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Financing nature-based solutions in cities: Exploring opportunities from municipal funding

This factsheet explores how implementing Nature-based Solutions (NbS) in cities can be a more financially viable alternative to conventional approaches. By outlining inspiring NbS case studies, this factsheet lists possible options for municipalities to fund NbS in order to address societal challenges and to contribute to human well-being. Thus, it aims to provide municipalities with concrete pathways and advice from success-stories to systematically ensure financial viability when implementing NbS in cities.

Who should read this?

Are you a municipality directly involved in, or thinking of implementing Nature-based Solutions (NbS) but would like to explore ways to fund them? Is your city looking for economically viable ways to address societal challenges? This factsheet is for you!

Implementing nature-based solutions in cities: a financial challenge?

Nature-based solutions (NbS) are “actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits” (UNEA-5, 2022).

As set by the [IUCN Global Standard on Nature-based Solutions \(2020\)](#), NbS need to be economically viable to be recognized as such and to ensure their long-term sustainability. But how can this be made possible?

The implementation of NbS requires an adapted response to factor in different aspects influencing the long-term sustainability of the intervention. These aspects are not just economic but also involve governance, participation, and knowledge. However, municipalities generally report “lack of funding” as the main barrier to NbS implementation. To address this

point, there are several external public funding initiatives that support the implementation of NbS in urban areas at different levels, from regional to European. Furthermore, local initiatives depending on municipal funding have the potential to provide opportunities for urban NbS implementation.

“The return on investment, the efficiency and effectiveness of the intervention, and equity in the distribution of benefits and costs are key determinants of success for an NbS. This Criterion requires that sufficient consideration is given to the economic viability of the intervention, both at the design stage and through monitoring the implementation”. IUCN Global Standard on Nature-based Solutions, Criterion 4.

Examples of funding programmes at EU level

- Cohesion policy: the [European Regional Development Fund \(ERDF\)](#), the [European Social Fund Plus \(ESF+\)](#), and the [Cohesion Fund](#)
- [LIFE programme](#)
- [Horizon Europe](#)

More information is available [here](#).



NbS as economic opportunities for cities

Future climate projections suggest that the frequency and severity of extreme climate events will increase in the coming years. Additionally, nature loss puts an estimated 44% of global GDP in urban areas (\$31 trillion) at risk of disruption ([World Economic Forum, 2022](#)).

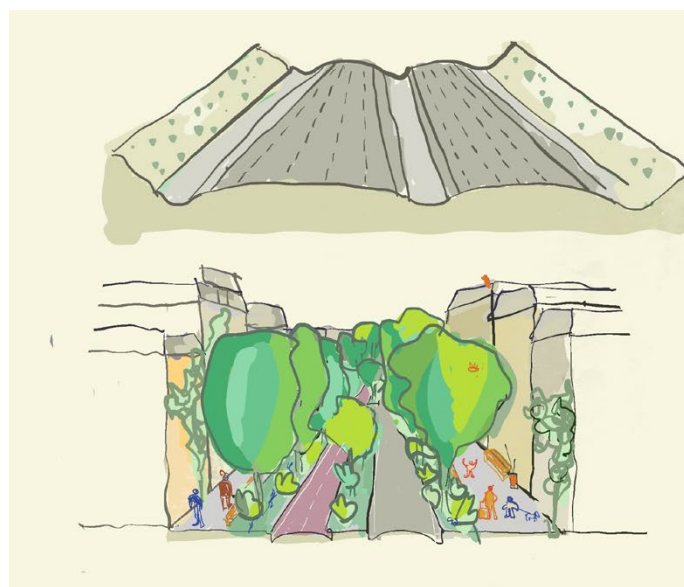
“With less than 0.3% of current spending on urban infrastructure going to NbS, there is a significant investment opportunity for cities to tap into – estimated to reach up to \$113 billion annually in 2030” ([WEF, 2022](#))

but especially of using the existing municipality investment capacity in areas of interest to shift from conventional approaches to NbS.

