



Barcelona Academy for Mediterranean Municipalities (BAMM)

Summary Report

1st EDITION
Green and Blue cities



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1. Barcelona Academy for Mediterranean Municipalities

1.1 Background

The Mediterranean region faces significant urban challenges due to climate change. In the future, the region is expected to remain among the regions most affected by climate change, particularly when it comes to heat, precipitation and the hydrological cycle. In comparison to other regions, the Mediterranean's combination of multiple climate hazards and high vulnerability makes it a hotspot for climate risks. Given these severe impacts, it is imperative for Mediterranean cities to implement robust climate adaptation and mitigation strategies.

Barcelona has pioneered climate-adaptive urban planning and aims to share its expertise to enhance local government policies across the Mediterranean.



Based on this premise, Medcities Association and the Barcelona City Council joined forces and efforts to conceptualize the **Barcelona Academy for Mediterranean Municipalities (BAMM)**, which held its first edition in 2024, with a strong focus on fostering **sustainable urban planning and climate resilience** in Mediterranean cities.

This knowledge transfer and capitalization initiative aims to combine theoretical insights, featuring firsthand experts on the subject, with technical visits to locations where inspiring solutions have been implemented, creating spaces for discussion and exchange among all participants.

The Academy targets both political and technical representatives from invited municipalities in the Mediterranean region, with a special emphasis on those who are knowledgeable about the subject matter and have the capacity to transfer the learnings from BAMM to their local contexts.

The main objectives of BAMM are:

- 1. To develop an annual program:** Implement an annual executive program on sustainable urban development in the Mediterranean, gathering municipalities from the region.
- 2. To enhance local capacities/knowledge:** Strengthen knowledge about sustainable development policies and the ability to implement these policies locally.
- 3. To share best practices:** Share good urban management practices with transferability potential.
- 4. To build a collaborative work:** Create a community for sharing experiences between technical and political staff from Mediterranean cities, promoting collaborative learning.
- 5. To foster technical cooperation:** Strengthen technical cooperation between Mediterranean municipalities, identifying new lines of collaboration.



1.2 About BAMM'24

The debut edition of BAMM focused on embracing “green & blue” strategies as a pathway to climate resilience. As we confront the pressing challenges of climate change, the concept of “green & blue” cities emerges as a beacon of hope and innovation. These cities champion the renaturalization of urban spaces and the implementation of Nature-Based Solutions (NBS), while recognizing water as a critical, yet limited, resource that must be managed holistically. Urban transformation through “green & blue” solutions, which integrate green spaces and water management into the very fabric of urban planning, enables cities to enhance biodiversity while also creating cooler, more liveable environments that mitigate the urban heat island effect. Parks, green roofs, and urban forests become vital components of the cityscape, offering residents a breath of fresh air and a connection to nature.

In the Mediterranean region, where the effects of climate change are particularly pronounced, the adoption of “green & blue” city principles is not just an option but a necessity. By embracing these strategies, Mediterranean cities can lead the way in creating sustainable, resilient, and vibrant urban environments that serve as models for the rest of the world.

1.3 About this report

Building local resilience in the face of global challenges such as climate change, social exclusion and digital transition is an urgent issue. If each city attempts to solve it alone, success will become harder to achieve. However, if cities share their respective progress, adopting effective solutions developed by others they can adapt these strategies to their local contexts and scale up their efforts.

The goal of knowledge transfer is to ensure that critical knowledge is passed on and retained within an organisation, team, or community. By sharing expertise and experience, organizations can build upon their successes and avoid the mistakes of others, leading to better decision-making and improved performance.

This report aims to provide a comprehensive summary of the key content delivered during the training sessions, highlighting the primary insights and learnings that are considered transferable to the contexts of participant cities.

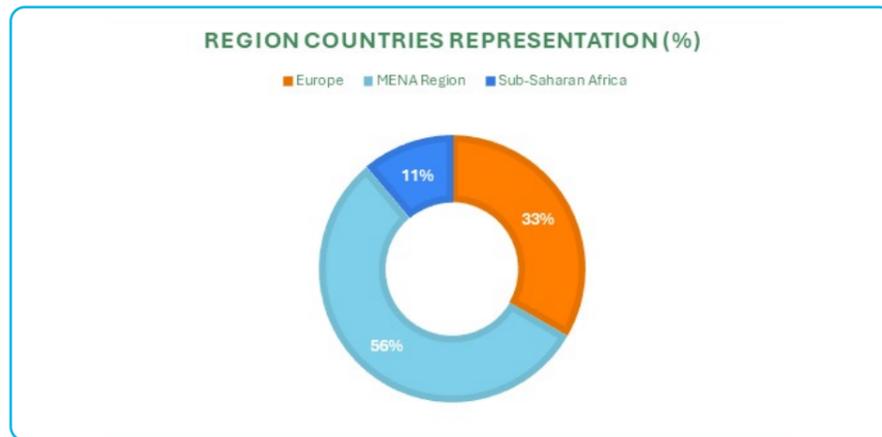
By compiling the core themes and actionable lessons, the report serves as a reference material for participants to consolidate and reflect on the knowledge gained. It is particularly valuable for cities that took part in the training and aim to leverage the acquired expertise to address local challenges.

