1 Green roofs/ walls/ vertical gardens

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to engineered systems, extensive or intensive, that include an impermeable membrane, a drainage layer, a growing medium and vegetation. These layers absorb and retain rainwater, reducing flash flooding and helping to mitigate the urban heat island effect, while promoting urban biodiversity.

Image: ekagroup.com

Topographical area urban- industrial

Scale of implementation small

Examples of analyzed projects promoting or implementing the measure AQUACROSS, BRIGAID, CASCADE

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

2

Rain garden and bioswales (or vegetated swales)

Interreg Euro-MED | Co-funded by the European Union

LocAll4Flood

Technical description

It refers to shallow, vegetated depressions designed to capture and infiltrate stormwater runoff from impervious surfaces such as roofs and streets. Commonly found in parks and public spaces, these measures help manage water, reduce flooding, and support groundwater recharge.

Image: mmsd.com

Topographical area urban- industrial

Scale of implementation small- medium

Examples of analyzed projects promoting or implementing the measure BLUEHEALTH, BRIGAID, CASCADE

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

3 Permeable pavements /Green parking

Interreg Euro-MED | Co-funded by the European Union

LocAll4Flood

Technical description

It refers to permeable surfaces that allow water to infiltrate into the underlying soil, reducing surface runoff and preventing flooding. Made of materials such as permeable concrete, permeable pavers, or porous asphalt, these systems promote natural drainage and flood mitigation.

Image: uxdesign.cc

Topographical area urban- industrial

Scale of implementation medium

Examples of analyzed projects promoting or implementing the measure BRIGAID, CLARITY, CLEARING HOUSE

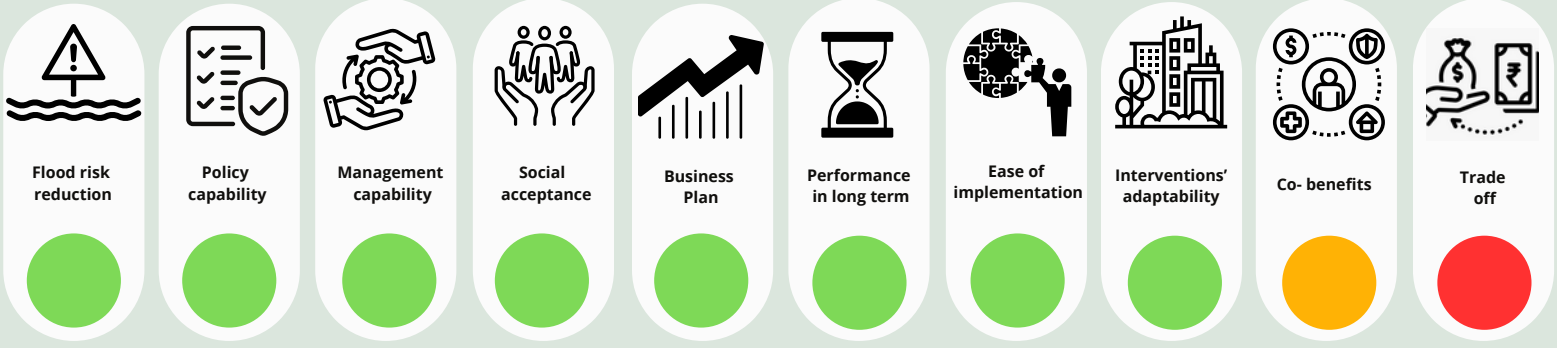
Benefits

- ☹ Absorb and store rainwater
- ☺ Reduce stormwater runoff
- ☹ Flood and peak flow reduction
- ☺ Recharge groundwater
- ☺ Enhance water infiltration
- ☹ Reduce coastal erosion
- ☺ Reduce pressures on urban surface

Barriers

- ☺ Economic and financial constraints
- ☺ Stakeholders' awareness and interest
- ☺ Technical challenges
- ☺ Legal and policy restrinctions
- ☹ Public acceptance
- ☹ Knowldege gap
- ☺ Coordination between sector

Effectiveness domain



4

Urban wetlands and ponds

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to engineered systems that replicate the functions of natural wetlands to treat stormwater runoff and reduce flood risk. Using a combination of vegetation, soils, and physical processes, these systems effectively remove pollutants, retain water, and mitigate peak flows during heavy rainfall events.