NbS provide sustainable solutions that not only respond more effectively to such hazards than conventional grey solutions but also contribute to reducing their frequency and/or intensity ([European Commission, 2015](#)). In this sense, NbS investments in cities can be made by a broad range of sectors for which local governments are responsible, also beyond the environmental sector. This places municipalities in the position of not only exploring new sources of funding

In addition, NbS have an important advantage in their potential to create new green jobs. Through participatory processes, local communities can become involved in the planning and implementation of NbS projects, which can lead to job creation and economic development. The long-term nature of many NbS interventions also brings longer job security for employees.

“The potential role of NbS for employment in urban areas is significant, and impacts are likely to be concentrated in specific sectors and activities with a strong link to NbS such as water and flood management, development of urban public spaces, green buildings, and use of natural and hybrid infrastructure” ([ILO-UNEP-IUCN, 2022](#))



From grey...

£1.28 billion to widen a 100km highway

£7.2 billion total local authority spending on highways (2008-2009)

...to green

£1.28 billion to plant 3.2 million street trees that will save 3 million tonnes of carbon

£1.1 billion total local authority spending on parks and open spaces (2008-2009)

Data from the UK extracted from ([CABE, 2009](#))

Therefore, NbS offer opportunities for outstanding direct monetizable economic benefits to municipalities. Though, implementing systematic approaches that allow to identify and implement the NbS that are capable to do so might need a coordinated approach in practice, research, financing, policy making, and public procurement, among other.

Looking for an example of urban NbS leading to economic advantages and reduced environmental and social risks?

Read about the Medmerry case on coastal realignment!

[Case study](#) & [slide](#)

Implementing NbS can be substantially cheaper than conventional approaches

A recent [EIB report on investing in nature-based solutions](#) categorises implemented NbS in Europe in

different ecosystems, showing a vast majority in the urban ecosystem, considering both urban regeneration (including changes in management) and development of new NbS, such as the implementation of green roofs and/or parks. According to the report, EU funds represent the most common investor in NbS. In the future, the demand for urban NbS can be expected to rise exponentially, and the additional investment in urban NbS is estimated at €136 000 per km² on average ([EIB, 2023](#); [Nesbit, M., Whiteoak, K, et al., 2022](#)).

Demonstrating the economic viability of NbS interventions is crucial to increase their uptake in urban areas, as well as to ensure public acceptance, which is key to the deployment of a long-term NbS strategy. Both scientific literature and practice have been contributing to this evidence with cases where NbS represent the most economically viable approach, showing their economic opportunity.

Actions to sustainably manage urban ecosystems

One of the most striking cases can be seen in green surfaces management. As labour represents 80-99% of maintenance costs of gardens and green spaces ([Rennes,](#)

[2012](#)), it provides a relevant economic opportunity for implementing NbS and promoting biodiversity in urban areas.




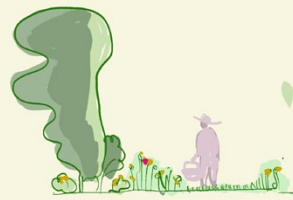

Table 1 describes the management needs of different types of green areas. It outlines the economic advantages of switching from a conventional management (here called *structured or functional*), generally linked to low biodiversity and ecosystem services, to a nature-based management (*country or nature*), with higher ecological integrity and delivering a more extended range of ecosystem services ([Threlfall et al., 2017](#)).

A good example following this approach is provided by the Rudersdal

Kommune, in Denmark. With a closed, fixed budget assigned to green areas, the municipality invested the savings made from shifting from conventional to a more sustainable management in green areas (from 30 to 60% of the costs) in putting in place new sustainable measures and to further promote biodiversity. As an example, in [Nørrevangssletten](#), a park located in the municipality, management costs were reduced by approximately 33% in operations, by burning grassland, instead of cutting it, between other measures. Scientists monitored this process and found that burning was promoting the presence of red-listed species (*Lycaena hippothoe* and *Zygaena viciae*).¹



Table 1 - Labour time for urban parks management

	Structured garden with a lot of flowers	Structured garden	Functional garden	Country garden	Nature garden
					