2. Detailed report of BAMB'24

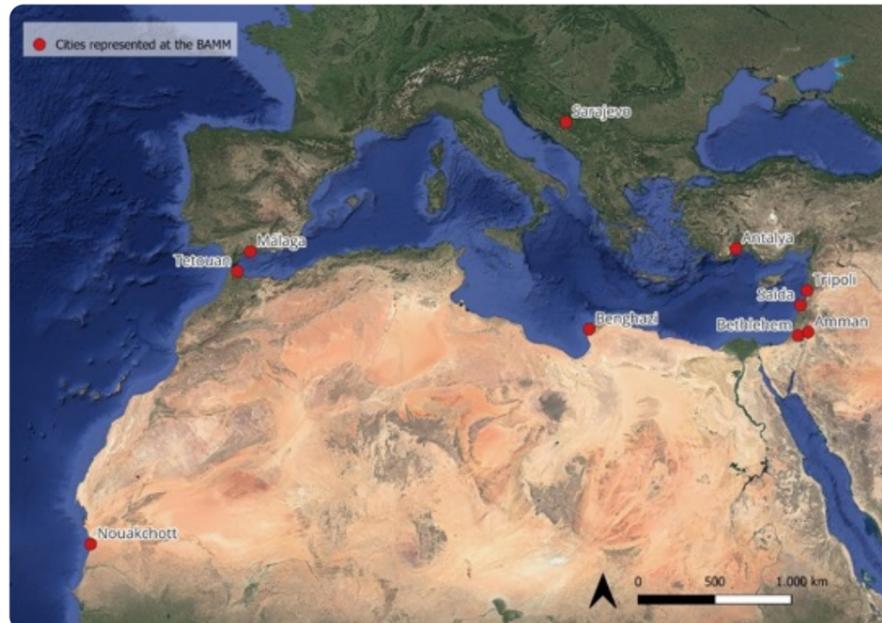
2.1 Cities context and background

2.1.1 Participating cities

An amount of 22 people registered for the Academy, representing 9 countries and 10 different cities, all located within the Mediterranean region, except for the city of Nouakchott, the capital of Mauritania. The vast majority were part of the MENA Region.



Graph 1. Percentage (%) representation of BAMB'24 participating countries by region: European, MENA region and Sub-Saharan Africa.



Map 1. Cities represented at the BAMB'24
The participants came from diverse professional backgrounds: 3 Mayors, 3 Deputy Mayors, 3 chairpersons, 5 Directors or Heads of Service/Department, 5 Projects Managers and 1 Councillor.

2.1.2 Preliminary analysis of challenges and best practices

The following is a brief analysis of the state of the art and the main challenges faced by the cities participating in the Academy, related to the themes included in the training program. While the effects of climate change vary from one site to another, there are some commonalities within the Mediterranean region.

- **Increase in urban flooding:** Floods are the most common hazards in the region. The threat of flooding occurs in three major forms depending on geographical and climatic factors: 1) flash floods, referring to the sudden and intense floods often triggered by heavy downpours in short periods, affecting mountainous and desert areas; 2) riverine or wadi flooding, which occurs when major rivers/ wadis overflow due to excessive rainfall or snowmelt; and 3) coastal flooding that occurs in low-lying coastal areas due to inundation from storm surges and rising sea levels.

- **Intensification of drought (security of water supply):** The region is one of the most water scarce in the world, possessing the lowest freshwater resources. The majority of the countries represented in the BAMB suffer from chronic water scarcity and fall below the water poverty line of 1,000m³ per capita per year. The arid climate and limited water resources force countries in the region to rely heavily on food imports to sustain their populations. Rainfall is expected to decrease by up to 50% in the region due to climate change, accompanied by more intense heatwaves and droughts. The World Resources Institute's Aqueduct water risk measuring and mapping project ranks the countries as extremely high, high or medium high regarding water stress:



- **Increase in intensity and duration of heatwaves:** the region is expected to experience a rise in average annual temperatures ranging from 0°C to 2°C between 2011 and 2041. Temperatures in the Middle East are already increasing almost twice as fast as the global rate of warming, while the intensity and frequency of heatwaves, which have also increased, are expected to rise by 16% by 2040. According to a study published in 2021, the Middle East is expected to experience super and 'ultra-extreme' heatwaves in the coming years, where temperatures will rise to 56°C and higher for prolonged durations, up to several weeks at a time.

It is important to note that the impacts of climate change manifest disproportionately across different types of urban dwellers, with women, children, refugees, and older persons being the most negatively affected.

The cities of the BAMB are already experiencing or will face the impacts associated with the risks generally described in the previous list. In this context, the following outlines the main specificities, challenges, and progress of these cities in the field of urban resilience:

Amman (Jordan):

Key achievements

- Nature-based solutions (NbS): Amman has implemented green infrastructure projects such as urban parks, green roofs, and natural water retention areas to mitigate flooding, reduce heat stress, and improve air quality.
- Resilient urban planning: The city has integrated climate resilience into its urban master plan, focusing on flood risk management, sustainable land use, and zoning regulations to protect vulnerable areas.
- Water resource management: In response to acute water scarcity, Amman has invested in advanced water recycling systems, rainwater harvesting, and the promotion of efficient irrigation techniques for urban green spaces.
- Risk assessment and early warning systems: The city has developed tools to assess and map climate risks, enabling better planning and implementation of disaster preparedness measures, particularly for flooding.
- Public space transformation: Efforts to adapt public spaces to extreme heat include increasing vegetation coverage, installing shading systems, and creating pedestrian-friendly zones to enhance urban liveability.

