



Research article

# Assessing the Co-Benefits of green-blue-grey infrastructure for sustainable urban flood risk management

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## Highlights

- We include co-benefits valuation into cost-benefits analysis of flood mitigation measures.
- Co-benefits need to be considered in order to achieve efficient green measures.
- Grey measures excel reducing flood risk while green measures provide co-benefits.
- Mixing green-blue-grey options is the best strategy since they complement each other.
- Flood mitigation should remain as the main objective when choosing the strategy.

## Abstract

Green-blue infrastructures in urban spaces offer several co-benefits besides flood risk reduction, such as [water savings](#), [energy savings](#) due to less cooling usage, air quality improvement and carbon [sequestration](#). Traditionally, these co-benefits were not included in decision making processes for flood [risk management](#). In this work we present a method to include the monetary analysis of these co-benefits into a [cost-benefits analysis](#) of flood risk [mitigation measures](#). This approach was applied to a case study, comparing costs and benefits with and without co-

benefits. Different intervention strategies were considered, using green, blue and grey measures and combinations of them. The results obtained illustrate the importance of assessing co-benefits when identifying best [adaptation strategies](#) to improve urban flood risk management. Otherwise green infrastructure is likely to appear less efficient than more conventional grey infrastructure. Moreover, a mix of green, blue and grey infrastructures is likely to result in the best adaptation strategy as these three alternatives tend to complement each other. Grey infrastructure has good performance at reducing the risk of flooding, whilst green infrastructure brings in multiple additional benefits that grey infrastructure cannot offer.

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## Keywords

Sustainable urban drainage; Green-blue-grey infrastructure; Flood risk management; Co-benefits valuation; Decision making; Cost-benefits analysis

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