Level and type of management²	High level of management. Frequent mowing, regular pruning	High- medium management. Frequent mowing, basic pruning	Basic management, Basic pruning, Reduced mowing.	Basic to minimum management. Occasional mowing.	Minimum management. Mowing max once a year
Average	2800 h/ha/an	1200 h/ha/an	800 h/ha/an	250 h/ha/an	90 h/ha/an
Minimum	2500h/ha/an	750h/ha/an	450 h/ha/an	200 h/ha/an	70 h/ha/an
Maximum	4600h/ha/an	1200 h/ha/an	1200 h/ha/an	450 h/ha/an	200 h/ha/an

Adapted from [Rennes, 2008](#) and [Rennes, 2012](#)

Actions to restore ecological processes in urban ecosystems

The concept of NbS itself acknowledges the capacity of nature to address societal challenges. By doing so, it supports a conceptual framework where to compare costs and the economic, social and environmental benefits of different types of solutions

against societal challenges. For instance, several examples in the literature acknowledge the economic potential of NbS in comparison to grey infrastructure.

A striking case is provided in the report “Cost-effectiveness of NbS in the Urban Environment” ([Panduro et al. 2021](#)), produced in the context of the

[REGREEN project](#), comparing the cost-effectiveness of different ecosystem-based approaches in two particular case studies.

“It is estimated that NbS working as infrastructure are 50% cheaper than grey infrastructure” (World Economic Forum, 2022)

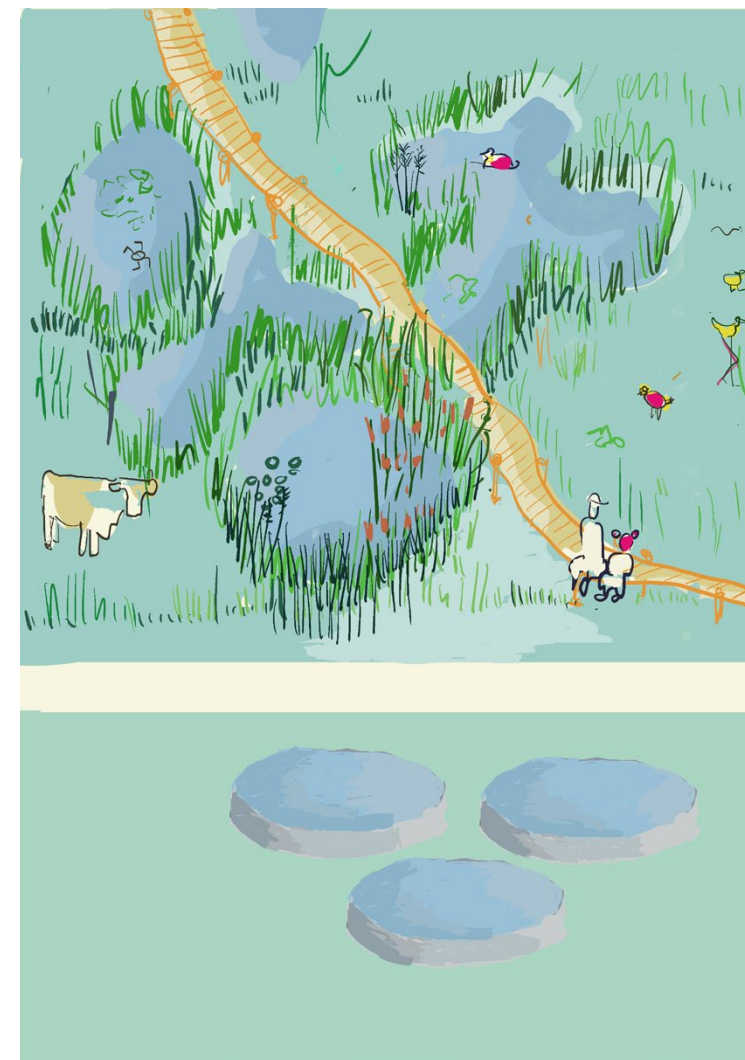
Table 2 - Cost-effectiveness studies comparing ecosystem-based and grey approaches

The first case study aims to **reduce sewerage system pressure in Aarhus by retaining or infiltrating 2145m³ of runoff water**. An ecosystem-based approach and a grey –conventional- infrastructure are evaluated.

