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Implementing Nature-based Solutions to Achieve Climate Resilience in Ìzmir, Türkiye

Boosting efforts to tackle urban climate challenges in the coastal city

Multiple Nature-based Solutions such as green corridors, urban forests, and innovative water management systems improve climate resilience and enhance urban biodiversity.

Key Learnings

- **Community engagement and participation**: Involving citizens at every stage of the project has been crucial to its success. Strategies such as public consultations, educational workshops, and awareness campaigns have helped foster community involvement and acceptance, ensuring long-term sustainability.
- Effectiveness of Nature-based Solutions: Vertical gardens, green roofs, and urban forests have proven highly effective in reducing urban heat stress, improving air quality, and enhancing biodiversity. These solutions not only mitigate climate risks but also contribute to a more liveable city.
- **Overcoming implementation challenges**: Adaptive planning, stakeholder dialogue, and policy adjustments helped address initial resistance and concerns from some stakeholders regarding urban space limitations, including scale, land use, and property constraints.
- **Successful water management**: Smart irrigation systems and stormwater retention infrastructures have successfully addressed water scarcity and reduced the risks of urban flooding, demonstrating the critical role of Nature-based Solutions in sustainable urban water management.

About the region

Ìzmir is the third-largest city in Türkiye, with a population of over 4 million. The city is located on the Aegean coast, characterised by a Mediterranean climate with hot, dry summers and mild, rainy winters. Izmir's rapid urbanisation has led to increased environmental challenges, including heat island effects meaning warmer temperatures within the city compared to its surrounding area, water scarcity, and pollution.

Climate Hazards

Droughts, Hot Temperatures, Flooding,

Water Scarcity

Sector

Buildings, Land Use Planning, Biodiversity,

Forestry, Water Management

Key system

Ecosystem and Nature-based Solutions,

Water Management, Health and Wellbeing



Climate Threats

Izmir has been experiencing a steady rise in average temperatures over the past 50 years, with recent summers recording some of the highest temperatures in the city's history. The key climate threats include droughts and extreme temperatures causing water scarcity and flooding due to heavy rain events stressing the city's drainage system. More frequent and intense heatwaves have increased the temperature within the city compared to its surroundings, significantly impacting public health and increasing energy consumption for cooling. Prolonged droughts and population growth also lead to water shortages due to increased demand for freshwater. Changes in precipitation patterns and temperature extremes (hot to cold and vice versa) threaten biodiversity, reducing ecosystem resilience in urban and suburban areas. These threats have required prioritising climate adaptation and resilience-building in Izmir's urban planning strategy.

Integrating climate risks into urban development

The city's exposure to climate threats has driven local policymakers to prioritise climate adaptation and integrate risk mitigation strategies into urban development. In response to growing climate challenges, climate resilience rose to the top of the political agenda, leading Izmir to join the now-completed URBAN GreenUP project. This initiative created a Network of Cities committed to addressing climate change through Nature-based Solutions. As one of three front-runner cities, Izmir played a key role in implementing and testing measures to combat urban heat, air pollution, and water management issues. Key interventions included:

• Green corridors and reforestation along major roads and riverbanks enhance biodiversity, have cooling effects and connect green spaces.

- Vertical gardens and green facades on public and private buildings reduce the urban heat, improve air quality, and increase aesthetic value.
- Sustainable Urban Drainage Systems, such as bioswales, permeable pavements, and rain gardens reduce runoff, improve stormwater management, and replenish groundwater. Smart irrigation systems successfully reduced water scarcity during dry periods and reduced the risk of urban flooding during heavy rain.
- Pollinator-friendly meadows and urban greening boost ecological connectivity and support urban biodiversity.
- Mobile urban green infrastructure, like green pavilions and modular green walls, enables flexible and context-sensitive greening across different urban environments.
- Green playgrounds and shaded urban areas provide comfortable public spaces for citizens, especially children and the elderly.

Implementing these solutions across residential, commercial and industrial zones across the city highlights the adaptability of Nature-based Solutions in different urban contexts. Monitoring systems enable assessing the environmental, social and economic impacts of installing Nature-based Solutions.

The city's experience and outcomes continue to serve as a valuable model, encouraging broader adoption of urban adaptation strategies across Europe and beyond. Izmir's successful implementation of the Nature-based Solutions demonstrates their potential to create greener, healthier, and more climate-resilient cities.

