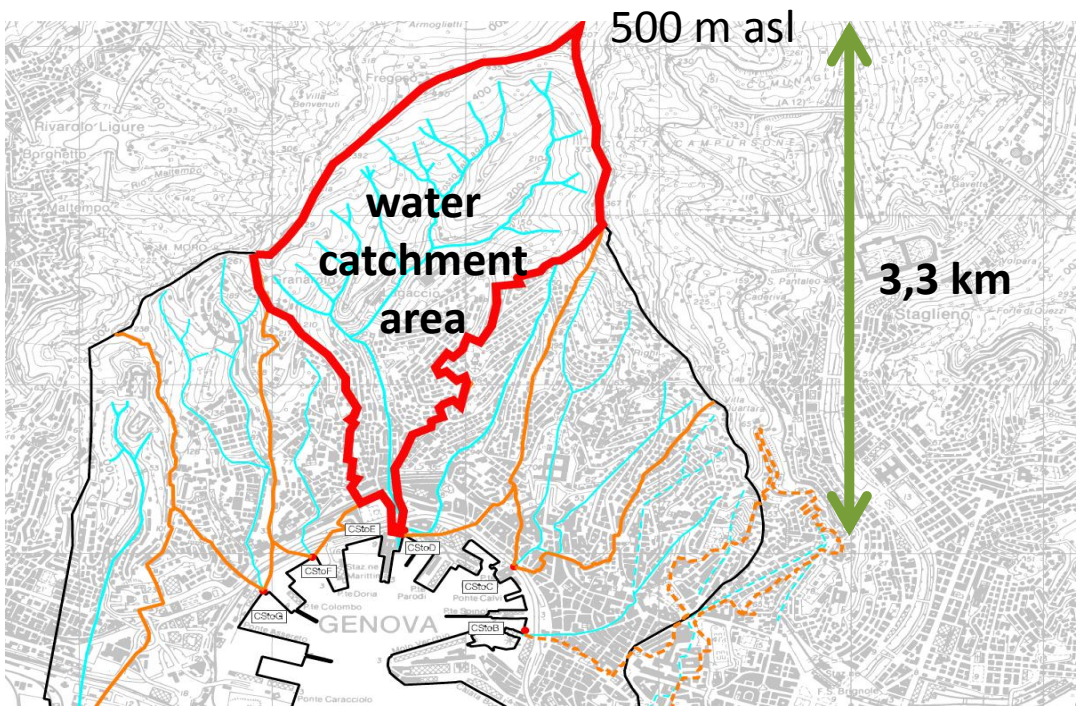
Genoa
Topics Agenda

- Introduction: description of the studied area and of the water related challenges that had to be faced
- Description of the different water related NBS adopted
- Successful stories that inspired the water related NBS implemented
- Conclusions: suggestions related to the previous reported experiences that could be helpful to the other cities

European Commission

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*

Genoa: the Lagaccio river



The Lagaccio river basin

- High slopes gradient
- Short distance between the sources and the sea
- Bedrocks
- High percentage of sealed soil in the urbanised area
- Channeled rivers and built up
- Flooding and damage

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

Genoa: the Gavoglio Urban Park

European Commission

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*

Genoa
NBS: Retention Basins/Draining Areas

Infiltration areas	
Objectives	Management of runoff water from the slopes and pathways relative to the Rio Cinque Santi, their infiltration into the soil
Description	Depressions of vegetated soil for the temporary retention of surface meteoric water. Filter bottom and herbaceous vegetation
Relation with grey infrastructures	Deduce the rainwater that falls in the park area from the network of mixed water pipes that could be overloaded in the event of heavy rains
Actors involved	Municipality
Role of the community	Citizens understood the importance of adopting a natural solution to manage rainwater

European Commission

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

Genoa
NBS: Retention Basins/Draining Areas

Infiltration areas	
Technical & legislative pre-conditions	Permeable subsoil, not rocky; regulations that allow land movements
Cost & financing	*€15-25 /m2* Annual maintenance costs must include necessary pruning; mowing of the vegetation existing in the park; periodical cleaning tasks of the park; inlet and outlet control structures of water flow of the detention basin.
Barriers	Lack of experience of the PA in this type of rainwater management

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

Genoa
NBS: Retention Basins/Draining Areas

Draining Pavements	
Technical & legislative pre-conditions	Compliance with regulations regarding spaces open to the public. Possibility of easy access for people with disabilities
Cost & financing	€15 - 20 /m2 Public financing
Barriers	Need skilled workers for the realization

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

Genoa
NBS: Retention Basins/Draining Areas

Rain garden	
Objectives	A rain garden is a bioretention shallow basin designed to collect, store, filter and treat water runoff.
Description	It must include a porous soil mixture, native vegetation and some hyperaccumulator plants, capable of phytoremediation.
Relation with grey infrastructures	Rain garden represent an important technique of sustainable drainage, harmonizing the serious impacts of urbanization and soil sealing.
Actors involved	Municipality
Role of the community	Rain garden can be implemented including participatory planning.

