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# COASTAL PROTECTION AND SUDS – NATURE-BASED SOLUTIONS

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## Key messages

I Nature-based solutions (NBS) help society to adapt to climate change, while simultaneously enhancing the environment and saving raw materials

II NBS have the capacity to adapt more effectively and sustainably to sea-level rise and increasing amounts of stormwater in urban areas as compared to conventional grey infrastructure approaches

III NBS can offer multiple benefits in parallel, such as improvements in public health, biodiversity conservation and recreational opportunities for urban populations

IV Though frequently implemented in isolated cases, the full potential of NBS has not yet been reached due to a number of existing barriers, such as uncertainty about their long-term performance and cost-effectiveness

V Shifts in decision-making processes and environmental assessment approaches are needed in order to take account of the added benefits of NBS as compared to grey infrastructure

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# What to find in this policy brief?



RECREATE is a 5-year project running from 2013 to 2018, funded by the European Commission. It is carried out by a consortium consisting of 16 key partners from European research and industry and is led by the Joint Institute for Innovation Policy (JIIP). The overall objective of the project is to support the development of the European Union's research and innovation funding programme Horizon 2020, with a specific focus on the part *Societal Challenge 5: Climate Action, Resource Efficiency and Raw Materials.*

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Dear Readers,

We are very pleased to present you with the first three editions of the RECREATE Policy Briefs, which present the key outcomes of the project deliverables and translate them into policy-relevant messages. These first three RECREATE Policy Briefs are directly based on the so-called Evidence-Based Narratives (EBNs), which have been produced by us following a specific request from DG RTD of the European Commission. The purpose of the EBNs is to describe, in a narrative form, the potential but also the risks and remaining challenges of particularly promising innovations in the DG RTD priority areas of Systemic Eco-Innovation, Nature-Based Solutions and Climate Change Services. Ultimately, the objective is to support DG RTD with the formulation of future H2020 Work Programmes.

Policy Brief no. 3 discusses so-called nature-based solutions (NBS) in two different application areas: (1) costal protection and (2) urban drainage systems. NBS, as defined by the EC, are "living solutions inspired by, continuously supported by and using nature". In the two mentioned application areas, NBS have the potential to not only serve their purpose in a more effective and a more sustainable way than grey infrastructure"". They also offer multiple co-benefits such as enhancing the environment, saving raw materials, improving public health, fostering biodiversity and creating new recreational spaces.

The challenges to a more widespread implementation of NBS are of different sorts. First of all, there are of course still a number of knowledge gaps about the NBS themselves and their applicability and effectiveness in various fields. Furthermore, there is uncertainty specifically with regard to the long-term performance and cost-effectiveness of the various solutions. Hence, what is needed in addition to research on the solutions as such are longitudinal studies and research that tests, proves and improves these solutions over longer time spans. Yet in many cases, the long-term performance and cost-effectiveness has in fact been proven but is simply not sufficiently taken into account by decision-makers, who tend to think in more short-term horizons. Therefore, support for additional research needs to be accompanied by awareness-raising measures and financial solutions that encourage decision-makers to opt for the NBS.

On behalf of the entire RECREATE consortium, we wish you a good read and look forward to your feedback. If you would like to find out more about the project, please visit our website www.recreate-net.eu or send an email to info@recreate-net.eu.

Kind regards,

**Robbert Fisher**
Project Coordinator

# Policy support needed to unlock the potential of nature-based solutions for urban flood protection

*Nature- based solutions (NBS) have the potential to sustainably protect cities from flooding, while also creating additional benefits for the environment and society. However, in order to unlock their potential, an enabling governance framework and research on long-term performance and critical factors is needed.*

## I What is the problem? What is the suggested innovative solution?

### Nature-based solutions – a sustainable alternative to conventional urban flood protection measures

European cities are experiencing an increase in the intensity and frequency of floods and extreme weather events, leading to significant economic damages. Coastal and delta cities are particularly vulnerable, a trend which is exacerbated by climate change and rapid urbanisation. Nature-based solutions (NBS) present long-term and robust options for flood protection in urban areas. This policy brief focuses on two types: sustainable urban drainage systems (SuDS) and NBS for coastal protection of cities.