Barriers and challenges

- Resource limitations: Insufficient financial and technical resources hinder the implementation and scaling of resilience projects, especially in water management and infrastructure upgrades.
- Rapid urbanization: The city's rapid population growth and urban sprawl strain existing infrastructure and complicate long-term resilience planning.
- Water scarcity: With limited renewable water resources, securing sustainable water supplies remains a persistent and critical challenge.
- Coordination among stakeholders: Ensuring effective collaboration between municipal departments, national authorities, and local communities is often complex and requires substantial capacity-building efforts.
- Public awareness and engagement: Raising awareness among residents and fostering community participation in resilience-building initiatives are ongoing hurdles.

Actionable pathways

- To balance the growing demand for water due to population growth and urbanization with limited water resources, while considering the increasing impacts of climate change, Amman could implement a strategic plan for the integrated water cycle, drawing inspiration from the [Strategic Plan for the Integrated Water Cycle \(PECIA\)](#) developed in the metropolitan area of Barcelona.
- To address the problem of water scarcity and dependence on external water systems, while also reducing the impact of flooding, minimizing water pollution, and promoting biodiversity and landscape integration, Amman could implement Sustainable Urban Drainage Systems, drawing inspiration from the cases of [Al-Zohour](#) and [Barcelona](#).
- Other initiatives that could be implemented to optimize water management and usage include promoting smart water metering and reducing non-revenue water losses through improved leak detection and maintenance, as well as investing in desalination plants or partnerships with nearby regions to import water sustainably or adopting water-saving technologies in households and industries.

Antalya (Turkey):

Key Achievements

- Nature-based solutions (NbS): Antalya has integrated NbS into urban development, including the restoration of natural water systems, creating green corridors, and implementing projects to enhance biodiversity and mitigate urban heat.
- Flood risk management: The city has invested in advanced drainage systems and urban infrastructure to address the increasing risks of flash floods due to extreme rainfall events.
- Sustainable Energy and Climate Action Plan (SECAP): Antalya has developed a comprehensive SECAP that incorporates both mitigation and adaptation measures, aligning urban resilience efforts with broader climate goals.
- Public space revitalization: Projects such as the Boğaçay Marina and Creek revitalization have focused on flood mitigation, ecological restoration, and the creation of multifunctional public spaces that enhance social cohesion and urban liveability.
- Risk monitoring and early warning systems: The implementation of real-time monitoring tools and early warning systems helps anticipate and respond to climate-induced disasters, particularly floods and heatwaves.

Barriers and challenges

- Rapid urbanization and tourism pressure: Antalya's rapid growth as a tourist destination has increased urban density, placing strain on natural resources and infrastructure, which complicates long-term resilience planning.
- Resource and funding limitations: The implementation of large-scale resilience projects often faces financial constraints and limited access to technical expertise.
- Water scarcity: As a region prone to droughts, securing sustainable water resources for both residents and the tourism sector is a persistent challenge.
- Climate awareness and community engagement: Building widespread awareness of climate risks and involving local communities in resilience initiatives remain ongoing challenges.
- Coordination among stakeholders: Aligning efforts between municipal authorities, national agencies, and private stakeholders can be difficult, particularly in the context of large-scale projects.

Actionable pathways

- To balance urban growth with the preservation of natural resources, incorporating eco-tourism initiatives and low-impact resources and infrastructure in the next few years, Antalya could develop a Sustainable Tourism Master Plan.
- To address the issue of water scarcity and improve flood prevention, Antalya could consider implementing NbS such as rain gardens, retention ponds, and permeable surfaces to transform into a [sponge city, as is the case with Izmir](#), as a part of their public space revitalization projects.
- Another initiative to consider for improving the city's green infrastructure while involving local communities in resilience initiatives is the [Urban Micro-Lungs pilot project in Amman](#), which promotes the integration of native species and the creation of maintenance-free mini-forests that optimize the use of limited water resources. Additionally, community members and youth initiatives have actively participated in the planting of native trees and shrubs.

Benghazi (Libya):

Key Achievements

- Post-conflict reconstruction and urban planning: Efforts to rebuild critical infrastructure and housing have integrated resilience principles, focusing on improving structural safety and creating sustainable urban layouts.
- Water management initiatives: Projects aimed at rehabilitating water infrastructure have been implemented to address water scarcity and ensure more reliable access to clean water for residents.
- Community engagement in resilience projects: Local communities have been increasingly involved in planning and executing small-scale projects, such as neighbourhood clean-ups and the rehabilitation of public spaces, fostering a sense of ownership and collaboration.
- International support and partnerships: Benghazi has collaborated with international organizations to secure technical expertise and funding for urban resilience projects, including disaster preparedness and sustainable development.
- Climate awareness campaigns: Efforts to raise public awareness about climate change and environmental sustainability have begun to lay the groundwork for greater community participation in resilience-building activities.