Image: habitatcreations.com.au

Topographical area urban

Scale of implementation medium

Examples of analyzed projects promoting or implementing the measure CASCADE, CLEVER CITIES, ENABLE

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

5

Urban forest and trees

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to forest ecosystems within urban areas or at the urban-rural interface that consist of a diverse mix of trees, diverse soils, and a variety of plants and grasses. These ecosystems enhance biodiversity, improve air quality, and provide vital green spaces that contribute to the overall health and resilience of urban environments.

Image: lmchouston.com

Topographical area urban- natural

Scale of implementation large - extralarge

Examples of analyzed projects promoting or implementing the measure CONEXUS, DESSIN, ENABLE

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

6 River floodplains restoration/ Channel Naturalization

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to natural or artificial areas, characterized by layers of soil, diverse vegetation, and engineered materials that are found along watercourses. Restoring natural channel features, such as meanders and floodplain connections, improves watercourse stability, increases water storage capacity, and reduces erosion and sedimentation.

Image: mrbconservationnetwork.wordpress.com

Topographical area urban- natural

Scale of implementation large- extra large

Examples of analyzed projects promoting or implementing the measure AQUACROSS, NATURAL COURSE, CLARITY

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

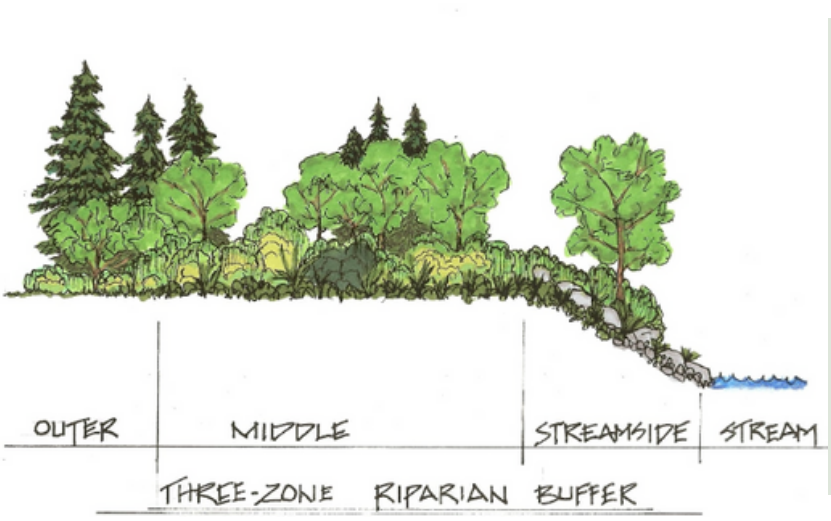
Effectiveness domain

7

Riparian buffer zones/ Bioengineering Techniques

Interreg Euro-MED | Co-funded by the European Union

LocAll4Flood



Technical description

It refers to techniques for restoring floodplains by allowing water to disperse and lower flood peaks, while using vegetation to stabilize slopes and manage erosion. Techniques such as live poles, brush mattresses and coconut trunks are used to strengthen stream banks and improve connectivity within the floodplain.

Image: troutheadwaters.com

Topographical area urban- natural

Scale of implementation large- extra large

Examples of analyzed projects promoting or implementing the measure AQUACROSS, CLEVER CITIES, CLIMARK

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

8 Pocket parks/ Natural playgrounds

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to small green spaces designed to manage stormwater and reduce the risk of flash flooding. By incorporating permeable surfaces and native vegetation, these areas absorb stormwater, mitigate runoff, and provide recreational opportunities for communities, enhancing both environmental and social benefits.

Image: culturalheritageinaction.eu

Topographical area urban

Scale of implementation small

Examples of analyzed projects promoting or implementing the measure BRIGAID, GROW GREEN, NATURE4CITIES

Benefits

- ☹ Absorb and store rainwater
- ☺ Reduce stormwater runoff
- ☺ Flood and peak flow reduction
- ☹ Recharge groundwater
- ☺ Enhance water infiltration
- ☹ Reduce coastal erosion
- ☺ Reduce pressures on urban surface

Barriers

- ☺ Economic and financial constraints
- ☺ Stakeholders' awareness and interest
- ☺ Technical challenges
- ☹ Legal and policy restrinctions
- ☹ Public acceptance
- ☹ Knowldege gap
- ☺ Coordination between sector

Effectiveness domain

9 Urban and regenerative agriculture

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to cultivated areas in and around cities that are intended for personal or local consumption. Regenerative agriculture practices, including agroforestry, contour tillage, and cover cropping, improve soil health, improve water infiltration, and reduce runoff on farmland, thereby mitigating the risks of flash flooding downstream by improving soil structure and plant cover.