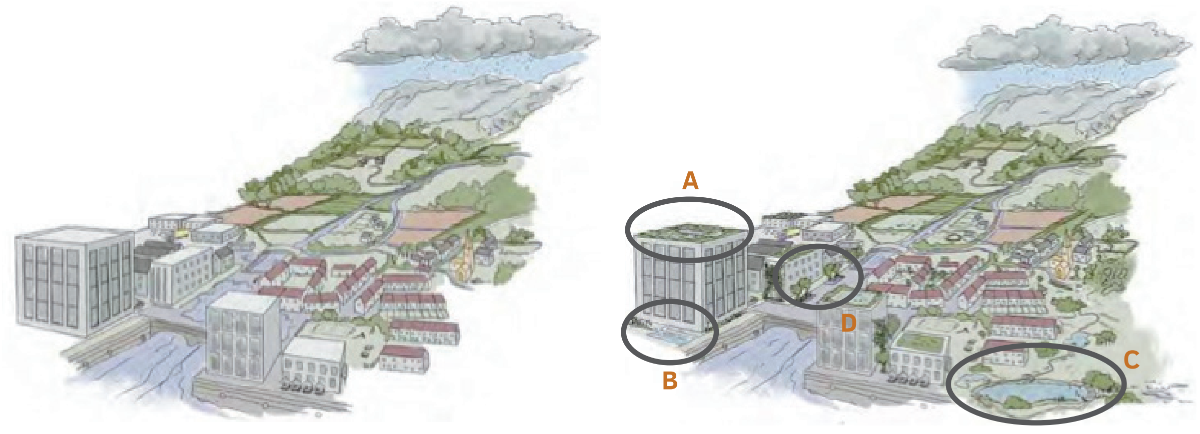
> Fact 1
> *Nature-based solutions are living solutions inspired by, continuously supported by and using nature (EC, 2015).[1]*

### Sustainable urban drainage systems (SuDS)

Conventional urban drainage solutions, i.e. piped drainage systems, are increasingly lacking the capacity to keep pace with ongoing urbanisation and higher rates of stormwater. These shortcomings of grey infrastructure can result in urban flooding[2], the discharge of untreated excess water to the regional water system and an increase of pollutants in the water, which can in turn lead to algal blooms, harming wildlife and reducing amenity values. Urban drainage systems based on natural processes present a more sustainable and cost-effective drainage alternative, which serves to increase water absorption capacity and also improve water quality. SuDS utilise a combination of natural processes, such as storage, evaporation, infiltration and plant transpiration, both above and below the surface. SuDS have the potential to mitigate extreme weather events by promoting infiltration and reducing the overall amount of water entering local storm sewers or surface waters. Utilising nature serves to reduce the harmful impacts of non-point source (diffuse) pollution (e.g. oil, organic matter and toxic metals) to urban water bodies.[3] Elements of SuDS include, for example, permeable surfaces, filter and infiltration trenches, green roofs, detention basins, underground storage, wetlands and/or ponds. Figure 1 compares a SuDS to a conventional, grey infrastructure-based drainage system.

A diversity of actors and agencies from different disciplines are involved in the development, implementation and maintenance of SuDS. Of key relevance are, for example, water service providers, local authorities, engineers, urban designers, highway authorities, land or housing associations, drainage consultants or suppliers, flooding managers and research institutions.

Figure 1: On the left: conventional grey infrastructure drainage system characterised by piped drainage, impermeable surfaces (roofs, walls, pavements, car parks and roads) and little wildlife habitat. On the right: sustainable drainage system (SuDS) featuring (A) green roofs, (B) ponds, (C) retention basins, and (D) roadside permeable planters.