Barriers and challenges

- Conflict and political instability: Ongoing political tensions and security concerns disrupt long-term planning, hinder access to funding, and make the implementation of resilience projects challenging.
- Infrastructure damage and aging systems: Decades of neglect and damage to infrastructure, particularly water, energy, and waste management systems, have created significant hurdles for urban resilience efforts.
- Resource scarcity: Limited financial resources and technical capacity constrain the ability to execute large-scale projects needed to address pressing climate and urban challenges.
- Water scarcity and drought: The city struggles with severe water scarcity, worsened by inefficient systems and limited access to alternative water sources.
- Environmental degradation: Urban sprawl and unmanaged development have led to environmental issues such as soil erosion and loss of green spaces, further reducing the city's ability to adapt.

Actionable pathways

- To address the environmental degradation caused by urban sprawl and unmanaged development, the city of Benghazi could consider implementing urban growth boundaries, which would help restrict the expansion of urbanization into surrounding natural areas and protect green spaces. Additionally, it could invest in green infrastructure initiatives, such as creating parks and urban gardens, as well as soil restoration projects, to restore lost green spaces and enhance the city's resilience against environmental degradation.
- The city's reconstruction process could be a great opportunity to rethink infrastructure and adapt it to new social and climatic contexts. To achieve this, Benghazi could consider implementing a green infrastructure strategy, drawing inspiration from the [NATURMED project](#) as well as [Izmir's re-naturalization strategy](#).
- To address the problem of water scarcity, reduce the impact of water pollution, and promote biodiversity and landscape integration, Benghazi could implement Sustainable Urban Drainage Systems, drawing inspiration from the cases of [Al-Zohour](#) and [Barcelona](#).

Bethlehem (Palestine):

Key Achievements

- Integrated urban planning: Bethlehem has prioritized sustainable urban planning by incorporating resilience strategies into its municipal development plans, focusing on land use optimization and reducing vulnerability in flood-prone areas.
- Water management initiatives: Recognizing water scarcity as a critical issue, Bethlehem has invested in rainwater harvesting systems, improved water distribution networks, and promoted public awareness campaigns on water conservation.
- Renewable energy projects: The city has implemented solar energy projects to reduce reliance on external energy sources, increasing energy security and reducing greenhouse gas emissions.
- Preservation of cultural and natural heritage: Efforts to protect and restore historical sites and green spaces have contributed to strengthening the city's identity and enhancing resilience against climate impacts such as extreme heat and urbanization pressures.
- Community engagement and capacity building: Local residents have been actively involved in resilience initiatives, including public workshops and collaborative projects, fostering a sense of ownership and cooperation in addressing urban challenges.

Barriers and challenges

- Political and territorial constraints: The city operates under a complex political situation, which limits its autonomy, access to resources, and ability to implement large-scale projects effectively.
- Water scarcity: Bethlehem continues to face severe water shortages due to limited access to natural water sources, high dependency on external supplies, and inefficient infrastructure.
- Economic limitations: Resource constraints and reliance on external funding pose significant challenges to the implementation and sustainability of resilience initiatives.
- Rapid urbanization and population growth: Increasing urban density has placed pressure on infrastructure and public services, exacerbating vulnerabilities to flooding and heat stress.

Actionable pathways

- Building on initiatives to protect and restore central spaces and green areas, Bethlehem could place greater emphasis on its heritage-centric approach to enhance climate resilience by identifying key challenges and examples of heritage-based solutions in the region, as demonstrated by the project carried out in [MENA cities](#).
- To address the issue of heat stress, Bethlehem can draw inspiration from the [bioclimatic network in Malgrat de Mar](#), which uses bioclimatic shelters to reduce localized heat and provide cooler spaces for urban residents. Similarly, it can look to the [case of València](#), which has identified and geolocated over 1,000 potential shelters, including libraries, social service centers, and municipal facilities, to protect public health during extreme heat events.
- To address the issue of water supply interruptions, Bethlehem can draw inspiration from the [sponge city project in Izmir](#), a project designed to manage rainwater through natural processes that capture, store, and filter water as close as possible to where it falls. As part of this initiative, rainwater tanks were distributed to residents, each capable of saving up to 220 tons of water annually for non-potable uses such as garden irrigation and cleaning.
- In the peer-to-peer session held within the context of BMM, which focused on the specific case of the Bethlehem of the future, certain actions were proposed that should begin to be planned in the short and medium term to achieve the defined strategic vision.

Broadly speaking, the following actions were proposed:

- Making the city cleaner: through improving the waste management system and developing a reuse and waste-sorting program.
- Increasing environmental and energy sustainability: by increasing the use of solar energy, implementing smart lighting systems, promoting natural solutions for water management and decentralized water collection systems, and utilizing naturally collected water for urban purposes.
- Deploying a more sustainable mobility model: by creating an accessible and walkable city, establishing pedestrian-only streets in historic areas, introducing oneway streets for key urban roads, developing an efficient public transportation system, and promoting electric mobility.
- Optimizing land use and urban planning: by relocating industrial areas to peripheral, less densely populated zones, adopting vertical growth strategies, developing tailored greening solutions for narrow streets, collaborating with neighbouring cities, mandating tree planting in new projects, modernizing urban planting techniques, and adapting vegetation and green infrastructure to regional climatic conditions.
- Improving governance and communication: by fostering closer cooperation with the central government and neighbouring municipalities, promoting participatory and multisectoral strategies, enhancing municipal capacity for urban regulation, and developing marketing and branding campaigns.