Image: foodtank.com

Topographical area urban

Scale of implementation small- medium

Examples of analyzed projects promoting or implementing the measure CLEVER CITIES, GROW GREEN, IMAGINE

Benefits

- ☹ Absorb and store rainwater
- ☺ Reduce stormwater runoff
- ☹ Flood and peak flow reduction
- ☺ Recharge groundwater
- ☺ Enhance water infiltration
- ☹ Reduce coastal erosion
- ☺ Reduce pressures on urban surface

Barriers

- ☺ Economic and financial constraints
- ☺ Stakeholders' awareness and interest
- ☺ Technical challenges
- ☹ Legal and policy restrinctions
- ☹ Public acceptance
- ☹ Knowldege gap
- ☺ Coordination between sector

Effectiveness domain

10 Cycle and pedestrian green routes

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to a greenways that improve connectivity between urban areas and ecosystems, with deciduous trees along roads and infrastructure. These trails support wildlife habitats, reduce urban flooding, improve water quality, promote outdoor education, and achieve various green infrastructure goals, benefiting both nature and communities.

Image: warwickshire.gov.uk

Topographical area urban

Scale of implementation medium

Examples of analyzed projects promoting or implementing the measure NATURE4CITIES

Benefits

- ☹ Absorb and store rainwater
- ☹ Reduce stormwater runoff
- ☺ Flood and peak flow reduction
- ☹ Recharge groundwater
- ☺ Enhance water infiltration
- ☹ Reduce coastal erosion
- ☺ Reduce pressures on urban surface

Barriers

- ☺ Economic and financial constraints
- ☺ Stakeholders' awareness and interest
- ☺ Technical challenges
- ☺ Legal and policy restrinctions
- ☹ Public acceptance
- ☹ Knowldege gap
- ☺ Coordination between sector

Effectiveness domain

11

Rainwater Harvesting Systems

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to a system is designed to collect, store and utilise rainwater from roofs and other surfaces for non-drinking uses, mainly for irrigation of small crops and maintenance of green roofs. By harnessing rainwater, it promotes sustainable water management and supports urban agriculture and green infrastructure.

Image: graf.info

Topographical area urban- industrial

Scale of implementation small

Examples of analyzed projects promoting or implementing the measure AQUACROSS, BRIGAID, IMAGINE

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

12

Constructed wetlands for industrial effluent

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Image: leachate.us

Technical description

It refers to engineered free surface systems feature depressions that mimic natural wetland ecosystems. These systems are designed to manage water flow, enhance biodiversity, and improve water quality, functioning similarly to natural wetlands while providing ecological and environmental benefits.

Topographical area industrial

Scale of implementation medium

Examples of analyzed projects promoting or implementing the measure CASCADE, CLARITY, CONEXUS

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

13

Seagrass /Flora restoration/ Coastal permeable structures/ Natural coastal barriers

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to planting mangroves and encouraging the natural regeneration of coastal flora and fauna are vital actions for protecting coastlines from degradation. These efforts help stabilize the seabed, enhance biodiversity, and strengthen coastal resilience against erosion and other environmental threats.

Image: news.wgcu.org

Topographical area natural - coastal

Scale of implementation medium- extralarge

Examples of analyzed projects promoting or implementing the measure MOORLIFE

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

14

Sandy beach nourishment/ Dune restoration and creation

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to activities related to expanding beaches and dunes to absorb wave energy, safeguarding coastal infrastructure and reducing flash flood risks. It also integrates natural barriers such as dunes, mangroves, and coastal vegetation to protect communities from storm surges, tidal flooding, and erosion, enhancing overall coastal resilience.

Image: eu.news-journalonline.com

Topographical area natural- coastal

Scale of implementation large- extralarge

Examples of analyzed projects promoting or implementing the measure AQUACROSS, CLARITY, NAIAD

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

15

Living shorelines

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to the use of plants, sand, rocks, and natural materials to stabilize shorelines. These ecologically engineered structures leverage resources like plants, oyster reefs, and marsh vegetation to prevent erosion, dissipate wave energy, and create habitats for marine life. They enhance shoreline resilience and help mitigate coastal flooding.

Image: vaswcd.org

Topographical area natural - coastal

Scale of implementation large- extralarge

Examples of analyzed projects promoting or implementing the measure BRIGAID, GROW GREEN, CLEARING HOUSE

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

16

Floodable coastal parks/ Coastal wetlands/ Salt marshes

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to activities to restore local hydrology or by depositing dredged mud to reproduce the natural movement of sediments. These methods help maintain ecological balance, increase habitat diversity and improve water quality in coastal areas.