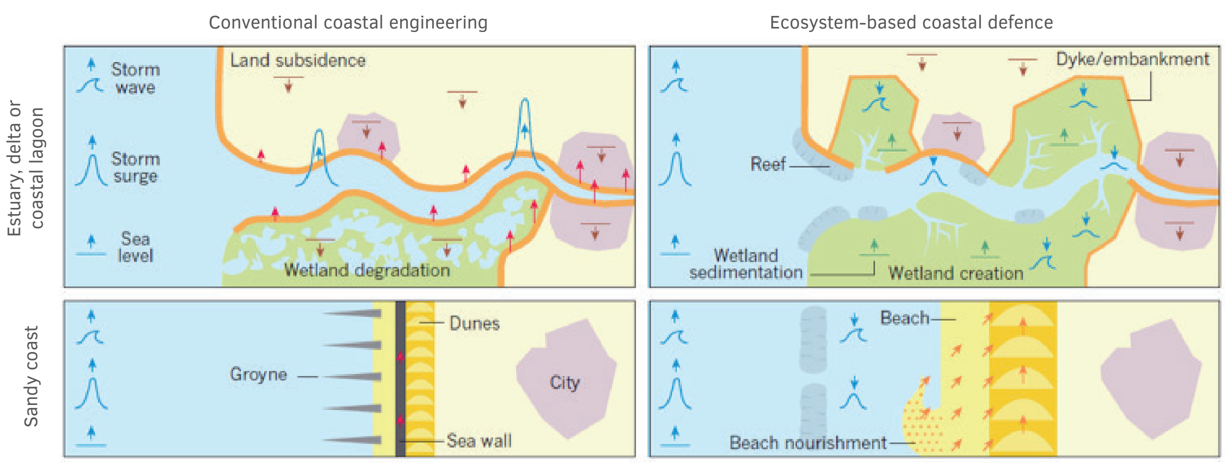

Source: adapted from Graham et al. (2012), p.3&4[4]

## Nature-based solutions in coastal protection

Conventional, concrete-based coastal defence structures are not able to adapt to and compensate for sea-level rise and, therefore, need to be regularly maintained and reinforced. Furthermore, such structures tend to cause unwanted erosion in other locations. NBS are an attractive alternative for coastal protection: they reduce wave intensity and protect coasts from erosion, thereby stabilising shorelines. In contrast to concrete-based solutions, NBS can grow with sea-level rise or, if necessary, can be easily adapted. Various types of NBS for coastal protection exist, including artificial wetlands or salt marshes, beach nourishment, oyster reef creation and mangrove re-establishment and protection. For example, artificial oyster reefs created in New York, USA and the Oosterschelde, Netherlands, achieved both wave attenuation and erosion protection.[5,6] The Wallasea Island Wild Coast project in the UK is an example of a coastal wetland that was restored to increase the water storage capacity and lower inland storm surges[7] (see chap. 3).

Key actors involved in the establishment of NBS for coastal protection are public authorities, construction companies, consultancy firms, research institutes, universities and environmental NGOs. In some cases, neighbourhood organisations and local interest groups also get involved.

Figure 2: Conventional vs. nature-based coastal defence measures. Blue arrows indicate the increase/decrease of storm waves, storm surge and sea level (as specified); red arrows indicate the need for maintenance and heightening of dykes/embankments/sea walls with sea-level rise; and brown arrows indicate land subsidence.




Source: Temmerman et al. 2013[8]

# II Economic and environmental potential of the solution

## Nature-based solutions create multiple benefits in addition to flood protection

In addition to offering flood protection and reducing the impacts of stormwater, NBS offer multiple additional benefits: they can help to combat climate change by offering an increased $CO_2$ storage capacity in created, maintained or restored ecosystems; they benefit biodiversity through the creation of green and blue corridors in relation to the EU Green Infrastructure Strategy; and they can reduce the use concrete and thus save valuable resources. Through the range of environmental benefits they offer, NBS can contribute to achieving the goals of the Water Framework Directive and the Marine Strategy Framework Directive.

Furthermore, NBS have the potential to offer significant co-benefits for urban populations, such as improvements in public health and increased recreational opportunities. Direct economic benefits from SuDS, in particular, include the absorption of rainwater and, thus, the reduction of water that needs to be treated by local stormwater utilities.[9]

A range of examples show that the benefits obtained from the implementation of NBS can greatly exceed those of conventional, concrete-based solutions when adopting long-term perspective and considering wider environmental benefits. In the case of SuDS, for example, evidence from the stormwater management programme in the City of Philadelphia, USA suggests that the net benefits of using SuDS surface techniques are almost $3 billion, compared with less than $100 million for the grey infrastructure, piped alternative. These net benefits include changes to property values, reductions in greenhouse gas emissions and reduced crime.[10] The Wallasea Island Wild Coast project in the UK (see box 3) is another example of the range of benefits provided by the implementation of a NBS, in this case aiming to combat coastal flooding. Although such figures need be interpreted with caution given the high level of uncertainty and contextual variations surrounding effectiveness, they illustrate the high potential of NBS to produce a range of benefits extending beyond the primary goal of flood protection.