Irbid (Jordan):

Key Achievements

- Sustainable water management: Irbid has implemented projects to address water scarcity, including rainwater harvesting, the rehabilitation of aging water infrastructure, and promoting efficient water use in public and private sectors.
- Renewable energy initiatives: The city has invested in solar energy projects, particularly for public buildings and street lighting, to reduce energy costs and reliance on non-renewable sources.
- Integrated urban planning: Urban development strategies have incorporated resilience considerations, such as zoning regulations to prevent construction in flood-prone areas and enhancing green spaces to mitigate the urban heat island effect.
- Community-based resilience programs: Local initiatives have engaged residents in disaster preparedness activities, waste management campaigns, and sustainable agricultural practices, fostering collective action and awareness.
- Support for refugee populations: With a significant influx of refugees, Irbid has implemented programs to improve housing, access to essential services, and social cohesion between host communities and displaced populations.

Barriers and challenges

- Water scarcity: Irbid faces severe challenges in meeting water demands due to limited resources, high dependency on groundwater, and inefficient distribution systems.
- Pressure from rapid urbanization: Population growth, driven in part by refugee influxes, has overwhelmed infrastructure, housing, and public services, increasing vulnerabilities to climate and social stresses.

- Economic constraints: Limited financial resources and dependency on external funding restrict the city's ability to implement large-scale resilience projects and sustain existing initiatives.
- Coordination and capacity: Fragmented governance and limited technical capacity among municipal stakeholders pose challenges to cohesive resilience planning and execution.

Actionable pathways

- To complement the initiative to support refugees and reduce the impact of climate risks on them, Irbid could implement a rooftop farming strategy, as the [Greater Cairo Region](#) has already done, aimed at reducing climate vulnerability in Cairo's informal settlements. This initiative demonstrated positive impacts on food security, income generation, and community involvement, particularly among marginalized groups.
- In addition to enhancing green spaces to mitigate the urban heat island effect, Irbid could draw inspiration from the bioclimatic network in [Malgrat de Mar](#), which utilizes bioclimatic shelters to reduce localized heat and provide cooler spaces for urban residents. Similarly, it could look to [València's example](#), where over 1,000 potential shelters, including libraries, social service centers, and municipal facilities, have been identified and geolocated to protect public health during extreme heat events.

Málaga (Spain):

Key Achievements

- Green and blue infrastructure projects: Málaga has expanded green spaces and restored natural ecosystems, including the revitalization of the Guadalmedina River and the development of urban parks, to mitigate flooding, reduce heat stress, and enhance biodiversity.
- Sustainable urban mobility: The city has prioritized sustainable transport through investments in cycling lanes, pedestrian-friendly streets, and an expanded public transportation network powered by renewable energy.
- Climate action planning: Málaga's commitment to reducing greenhouse gas emissions is outlined in its Sustainable Energy and Climate Action Plan (SECAP), which integrates adaptation measures such as flood risk management and heatwave mitigation.
- Smart city initiatives: Leveraging digital tools and technologies, Málaga has implemented smart water and energy management systems to optimize resource use and monitor risks in real time.
- Community engagement and education: Public campaigns and community programs have been launched to raise awareness of climate resilience and promote citizen participation in sustainability initiatives.

Barriers and challenges

- Flooding risks: Despite significant investments, the city remains vulnerable to flash floods, particularly in areas with aging drainage infrastructure or dense urbanization.
- Resource constraints: Limited financial and human resources can hinder the scaling and maintenance of resilience projects, particularly in underserved neighbourhoods.
- Coordination among stakeholders: Aligning efforts between municipal departments, regional authorities, and private stakeholders is a challenge, especially for large-scale and cross-sectoral projects.

Actionable pathways

- Malaga, as a coastal Mediterranean city, faces climate change-related challenges like water scarcity and flood risks. To mitigate these issues, the city could adopt Nature-based Solutions (NbS) within its urban greening efforts. Incorporating features such as rain gardens, retention ponds, and permeable surfaces would support its transformation into a sponge city, following [Izmir's example](#).
- To address flooding issues, Malaga can draw inspiration from the [Al-Zohour Green Triangle pilot project](#), which is part of a larger initiative aimed at improving resilience against flash floods for vulnerable communities. The project focuses on using Sustainable Urban Drainage Systems (SUDS) to manage surface water runoff. It features bio-retention and rainwater detention techniques, including an underground rainwater storage tank with a capacity of 2,500 m³. In this regard, [Barcelona](#) can also be a good source of inspiration for the installation of SUDS.

Nouakchott (Mauritania):

Key Achievements

- Flood management and coastal protection: Nouakchott has undertaken projects to address its high vulnerability to flooding and coastal erosion, including the construction of protective dikes and the reinforcement of natural barriers along the coastline.
- Water resource management: Efforts to improve water access and conservation include upgrading urban water infrastructure and implementing rainwater harvesting systems to address both scarcity and flooding challenges.
- Urban green spaces: The city has initiated reforestation and greening projects to combat desertification, reduce urban heat, and improve air quality, contributing to climate adaptation.
- Community-based resilience programs: Local organizations and residents have been involved in risk education and small-scale interventions, such as flood preparedness training and waste management initiatives, fostering grassroots resilience.
- International partnerships: Nouakchott has engaged with international donors and development agencies to secure funding and technical expertise for resilience projects, particularly in areas of coastal protection and sustainable urban planning.