Success Factors of Nature-based Solutions Implementation

Several factors have contributed to the successful implementation of Nature-based Solutions and effective application of the climate change adaptation strategy within the URBAN GreenUP project in Ìzmir:

- Strong collaboration among local authorities, academic institutions, and 25 European and non-European partners (8 municipalities, 18 technical and educational institutions, 5 industry organisations, 2 non-profit organisations and 1 public body), fostering knowledge exchange and sharing best practices.
- Efficient use of green infrastructure, such as planting native, location-adapted species and water reuse, providing urban cooling, improved air quality, and increased biodiversity.
- Innovative smart water management solutions provided by Nature-based Solutions, including rainwater harvesting and smart irrigation systems, ensuring water conservation and flood control.
- Community participation and public support, engaging citizens in co-design and co-creation activities, ensures long-term sustainability and social acceptance of Nature-based Solutions.

 Policy integration and adaptive governance within urban planning, allow flexible policy adjustments based on real-time data and stakeholder feedback, provided by stakeholder dialogues. Those measures also helped address initial stakeholder resistance and concerns regarding limitations at different scales, land uses and properties.

> "By integrating Nature-based Solutions into urban planning, İzmir is not only mitigating climate risks but also creating a more liveable and sustainable environment for its citizens."

> > Raúl Sánchez – URBAN GreenUP Project Coordinator

These factors demonstrate the importance of interdisciplinary cooperation and local engagement in addressing urban climate challenges.

Citizen involvement at every project stage is crucial for implementing urban climate change adaptation measures and for project success. Activities include public consultations to engage the broad public, educational workshops for collaboratively designing tailor-made solutions and awareness-raising about the importance of Nature-based Solutions. Informing citizens in the first place, and considering their concerns ensures community involvement and acceptance, helping overcome implementation barriers and increase overall acceptance of the adaptation efforts. This also ensures long-term sustainability.

Smart water management solutions such as sustainable water diversions (Figures 2 and 3) and planted swales (Figure 4) enable thoughtful irrigation during water scarcity and stormwater retention to reduce the risk of flooding during storms.



Figure 1: Sustainable water diversions in izmir within the <u>URBAN GreenUP</u> project. Image Credit: © izmir Metropolitan Municipality.



Figure 2: Sustainable water diversions in Ìzmir. URBAN GreenUP. Image Credit: © Ìzmir Metropolitan Municipality.



Figure 3: Planted Swales in Ìzmir. URBAN GreenUP. Image Credit: © Ìzmir Metropolitan Municipality.

Green corridors formed by urban forests, urban parklets, and vertical gardens such as fruit walls and green pavements, planted with climate-adapted species (Figures 4-6) provide shading, enhance biodiversity and contribute to citizen well-being by improving open space quality, making Ìzmir a more liveable city. Green roofs and urban forests effectively reduce urban heat, improve air quality and enhance biodiversity.



Figure 4: Green Corridor in Ìzmir. URBAN GreenUP. Image Credit: © Ìzmir Metropolitan Municipality.



Figure 5: Parklets in Ìzmir. URBAN GreenUP. © Ìzmir Metropolitan Municipality.



Figure 6: Fruit Walls in Ìzmir. URBAN GreenUP. Image Credit: © Ìzmir Metropolitan Municipality.

Summary

Ìzmir showcases the transformative potential of Nature-based Solutions in addressing urban climate challenges. By integrating measures such as green corridors, parklets, and natural water management systems into city actions, the city has taken significant steps in reducing heat stress in urban areas, managing water scarcity through sustainable solutions and enhancing biodiversity and ecological resilience. The success of this initiative underscores the crucial role of citizen engagement, adaptive urban planning, and multi-stakeholder collaboration in fostering climate resilience and sustainable urban development.

Further information

The work presented in this adaptation story is part of the <u>URBAN GreenUP</u> project.

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- Urban GreenUP Project Website: https://www.urbangreenup.eu/
- Municipality of Izmir: www.izmir.bel.tr
- <u>https://www.youtube.com/watch?v=gMoiY_Yvc2M&embeds_referring_euri=https%3A%2F%2Fw</u> ww.urbangreenup.eu%2F&source_ve_path=OTY3MTQ

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