## Higher adaptive capacity in comparison to conventional solutions

NBS have the capacity to better adapt to sea-level rise or increasing amounts of stormwater in urban areas than conventional, concrete-based solutions (e.g. dikes, walls, dams, weirs, piped drainage systems). Coastal NBS, such as oyster beds, wetlands and salt marshes, can grow over time through the trapping of sediments and, thereby, compensate for sea-level rise.[12] Furthermore, even in cases where natural accretion cannot keep pace with rising sea levels, NBS are generally easier to modify and adapt than conventional, concrete-based coastal defence structures.[13]

Figure 3: Benefits of NBS in addition to flood protection (selection based on Ashley et al. 2012[11])

| environmental benefits | economic benefits | social benefits |
|---|---|---|
| • carbon storage<br>• provision of habitats<br>• reduction of urban heat island effect (SUDS)<br>• improvement of water quality (SUDS) | • enhancement of tourism<br>• reduction in water treatment needs (SUDS)<br>• energy savings (SUDS) | • increase in recreational opportunities<br>• improvement in public health<br>• asthetic values |

> *„Nature-based solutions are more climate-robust*" (expert interview)

### Combination with grey infrastructure possible

Both types of NBS mentioned above can be combined with conventional solutions. In the case of SuDS, green elements are complementary to existing grey infrastructure drainage systems and a combination of the two can increase the cost- effectiveness of the system as a whole. The implementation of NBS for coastal protection can also benefit from the integration of conventional grey measures, or vice versa (i.e. a so-called 'hybrid approach').[13] For example, artificial oyster reefs are complementing conventional flood protection measures in New York City, USA to fend off waves.

### Estimation of future market potential for SuDs and NBS in coastal protection

The market sizes for both SuDS and NBS in coastal protection are determined by

(i) the number of storm incidents / coastal flooding events,
(ii) the number of people living in urban areas (close to the coast), and
(iii) policies promoting NBS.

#### *Future Market potential for sustainable urban drainage systems*

There are three main market areas for SuDS across the globe: installation in new build urban spaces, complementing or substituting piped drainage solutions (e.g. to cope with changing demands), and replacing existing (mainly piped) drainage systems as they come to the end of their life. Frontrunners in the use of SuDS are the UK and the USA, but a range of other countries, such as Denmark, Australia, Sweden, Canada and the Netherlands, have also started applying SuDS.

The future market potential for SuDS is based on the estimation of the damage costs in the EU and globally from stormwater based urban flooding, in the EU and global markets. This is coupled with the evidence that SuDS have the potential to be more (cost-)effective and sustainable than traditional solutions when considering the significant co-benefits generated.[14] Costs occurring due to an overload of piped drainage systems can be significant: in 2002, for example, major flood events took place in six Member States and reached a record of more than $21 billion in damages to private and public property, including small business owners.[15] Another example is the flooding in Copenhagen in 2011 (see box 1). In this context, experts see an enormous market potential for both new builds and – while more challenging due to funding and site-specific considerations – retrofitting actions, with some experts arguing that essentially all existing buildings have the potential to be successfully retrofitted with SuDS.[13]

> **Fact 2**
> *In recent years, flooding from rivers, the sea and direct rainfall are the natural hazards that have caused the greatest economic losses in Europe.[17] Warmer climate projections show a further increase of urban drainage flooding problems, in particular in western and northern Europe (see figure 5).*

#### *Future Market potential for nature-based solutions for coastal protection*

Evidence of coastal flooding events causing losses in Europe and abroad suggests that there is a growing market for the coastal protection sector. Low lying coastal and delta cities, even farther than 50km off the coastline, are particularly vulnerable to the increased risk and severity of coastal flooding events.

