

## CLIMATE ADAPTATION AND NATURE-BASED SOLUTIONS



### KEY POINTS

- Nature-based solutions are key for adapting to climate change impacts, such as floods, heat waves, drought, and windstorms.
- Nature-based solutions for climate change adaptation also have the potential to increase stakeholder involvement for sustainable climate governance and planning.
- Challenges regarding the implementation of nature-based solutions are manifold.
- How these challenges can be addressed is shown by exemplary nature-based solutions in Sweden, Germany and Australia.

### ABOUT THE PROJECT

NATURE-based URban innoVATION is a 4-year project involving 14 institutions across Europe in the fields of urban development, geography, innovation studies and economics. We are creating a step-change in how we understand and use nature-based solutions for sustainable urbanisation.





## Climate Change Adaptation: Stories and Solutions

Climate change and related impacts, including climate variability and extremes, are an increasing threat to urban development. In fact, impacts, such as extreme precipitation, inland and coastal flooding, heat stress, drought, and water scarcity are increasing in both intensity and numbers. In this context, nature-based solutions offer an important prospect for climate change adaptation and advancing urban planning to address complex urban challenges simultaneously. They can comprehensively address climate risk in cities by: i) reducing hazard exposure (e.g. through the establishment of nature protection areas or parks designed to inhibit the development of housing in risk areas), reducing hazard exposure (e.g. through wetlands for improving water management in the outskirts of urban areas), iii) reducing vulnerability (e.g. through green roofs), and iv) increase response and recovery preparedness (e.g. through mobile planting systems during heatwaves). However, the integration of such measures for sustainable climate change adaptation in urban governance and planning is challenging as it requires changes at local, institutional and inter-institutional level. Whilst systematic approaches for climate policy integration exist, in practice there is still a long way to go. Barriers are manifold. At the same time, there is an increasing numbers of projects to learn from.



## Urban River Restorations – Munich, Germany

The river Isar is the most important green corridor in the city of Munich. Since the beginning of the 19th century this pre-alpine river has been increasingly regulated, both to reduce the risk of flooding and for power generation. However, flood risk and legal requirements related to flood protection necessitated its fundamental redesign. Consequently, the Isarplan project was implemented. The obvious solution was to continue to elevate the river's dams. Instead, an innovative approach was taken to improve flood control and, at the same time, to restore the river's ecological functions and improve recreational opportunities for the city's population. The riverbed was widened into surrounding flood plains, existing embankments were removed, and a naturalistic system of riverbed rock ramps was implemented that allowed fish to move upstream. At the local level, the restoration of natural river banks and the widening of its channel reduced exposure to flood risk. The expansion of flood plains within the city created buffer zones that reduced vulnerability. At the institutional level, an interdepartmental working group was responsible for coordinating the project; this group provided support and fostered a multi-benefit approach. At the inter-institutional level, the project was designed by an interdisciplinary group of professionals, both internal and external to the city administration, and citizens were involved in different phases. Today river Isar has been successfully transformed into an appealing green space and a support for comprehensive flood protection and management.



## Urban Forest Strategies - Melbourne, Australia

Since the mid 1990s, Melbourne has experienced increasing climate extremes, such as heavy rains, floods, heatwaves, droughts and bushfires. In 2009, the Black Saturday bushfires killed nearly 200 people, destroyed thousands of homes, and disrupted power supplies to nearly 500,000 people, while the accompanying heatwave led to around other 400 deaths due to heat-related illness. Only one year later, the city experienced some of the worst floods ever seen in the area. This situation led to a strategic process of developing a comprehensive Urban Forest Strategy, which is closely linked to other city council policies and strategies, such as the Climate Change Adaptation Strategy. At the local level, it involves a systematic provision and maintenance of green space in combination with soft and grey infrastructure approaches in order to adapt to climate change, mitigate the urban heat island effect, create healthier ecosystems, become a water-sensitive city, and engage the community in these endeavours to support long-term sustainability. It is based on the understanding that green infrastructure, including open space, green environmental corridors, canopy cover and ecosystem services are the most efficient tools that cities can utilise to remain healthy, robust and liveable. At the institutional and inter-institutional level, the strategy includes the development of the 10-year neighbourhood-scale plans (precinct plans), which have been developed through visioning and close collaboration with the community, creating a local identity with nature, while tapping into a strong community sense of place. The Urban Forest Visual, which is again another measure, is the online mapping and establishment of a municipal tree database. Its 'E-mail-a-tree campaign' allowed citizens to identify with and e-mail trees, a campaign which evolved into a strong citizen-based engagement.





## Multifunctional Green Structures - Malmö, Sweden

Increasing heavy rainfall paired with a malfunctioning storm water management system, the lack of social integration in a growing and diverse population, and intense densification with weak integration of urban greenery and biodiversity in urban planning are major sustainability challenges in Malmö. These challenges called for urban revitalisation, restructuring and a denser, greener and more diverse city, with a mixed-use of spaces, where the residents can be close to nature and rich biological diversity. As a result, the BiodiverCity project was established. At the local level, it included more than 30 multifunctional green and blue nature-based solutions across Malmö in five main domains to reduce urban vulnerability: green roofs, green walls, mobile plant-systems, three-dimensional greenery and urban biotopes. At institutional and inter-institutional level, diverse actors, including the municipal and regional administration, research institutes, universities, consulting and housing companies, and building developers cooperated on the project by working in multidisciplinary groups. The continuous involvement of housing companies from planning through implementation and commercialization assured a project continuum by providing conditions for continuous learning, while the multidisciplinary working groups set the ground for horizontal and vertical knowledge development and dissemination.