European Commission

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

Genoa
NBS: Retention Basins/Draining Areas

Raingarden	
Technical & legislative pre-conditions	Sub soil structure
Cost & financing	€40 /m2
Barriers	NA

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

Genoa
NBS: Retention Basins/Draining Areas

Underground detention systems	
Objectives	Reduction of surface runoff of rainwater through collection and detention of rainwater, creation of water supplies for irrigation
Description	Underground rooms in modular elements of self-supporting semi-recycled polypropylene with detention / retention capacity of rainwater
Relation with grey infrastructures	Stored water will be reused for irrigation through pumping stations Exceeding water will be directed into the sewage network with delayed time from the rain event
Actors involved	Municipality
Role of the community	Citizens have understood the importance of saving rainwater for further uses and to provide spaces to mitigate natural hazards

European Commission

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

Genoa
NBS: Retention Basins/Draining Areas

Underground detention systems	
Technical & legislative pre-conditions	Watershed plan legislation, accurate insulation on borders to contain water without using concrete walls, maintain acceptable water quality standards to reuse for irrigation, provide outlet into proper infrastructure when full capacity is reached
Cost & financing	€ 78.000 Public investment or experimental sponsorship
Barriers	Unusual installation in local context, maintenance of underground rooms

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

Genoa
NBS: Retention Basins/Draining Areas

Afforestation on slopes	
Objectives	Arboreal areas can alleviate the impacts of flooding in urban areas and climate change effects
Description	Afforestation with young plants (local species) on specific pattern along the slopes
Relation with grey infrastructures	Increase of shading surfaces, C02 absorption, reduction of heat island effect, partial rainwater absorption, increase of biodiversity. Afforestation is combined with containing walls along the slopes
Actors involved	Municipality
Role of the community	Extensive stakeholder engagement in planning for implementation, and for interdisciplinary input.

European Commission

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

Genoa
NBS: Retention Basins/Draining Areas

Afforestation on slopes	
Technical & legislative pre-conditions	Permeable soil with acceptable pedological conditions
Cost & financing	€ 36.000 Public investment
Barriers	Soil preparation and mainteance on steep not-easily-accessible surfaces, identifying participation actions

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

Genoa
Successful Study Cases

Gazzo's area, Genoa Hill's slope consolidation

- Reduction surface runoff rainwater with infiltration direct in the ground
- In operation since 2016
- Public financing
- Reusability of local materials: wooden poles and stones
- Lower disposal costs of landslide material
- Constant maintenance over time

Gazzo's area, Genoa Meteoric water management

- rainwater regulation
- preservation of the hillsides

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

Genoa
Successful Study Cases

Genova Vegetated stone gabions

- Gabionate system in wire mesh
- filled with crushed debris coming from the demolitions

arranged to form three type of elements:

- containment walls steps with integrated seats
- Renovated terracing with roofing in
- shrubbery

Lura river area, Como IT Meteoric Water Management

- River flooding areas, afforestation areas, natural engineering on riverbanks
- In operation since 2017
- basins temporarily flooded during intense rainy, whilst the pond will recharge constantly the ditch to maintain wetland vegetation all over the year to guarantee its phytodepuration functions..

European Commission

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*

Successful Study Cases

(courtesy of LAND Italia Srl)

LAND

Varesine Garden, Milan IT Meteoric Water Management

- Public roof garden
- In operation since 2014

- The intervention aimed to create a high quality green open space with sustainable feature in accordance with the objectives of the whole project (LEED certification)

Krupp Park, Essen DE Meteoric water management

- Public park with rainwater disposal facilities
- In operation since 2012

- On former industrial area
- Bioswales, retention pond, draining paths, afforestated slopes
- Rainwater is collected and directed through bio-swales to a retention pond at the northern end of the park, a 9,000m2 lake

European Commission

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*

Genoa
Helpful Suggestions

- The interventions carried out in extra-urban territory have given good results in terms of functionality and environmental performance
- Good maintenance planning must be done to ensure durability over time
- Useful links & informations
  direzioneurbanlab@comune.genova.it

European Commission

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*