**Box 1: Damage Example: Flooding in Copenhagen in July 2011. Source: EEA 2012[16]**

After a very hot period, Copenhagen was hit by a strong thunderstorm on 2 July 2011. During a two hour period, over 150 mm of rain fell in the city centre, constituting the biggest single rainfall in Copenhagen since measurements began in the mid-1800s. The city's sewers were designed to handle much smaller amounts of precipitation and combined rainwater and sewage together, thereby making the city vulnerable to an increase in the amount and intensity of rainfall. The sewage system was unable to handle all of the water and, as a result, many streets were flooded and sewers overflowed into houses, basements and onto streets. The consequences were drastic, as emergency services had to close roads and attend to people trapped in their cars. The emergency services were within minutes of having to evacuate the city's two biggest hospitals because of flooding and power cuts. Insurance damages alone were estimated at €650–700 million. Damage to municipal infrastructure not covered by insurance, such as roads, amounted to€ 65 million.

Figure 4: Global need for coastal flood protection, large-scale examples and opportunities for the application of nature-based defence. Existing examples of large-scale applications of nature-based flood defence are shown in red.


Source: Temmerman et al. 2013[10]

Currently, up to 10,000 people are flooded annually in the EU, causing an average annual damage of € 1.9 billion, and scientific evidence suggests that up to 425,000 additional people might be affected by coastal flooding by 2080, with an expected annual damage as high as € 25.4 billion.[18]

According to an estimate by the International Association of Dredging Companies from 2011, the total coastal, marine and river engineering market is expected to grow between three and six percent, and the market share of NBS is expected to increase by 19% (estimates based on contract volume).[19] Similarly, experts interviewed for this project also suggested that there is a clear increase in the market share of NBS in coastal protection.

European enterprises, which are currently important market players in the worldwide development of conventional and nature- based coastal protection measures, such engineering firms (e.g. Royal Haskoning/DHV, Arcadis etc), as well as the big Dutch (e.g. Boskalis, Van Oord), Danish (e.g. Rohde Nielsen) and Belgian (Jan de Nul, DEME) dredging companies, could play a role in this future market if the innovation system is appropriately supported.

In some instances, European companies or consultancies are involved in establishing NBS outside of Europe, for example, in utilising mangrove forests in South East Asia for flood protection.[20,13] As can be seen in Figure 4, cities in estuaries or deltas can have various protection options, depending on their distance from the sea. For example, cities more than 50km from the sea (marked in dark green) can – in addition to conventional engineering – be adequately protected from flooding by marshes or mangroves. Cities located directly at the coast (blue) can be protected by engineering and to some extent by reefs. Dunes are a suitable option for cities more than five km from the sea and behind a sandy coast (orange) (Temmerman et al. 2013, p.81).[10]

# III Barriers to implementation

## Uncertainty about performance and costs

Capacity gaps and uncertainty prevail among relevant actors and authorities on the long-term maintenance, performance and (cost-) effectiveness of NBS, due to a lack of systematic testing, monitoring and reporting. This, in turn, is coupled with a lack of diffusion of information on experiences, guidance and tools across relevant institutional and stakeholder networks. Informational limitations also negatively affect the acceptance of nature-based flood protection measures in the general public.

The higher uncertainty associated with NBS in comparison to conventional solutions is an important factor that inhibits their wider acceptance and implementation. Moreover, standardised tools for measuring the (long-term) performance, costs and benefits of NBS are lacking, particularly on a city scale.

### Institutional, regulatory and governance barriers

Current institutional and regulatory arrangements form a further barrier to the implementation of NBS for flood protection. As there are at present no specific funding schemes for fostering the implementation of nature-based solutions on a national or European level, NBS have to compete with conventional coastal protection measures for funding. However, decision-making processes often fail to capture the longer lifespan, lower maintenance costs and the added benefits NBS can offer on top of their flood protection function.[21] Public authorities tend to choose those options for flood protection, which have the lowest implementation costs, without considering the value of other benefits, such as recreation or environmental protection.

The site-specific nature of NBS further requires these measures to be adapted and designed for each case individually, preventing the development of a technical 'one size fits all' solution. Given this site-specific nature, the levels of effectiveness, fulfilment of regulatory requirements and associated costs and benefits also vary greatly from case to case.[22]

### Uncertainty over responsibility for ownership and maintenance

Due to the variety of policy fields that may be relevant for implementing and maintaining NBS, the responsibilities and obligations for providing funding are not always clearly distributed. Such split responsibilities between various levels of authorities and institutions can complicate implementation and maintenance. Consequently, conflicts emerge in determining who pays for, operates and maintains NBS in the long-term, particularly in situations where NBS on public and private properties are concerned.