Image: phys.org

Topographical area coastal

Scale of implementation large-extralarge

Examples of analyzed projects promoting or implementing the measure AQUACROSS, AQUANES, BRIGAID

Benefits

- ☹ Absorb and store rainwater
- ☹ Reduce stormwater runoff
- ☹ Flood and peak flow reduction
- ☹ Recharge groundwater
- ☹ Enhance water infiltration
- ☺ Reduce coastal erosion
- ☹ Reduce pressures on urban surface

Barriers

- ☺ Economic and financial constraints
- ☺ Stakeholders' awareness and interest
- ☺ Technical challenges
- ☺ Legal and policy restrinctions
- ☹ Public acceptance
- ☹ Knowldege gap
- ☺ Coordination between sector

Effectiveness domain

17 Natural inland wetlands restoration

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to the restoration of constructed wetlands in suburban or industrial regions. By restoring or creating these wetlands, they function as natural sponges, absorbing floodwater, slowing down runoff and providing habitat for a variety of flora and fauna.

Image: gov.si

Topographical area urban- industrial

Scale of implementation medium- large- extralarge

Examples of analyzed projects promoting or implementing the measure AQUACROSS, BRIGAID, OPTWET

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

Terraces and slopes / Soil conservation practices

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to natural adaptation activities like porous fences, vertical wooden fences, and vegetation gabions designed to create terraces or stabilize slopes. Soil conservation methods such as contour cultivation, terracing, and cover crops are implemented to reduce soil erosion and enhance soil structure, thereby minimizing sedimentation in water bodies.

Image: worldatlas.com

Topographical area natural

Scale of implementation medium- large- extralarge

Examples of analyzed projects promoting or implementing the measure ENABLE, NAIAD, OPERANDUM

Benefits

- ☹ Absorb and store rainwater
- ☺ Reduce stormwater runoff
- ☹ Flood and peak flow reduction
- ☹ Recharge groundwater
- ☺ Enhance water infiltration
- ☹ Reduce coastal erosion
- ☹ Reduce pressures on urban surface

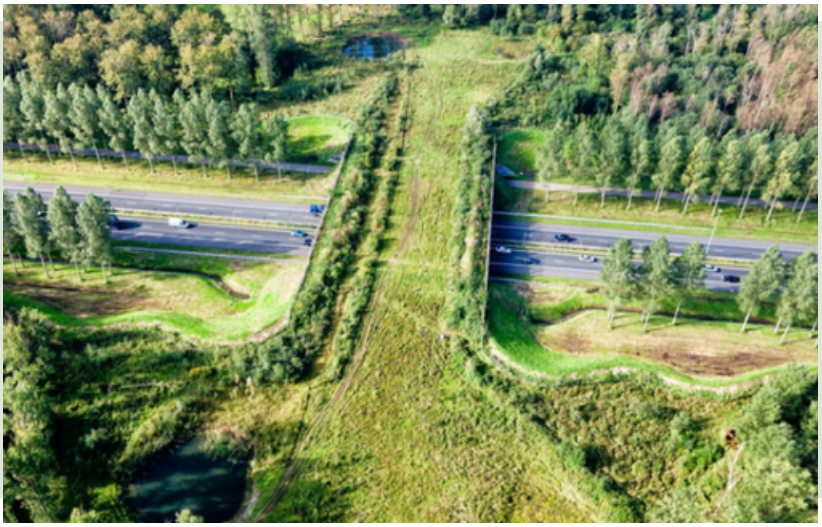
Barriers

- ☺ Economic and financial constraints
- ☺ Stakeholders' awareness and interest
- ☺ Technical challenges
- ☺ Legal and policy restrinctions
- ☹ Public acceptance
- ☹ Knowldege gap
- ☺ Coordination between sector

Effectiveness domain

Green corridors

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood



Technical description

It refers to a strip with abundant vegetation that connects significant natural areas within the city. It is crucial to reuniting fragmented habitats and promoting biodiversity. These corridors facilitate the movement of wildlife and improve ecological connectivity in urban landscapes.