	Ecosystem-based approaches	Grey infrastructure
	Retention pond	Closed basin
Costs of establishment	246 330 Eur	2 676 960 Eur
Maintenance costs	68 533 Eur	313 653 Eur
Life time	75 years	75 years
Cost-effectiveness ratio	146 Eur/m³	1 394 Eur/m³

A second case aims to **reduce the risk of flash flood in the Croult River in Gonesse, near Paris, by storing 55 000 m³ of water**. Following a similar procedure, the cost-effectiveness of the establishment of a flood expansion zone (restoring a floodplain) and some natural basins was evaluated in comparison to grey infrastructure.

	Ecosystem-based approach	Grey infrastructure
	Wetland + pond	Concrete open basins
Costs of establishment	722 000 Eur	38 115 000 Eur
Maintenance costs	1 391 602 Eur	8 016 751 Eur
Life time	>50 years	>50 years
Cost-effectiveness ratio	38 Eur/ m³	838 Eur/ m³



In both cases, the costs of establishment, the maintenance and the cost-effectiveness ratios evaluated were significantly lower (from 21 to 10 times) in ecosystem-based approaches than in conventional infrastructure. NbS are context specific and although one solution is the preferred option in one setting it might not be the same in another scenario. This is clearly the case in the first table, where the retention pond is better suited for the city's needs, and much more cost-effective than grey infrastructure. It follows that nature-based interventions may be costly, but when considered in comparison with other infrastructures with the same function that are publicly financed, ecosystem-based approaches can be, by far, the most financially viable option.



Beyond direct economic benefits, NbS address societal challenges and contribute to improving human wellbeing

A strong added value of NbS is the multiple co-benefits they provide in addition to the main societal challenge they are designed and implemented for. An NbS intervention designed as a response to a particular challenge also provides benefits to other issues that have not been the primary driver of the

intervention design. Nevertheless, the co-benefits associated with NbS are often difficult to monetise. This calls for a need to rethink the way benefits, economic effectiveness and impacts are assessed for cities' interventions to also account for such impacts when taking decisions.

“NbS deliver 28% greater added value in terms of direct and environmental benefits than man-made alternatives” (WEF, 2022)”

Table 3 – Barcelona: outcomes of NbS interventions compared to conventional solutions

The city of Barcelona, Spain faces significant challenges due to poor air quality and hence health issues, amplified by the impact of climate change and increasing heat waves. To address these issues, the city implemented a seven-year plan in 2013 to integrate nature-based solutions into the city's landscapes and conserve biodiversity.

Challenge	<ul style="list-style-type: none"> Limited space, high population density, high level of pollution of air and water, increasing heatwave incidents
Conventional Response	<ul style="list-style-type: none"> Technology for cooling systems Grey infrastructure for hazard risk mitigation
NbS Interventions	<ul style="list-style-type: none"> Street trees; Green corridors; Peri-urban forests; Hybrid dunes; Urban gardens
Outcomes of NbS	<ul style="list-style-type: none"> Creating and improving ecosystem and ecological connections Maintaining soil fertility Pollination CO2 sequestration Limiting rising temperatures and reducing urban heat island effect Stormwater retention and infiltration and reducing water runoff Adapting to sea level rise Flood risk reduction