### Land requirements

Certain types of NBS require large areas of land for their implementation, which can be costly and difficult to accept for planners and local authorities, particularly in urban environments. This makes the selection of NBS over traditional engineered approaches especially unlikely if the wider environmental and social benefits are not considered in decision-making processes.

Urban wetland in London (WWT London Wetland Centre)

# IV Good practice examples

### The Ekostaden Augustenborg initiative, Sweden

Augustenborg is a highly populated neighbourhood in Malmö, Sweden. It experienced periods of socio-economic decline and frequently suffered from floods caused by overflowing drainage systems. Resulting flooding was leading to damage to underground garages and basements, and restricted access to local roads and footpaths. Untreated sewage also often entered watercourses as a consequence of the increased pressure on the sewage treatment works. In order to minimise flood risk, between 1998 and 2002, the 'Ekostaden Augustenborg' initiative installed a "Sustainable Urban Drainage System" (SuDS). The project was carried out collaboratively by the city council and the MKB social housing company, with extensive participation of the residents in Augustenborg. As part of the project, green roofs, ditches, retention ponds, green spaces and wetlands were created. Due to the installation of the SuDS, rainwater run-off has decreased by half.[23] Additional benefits include improved water quality, reduced carbon emissions, aquifer recharge (relieving stress in water scarce areas), and increased biodiversity through the creation of new wetland habitats.[24] The increase in green space has improved the image of the area.

As the project involved significant physical changes in infrastructure, a main challenge was to ensure the acceptance of the local residents. An extensive and iterative process of stakeholder engagement was also initiated during the design and execution of this project, involving a 'rolling programme' of consultation with local residents, representatives from the local school, practitioners, city staff and local businesses.

The physical improvements in Augustenborg and related projects totaled approximately 21 million Euro. About half of the funds were invested by the MKB housing company. Without the partnership between resident companies and public authorities, the funding for this project would not have been sufficient.[25]

### The Dutch Ecoshape Consortium

Initiated by two major Dutch dredging companies, the Ecoshape consortium is a public-private collaboration promoting the implementation of water-related NBS in the Netherlands and worldwide. It is comprised of private parties, such as dredging contractors, equipment suppliers and engineering consultants, as well as public parties, such as government agencies and municipalities, universities and research institutes. The stakeholders joined forces in a €30 million Building with Nature innovation programme (2008–2012) and realised a wide range of projects, which demonstrate the use and functioning of NBS. One example is the Sand Engine on the coast of Delfland. The consortium was co-funded by the European Regional Development Fund (ERDF), the Dutch Ministry of Infrastructure and the Environment and the Municipality of Dordrecht.[17]

### Wallasea Island Wild Coast Project

In the Wallasea Island Wild Coast project, a wetland landscape of mudflats and salt marshes, lagoons and pasture was installed for coastal defence of an originally reclaimed island. Initiated by a proposal from the Royal Society for the Protection of Birds (RSPB) to purchase land and establish a protected area on the realigned coast, the project relied on cooperation between RSPB, different government agencies, scientists, consultants, and involved intensive stakeholder consultation. An ex-ante cost-benefit analysis initiated by the East of England Development Agency (EEDA) and conducted by consultants revealed that the opportunity costs and negative impacts (on recreational yachting, oyster fisheries and the loss of farmland) would be more significant in the (inevitable) event of an unmanaged breach of the old conventional protection infrastructure. On the benefits side, it was estimated that the intertidal habitat created would be capable of capturing up to 2.2 tonnes of carbon per hectare per year (the benefits generated from carbon sequestration were valued at £1.7 million over a period of 50 years), while the same land used for farming would act as a net source of carbon. The environmental benefits of the project include: habitat creation, waterborne nutrient processing and the provision of fish feedings and nursery habitats. In addition, the authors found that society at large would benefit from avoided expenditures for flood defence infrastructure (ca. £5–£10 million) and from the avoided loss of built assets on Wallasea worth £3.1 million under moderate flood event scenarios.[7]