Barriers and challenges

- Coastal vulnerabilities: As a low-lying coastal city, Nouakchott remains at significant risk of sea-level rise and coastal flooding, exacerbated by weak infrastructure and limited resources.
- Water scarcity: Access to reliable water sources is a persistent challenge, compounded by inefficient distribution systems and increasing demand from a growing population.
- Desertification and sand encroachment: The city faces ongoing challenges related to desertification, which threatens urban infrastructure and green spaces.
- Limited financial resources: The implementation of large-scale resilience projects is often hindered by budgetary constraints and dependency on external funding.
- Rapid urbanization and informal settlements: The city's rapid population growth has led to the proliferation of informal settlements, increasing vulnerability to flooding, poor sanitation, and other climate-related risks.
- Governance and institutional capacity: Fragmented governance structures and limited technical capacity among local authorities present obstacles to effective planning and coordination.

Actionable pathways

- To address the issue of desertification, Nouakchott could establish green belts by planting native vegetation, drought-resistant trees, and shrubs around the city to act as windbreaks and prevent sand encroachment. Additionally, the city could create urban forests and expand green spaces to stabilize the soil and mitigate the impact of desert winds.
- Regarding the mitigation of climate risks for the most vulnerable communities, Nouakchott can draw inspiration from the [National Heat-Health Action Plan \(HHAP\) of North Macedonia](#), which aims to reduce current and future morbidity and mortality related to extreme temperatures and heatwaves. The strategy primarily consists of three key points: Strengthening existing public health capacities for early detection and adequate response / Anticipating the consequences of emerging diseases potentially related to climate change. / Raising awareness among the population about the possible links between climate change and health.
- Another inspiring initiative to Nouakchott to address the problem of the city's rapid population growth and informal settlements could be the [Gardens of the Future project in Nicosia](#), which aims to utilize public spaces for food production, particularly benefiting underprivileged citizens.
- To address the risks of being a coastal Mediterranean city in the context of climate change, including water scarcity and flood risks, Nouakchott could consider implementing NbS (Nature-based Solutions) as part of its urban greening projects, such as rain gardens, retention ponds, and permeable surfaces, to transform into a sponge city—similar to the approach taken [by Izmir](#).

Sarajevo (Bosnia and Herzegovina):

Key Achievements

- Air quality improvement initiatives: Sarajevo has introduced measures to combat air pollution, a pressing issue for the city, including transitioning to cleaner heating systems, promoting public transport, and implementing stricter regulations on industrial emissions.
- Green infrastructure development: Efforts to restore and expand green spaces have been prioritized to mitigate urban heat islands, improve air quality, and enhance residents' well-being. Projects like the rehabilitation of Vrelo Bosne Park exemplify these initiatives.
- Sustainable urban mobility: The city has invested in modernizing its public transport system, including the refurbishment of its tram network and promoting the use of bicycles and pedestrian-friendly infrastructure.
- Flood risk mitigation: Sarajevo has strengthened flood management systems through river-bank reinforcement and improvements to stormwater drainage networks, addressing risks posed by heavy rainfall and snowmelt.
- Climate action planning: Through its membership in international networks like the Covenant of Mayors, Sarajevo has committed to reducing greenhouse gas emissions and integrating climate adaptation into urban development plans. It is also part of the EU Mission for climate neutral cities.

Barriers and challenges

- Air pollution: Despite progress, air quality remains a significant challenge, exacerbated by reliance on coal-based heating, outdated vehicles, and industrial emissions, particularly during winter.
- Urban sprawl and informal settlements: Rapid urbanization has led to unplanned development, putting pressure on infrastructure and increasing vulnerability to flooding and other risks.

- **Fragmented governance:** The complex administrative structure in Bosnia and Herzegovina creates challenges in coordinating resilience efforts across municipal, cantonal, and national levels.
- **Economic constraints:** Limited financial resources and economic instability restrict the city's capacity to implement large-scale resilience projects and maintain critical infrastructure.
- **Public awareness and engagement:** While progress has been made, there is a need to further engage the public in resilience initiatives and promote a culture of environmental responsibility.

Actionable pathways

- To address the issue of air pollution from a holistic perspective of a green and sustainable city, Sarajevo can draw inspiration from the [Amman Resilience Strategy](#), through which the city has reinforced legislation for environmental protection, strengthened environmental laws, and improved regulations governing issues such as air pollution, waste management, and water conservation.
- An inspiring initiative to improve public awareness, governance, engage citizens in resilience initiatives, and promote a culture of environmental responsibility in Sarajevo could be the [Sesvete Living Lab](#), which addresses environmental challenges through innovative climate solutions such as green roofs, aquaponics, and therapeutic gardens.