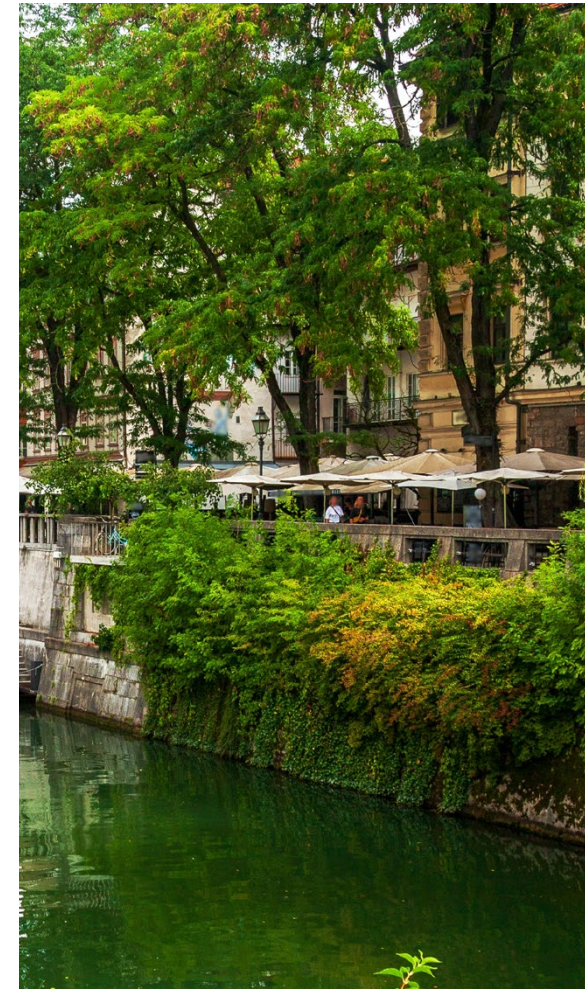


Table replicated from (Murti, R. and Sheikholeslami, D., 2021)

Roadmap for cities: What can municipalities do to enable funding and implementation of urban NbS?

Nature-based Solutions offer financially viable alternatives to conventional solutions, and an entry point for municipalities to halt and reverse biodiversity loss, mitigating pressing risks at local and global levels and improving the quality of life of their citizens.

Roadmap for cities

- 1. Start small, gain insights and experience** - Over a number of years, established NbS economic benefits will finance themselves the transition to NbS management. Do small experiments, build up experience, with a view to implementing on a larger scale later.
- 2. Acknowledge the capacity of NbS to contribute to different sectors** - NbS should be considered as a financially viable alternative to traditional approaches in different sectors, including infrastructure. Doing systematic cost-effectiveness analyses that consider NbS in comparison to other infrastructure can be a useful way to integrate them.
- 3. Create innovative governance solutions** - This may lead to enhance biodiversity and increase the local capacity to finance further and larger NbS (e.g. such as using savings from other initiatives).
- 4. Involve the staff who are implementing measures on the ground** - Successful design and implementation of NbS call for a good understanding of the urban system to identify potential synergies and to ensure a long-term management of resources. Involving technical staff in the design and decision-making process provides space for innovative ideas and builds ground for solutions with high rate of acceptance.
- 5. Adapt local regulations to allow introducing NbS as an alternative approach** - Even though NbS benefits are scientifically proven, regulations can be out-to-date, and might be hampering the implementation of new approaches.
- 6. Establish changes in public procurement procedures** - Public procurement procedures currently do not account for differences between nature-based and conventional grey solutions. Even if the implementation phase of NbS can be substantially cheaper, the design phase might need longer terms or a broader number of profiles involved. Public procurement for NbS should be designed to consider the long-term nature of such solutions and the need of a co-creative approach.
- 7. Consider co-benefits of different interventions** - NbS contribute to an extremely large range of objectives and goals, which are often not monetised, but that show the multi-functionality of these interventions. This raises an opportunity to develop and organise a coordinated approach and to set nature as a priority for your municipality as a response to multiple existing and arising societal challenges.
- 8. Rethink economic valuation and timeframes** - NbS offer many economic benefits and avoided costs that may not be fully reflected in the current economic valuation protocols used in projects appraisals. This leads to multiple co-benefits not being accounted for. In addition, ecosystem services associated with the NbS projects may take longer than the usual 3-5 years of projects cycles to provide the promised benefits and return on investment. Rethinking economic evaluation protocols to take into consideration these timeframes will facilitate unlocking the full potential of NbS in urban areas.



This factsheet was produced by IUCN within the NetworkNature project with contribution from Bruxelles Environnement and Rudersdal Kommune. (Thomas Søgaaard, Jens Eyvind Galby)

Recommended citation: Núñez Rodríguez, M.; Sheikholeslami, D.; Moncorps, L.; Gionfra, S. (2023). *Financing NbS in municipalities: Exploring opportunities from municipal funding*. Factsheet drafted by IUCN for NetworkNature (H2020 project No. 887396).

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 887396.