Image: planetcustodian.com

Topographical area natural

Scale of implementation medium- large

Examples of analyzed projects promoting or implementing the measure CLEARING HOUSE, CONEXUS, ENABLE

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

20 Natural Water Retention Measures (NWRM): small dams, ponds, retention basins and check dams

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to structures built on ephemeral or intermittent watercourses to temporarily store excess water and gradually release it, helping to reduce the risk of flooding downstream. These structures slow down runoff, reduce erosion and can be constructed from natural materials such as rocks, logs or earth-filled bags.

Image: https://megamanual.geosyntec.com/npsmanual/default.aspx

Topographical area natural

Scale of implementation medium- large

Examples of analyzed projects promoting or implementing the measure AQUANES, NATURVATION, NATURAL COURSE

Benefits

- Absorb and store rainwater
- Reduce stormwater runoff
- Flood and peak flow reduction
- Recharge groundwater
- Enhance water infiltration
- Reduce coastal erosion
- Reduce pressures on urban surface

Barriers

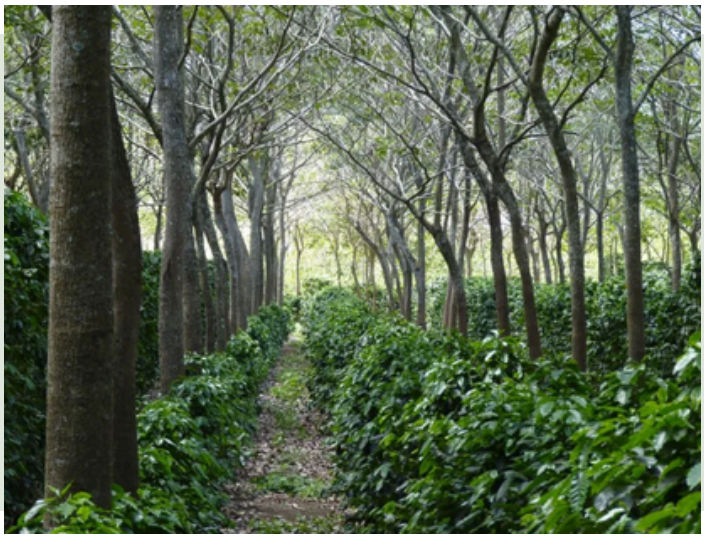
- Economic and financial constraints
- Stakeholders' awareness and interest
- Technical challenges
- Legal and policy restrinctions
- Public acceptance
- Knowldege gap
- Coordination between sector

Effectiveness domain

21

Sustainable Land Management techniques (agroforestry, rotational grazing and conservation tillage)

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood



It refers to land management practices that improve soil health can enhance water infiltration and reduce runoff. By focusing on soil quality, these practices help retain moisture, promote healthier ecosystems and mitigate the effects of flooding and erosion.

Image:reNature.com

Topographical area natural

Scale of implementation large- extralarge

Examples of analyzed projects promoting or implementing the measure AQUACROSS, BRIGAID, INHERIT

Benefits

- ☹ Absorb and store rainwater
- ☺ Reduce stormwater runoff
- ☹ Flood and peak flow reduction
- ☺ Recharge groundwater
- ☺ Enhance water infiltration
- ☹ Reduce coastal erosion
- ☹ Reduce pressures on urban surface

Barriers

- ☺ Economic and financial constraints
- ☹ Stakeholders' awareness and interest
- ☺ Technical challenges
- ☺ Legal and policy restrinctions
- ☹ Public acceptance
- ☺ Knowldege gap
- ☹ Coordination between sector

Effectiveness domain

22

Afforestation and reforestation

Interreg Euro-MED
Co-funded by the European Union
LocAll4Flood

Technical description

It refers to tree planting and forest restoration in upstream areas, which enhances soil infiltration, reduces surface runoff, stabilizes slopes, and regulates river flow. Additionally, planting native species along riverbanks and floodplains to stabilize soil, improve infiltration, and reduce erosion during floods.

Image: eos.com

Topographical area natural

Scale of implementation large- extralarge

Examples of analyzed projects promoting or implementing the measure MOORLIFE, NAIAD, OPERANDUM

Benefits

- ☺ Absorb and store rainwater
- ☺ Reduce stormwater runoff
- ☹ Flood and peak flow reduction
- ☺ Recharge groundwater
- ☺ Enhance water infiltration
- ☹ Reduce coastal erosion
- ☹ Reduce pressures on urban surface

Barriers

- ☺ Economic and financial constraints
- ☺ Stakeholders' awareness and interest
- ☺ Technical challenges
- ☺ Legal and policy restrinctions
- ☹ Public acceptance
- ☹ Knowldege gap
- ☺ Coordination between sector

Effectiveness domain