# V Policy support needs

## Need to create an enabling governance framework

NBS aiming to address the challenges of coastal flooding and urban drainage appear to be gaining more momentum in a number of EU Member States, particularly in the UK and the Netherlands. Yet, as elaborated above, several barriers impede the wider implementation and acceptance of NBS as a sustainable and effective alternative or complement to conventional grey infrastructure solutions. A policy framework is thus necessary which recognizes the full range of co-benefits provided by NBS, adopts a long-term perspective when discussing tradeoffs and prioritises multifunctional solutions to urban challenges instead of largely single priority conventional grey infrastructure solutions. Currently, decision-making processes often do not fully integrate the contributions of NBS to targets of other policy areas as additional arguments supporting their implementation, e.g. meeting the requirements outlined by the Water Framework Directive or contributing to the EU Biodiversity Strategy to 2020. Therefore, governance frameworks must be adapted to accommodate a more holistic approach which integrates technical, social, environmental and economic contributions of NBS into decision making processes. This also includes mobilizing new actors, encouraging innovative partnerships and incentivising the mainstreaming and pursuit of NBS as a substitute or complement to conventional solutions.

Due to the multiple benefits delivered by NBS, funding sources can be diversified and tap available pools extending far beyond those reserved for flood protection, an option that requires further exploration. Where possible, opportunities for co-financing by the private sector should be explored, such as by (health or risk) insurance companies, previous funders of other forms of green infrastructure, and private investments, NGOs and water companies.[13] Individual households could also increase their contributions via the establishment of tax breaks or application of other incentives.

> *„We have to bring the worlds of spatial planners and water managers together"*
> (expert interview)

A supportive national policy framework for NBS in the area of flood protection should:

- Rely on decision-making criteria that are more holistic in nature, reflecting the goals of other policy sectors, such as nature protection, recreation, public health, climate change mitigation, spatial planning or the development of the housing sector
- Encourage the involvement of a wide range of stakeholders and funding sources, combining multiple interests, such as the pursuit of biodiversity conservation, human well-being, water management, economic development and job creation, and climate change adaptation
- Promote the integration of NBS into current planning processes, as a complement to conventional grey infrastructure solutions

## Need for actions in European research and innovation policy

The most important research needs to increase the uptake and mainstreaming of NBS relate to their long-term performance and ability to achieve their objectives and continue to deliver co-benefits in extreme situations. The evidence base for NBS in terms of contributing to urban flood protection needs to be extended, made more comparable via the application of consistent methodological approaches and indicators, and disseminated in a targeted fashion to a diversity of potential decision makers and practitioners. The European Commission is already investing in research on NBS through the Horizon 2020 work programme 2016/2017.[26] NBS are addressed within societal challenge 5 of the work programme (Climate action, environment, resource efficiency and raw materials), which calls for research projects that contribute to enhancing the environment (through providing natural habitat, reducing disturbance, enhancing nutrient processing and aquifer recharge).

Following the recommendation of the EU-level Horizon 2020 Expert Group on 'Nature-Based Solutions and Re-Naturing Cities', NBS are also in the focus of the call "Smart and Sustainable Cities".[27] In particular, the call addresses the question of how and under which conditions NBS can be upscaled and transferred from one location to another.

The foreseen research projects touches on several key aspects currently inhibiting the wider implementation of NBS, namely the pursuit of common understandings of tools and methodological approaches for assessing and optimizing implementation and the potential of such solutions to simultaneously address multiple societal challenges. Increasing the evidence base will subsequently facilitate wider investments and an increased willingness of the public sector to act as a frontrunner and 'lead by example' by demonstrating the effectiveness of NBS in practice. Only through more extensive application and testing of NBS in a range of environments, contexts and scenarios will the level of confidence in claims supporting NBS effectiveness increase.

In order to foster the development and uptake of NBS for coastal flood protection and urban drainage, we suggest that European research and innovation policy could:

- Encourage cities to engage in living labs or pilot studies which involve the implementation of NBS in order to contribute to the evidence base
- Support the identification of critical factors which inhibit cities from reaching their full NBS potential, and develop a toolbox to assist planners in overcoming these obstacles
- Promote the development and application of standardised monitoring and reporting protocols with which to evaluate long-term NBS (cost)effectiveness, including integrating ecosystem services into environmental assessments, multi-criteria-analyses and cost benefit assessments
- Encourage peer to peer learning processes between EU cities, but also with non-EU cities which can offer good practice experiences in the implementation, monitoring and maintenance of NBS

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