Tetouan (Morocco):

Key Achievements

- **Climate change adaptation and mitigation:** Tetouan has initiated urban planning projects focused on climate resilience. These include the development of green spaces, the promotion of sustainable building practices, and efforts to reduce urban heat islands through the use of permeable surfaces and tree planting.
- **Flood risk management:** Given the city's vulnerability to heavy rainfall and flooding, Tetouan has invested in improving its drainage systems and enhancing flood prevention measures. Projects have been implemented to reinforce the city's infrastructure, including the construction of retention basins and the restoration of natural waterways to mitigate flood risks.
- **Waste management and circular economy:** In response to the growing challenges of urban waste, Tetouan has been enhancing its waste management systems by promoting recycling and composting. Local authorities are working to reduce landfill use and encourage a circular economy through public awareness campaigns and the implementation of waste sorting programs.
- **Social resilience and community engagement:** Tetouan has focused on strengthening social resilience through community-based initiatives aimed at improving disaster preparedness and fostering local solidarity. These initiatives include creating local response teams, conducting awareness campaigns, and organizing training for residents to enhance their preparedness for emergencies.

Barriers and challenges

- **Limited financial resources:** The city struggles with limited funding for large-scale resilience projects, which impacts the ability to implement and maintain comprehensive strategies.

Public-private partnerships and international financial support are critical for overcoming this challenge.

- **Urbanization and informal settlements:** Rapid urban growth and the expansion of informal settlements present a significant obstacle to resilience efforts. These areas often lack basic infrastructure, such as proper drainage systems and access to public services, making them particularly vulnerable to climate-related hazards.
- **Institutional coordination:** Although Tetouan has made progress in urban resilience, the coordination between various levels of government and stakeholders remains a challenge. The lack of a centralized approach to resilience planning can lead to fragmented efforts and inefficiencies in implementing long-term strategies.
- **Public awareness and participation:** While there have been efforts to raise awareness about resilience, many residents still lack sufficient knowledge about climate change impacts and the importance of urban resilience. Increasing public engagement and participation in resilience initiatives remains a key challenge for ensuring long-term success.

Actionable pathways

- To address the problem of water scarcity, while also reducing the impact of minimizing water pollution, and promoting biodiversity and landscape integration, Tetouan could implement Sustainable Urban Drainage Systems, drawing inspiration from the cases of [Al-Zohour](#) and [Barcelona](#).
- Regarding the lack of a centralized approach to resilience planning, conducting a modelling of [Urban Growth Scenarios in Jordan](#) has enabled cities to discuss the cross-sector effects of public policies, build consensus, and make informed decisions that contribute to the Kingdom's sustainable development objectives.
- Another inspiring initiative to Tetouan to address the problem of the city's rapid urban growth and the expansion of informal settlements could be the [Gardens of the Future project in Nicosia](#), which aims to utilize public spaces for food production, particularly benefiting underprivileged citizens.
- To tackle the issue of lacking sufficient knowledge about climate change impacts and the importance of urban resilience, Tetouan can draw inspiration from the [Sesvete Living Lab initiative](#), which tackles environmental challenges through innovative climate solutions such as green roofs, aquaponics, and therapeutic gardens.

Tripoli (Lebanon):

Key Achievements

- **Climate resilience and green infrastructure:** Tripoli has increasingly focused on integrating green infrastructure to address urban heat islands, improve air quality, and manage stormwater. Projects such as the development of urban parks, green roofs, and the restoration of the city's waterfront have been implemented to create more sustainable and resilient urban spaces.
- **Water and flood management:** Recognizing its vulnerability to flooding, particularly in low-lying areas, Tripoli has worked on improving its drainage infrastructure. Investments have been made to expand and upgrade the city's stormwater drainage system, with a focus on preventing flash floods and reducing waterlogging in urban neighbourhoods.
- **Waste management and recycling:** As part of its resilience strategy, Tripoli has enhanced its waste management system to tackle the growing challenge of waste disposal. Initiatives to

improve waste sorting, increase recycling efforts, and reduce landfill dependence have been introduced, alongside public campaigns to raise awareness of environmental responsibility.

- Disaster preparedness and social resilience: Tripoli has focused on strengthening social resilience through community-based disaster preparedness programs. These include training local response teams, enhancing early warning systems, and raising public awareness of disaster risks, particularly in vulnerable neighbourhoods affected by conflicts and economic instability.

Barriers and challenges

- Economic constraints and limited funding: One of the primary obstacles to enhancing urban resilience in Tripoli is the limited financial resources available for large-scale infrastructure projects. The city has struggled with economic challenges, including high unemployment and poverty rates, making it difficult to allocate sufficient funds for long-term resilience efforts.
- Political instability and governance issues: Political instability and fragmented governance in Lebanon pose a significant challenge to coordinated urban resilience planning in Tripoli. Lack of collaboration between different governmental bodies, as well as political disagreements, can delay or undermine the implementation of resilience strategies and policies.
- Vulnerable informal settlements: Tripoli, like many cities in Lebanon, has a significant number of informal settlements that lack basic infrastructure and services. These areas are particularly vulnerable to climate-related risks such as flooding, heatwaves, and poor waste management, presenting a challenge for urban resilience initiatives to reach all parts of the city.
- Public awareness and community engagement: Although Tripoli has made strides in improving awareness of resilience, many residents, particularly in underprivileged areas, remain unaware of the risks posed by climate change or the importance of resilience measures. Greater efforts are needed to engage local communities and ensure broad-based participation in resilience planning and implementation.

Actionable pathways

- To complement the initiative to integrate green infrastructure to address urban heat islands while improving public awareness and community engagement, Tripoli could implement a rooftop farming strategy, similar to what the [Greater Cairo Region](#) has already done. This strategy aims to reduce climate vulnerability in Cairo's informal settlements and has demonstrated positive impacts on food security, income generation, and community involvement, particularly among marginalized groups.
- Another inspiring project to address the challenges of rapid urban growth and vulnerable informal settlements in Tripoli could be the [Gardens of the Future project in Nicosia](#), which aims to utilize public spaces for food production, particularly benefiting underprivileged citizens.
- To address flooding issues, Tripoli can draw inspiration from the [Al-Zohour Green Triangle](#) pilot project, which is part of a larger initiative aimed at improving resilience against flash floods for vulnerable communities. The project focuses on using Sustainable Urban Drainage Systems (SUDS) to manage surface water runoff and features bio-retention and rainwater detention techniques, including an underground rainwater storage tank with a capacity of 2,500 m³. In this regard, [Barcelona](#) can also be a good source of inspiration for the installation of SUDS.
- To address the problem of political instability and governance issues that hinder coordinated urban resilience planning in Tripoli, the city could consider establishing multi-stakeholder governance platforms that bring together representatives from various governmental bodies, civil society organizations, and local communities. These platforms would facilitate dialogue and promote collaboration among stakeholders, enabling a more coordinated approach to urban resilience planning.

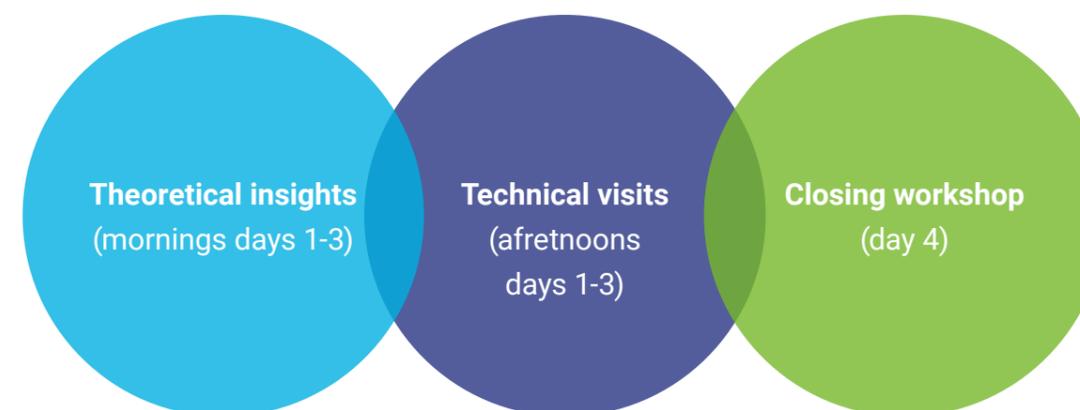
2.2 BAMM'24 overview

2.2.1 Basic information

- Dates: from 15th to 18th October 2024
- Location: Barcelona city, different locations.
- Format: 4 days intensive course.

2.2.2 Agenda

The [agenda](#) for the 4-day training and exchange program was organized according to the following structure:



Apart from this time-based organization, each day was dedicated to a key theme aimed at advancing toward more resilient and sustainable urban models.

- **Day 1:** Beyond the opening sessions, the content focused primarily on outlining the policy framework, planning strategies, and other initiatives that support urban resilience.
- **Day 2:** Dedicated to the “green” dimension, addressing trends related to urban renaturalization.
- **Day 3:** Focused on the “blue” dimension, exploring trends in water management as a crucial component of the urban metabolism in Mediterranean cities.
- **Day 4:** Concluded with a joint workshop that synthesized the key themes discussed throughout the previous days.

2.3 Topics covered and lessons learned

This chapter summarizes the key content presented by the various guest speakers at BAMM'24, including a brief exercise to identify the main takeaways and actionable lessons for the participating cities. It also includes a synopsis of the technical visits, as well as a summary of the reflections and discussions during the workshop on the last day.

2.3.1 Policies and initiatives in favour of urban resilience

Barcelona City Council's sustainable urban planning model

Maria Buhigas, Barcelona City Council

ABSTRACT:

In Barcelona, there is a strong focus on working with the built city, employing a strategy based on 2 key objectives:

- Redefining urban quality, with an emphasis on new elements that define quality (green spaces, shade, etc.).
- Adapting the built environment to new needs and challenges of the city.

From technical positions linked to the political cycle (in Barcelona, every 4 years), it is important to lay on a strategic vision or work plan (a long-term perspective) but also to deploy in a smaller scale (starting by developing prototypes that can be expanded and repeated). The current strategy for the city of Barcelona is structured around four pillars:

- "Pla Endreça" (maintenance plan)
- "Pla Clima" (focused on climate neutrality and adaptation)
- "Pla Viure" (housing policies)
- "Pla de Barris" (focused on specific areas of the city, with a multisectoral approach – including educational, social, and economic policies)

From these plans, more action-oriented programs are derived. Specific examples include:

- "Programa d'Espais de Proximitat i Interiors" (PEPI): This focuses on transforming over 100 hectares of unused spaces within the urban fabric (urban voids: block interiors, spaces between blocks, undeveloped areas, courtyards, corners, blind walls, roofs, plots) through the Space Improvement Program (improvement and repair, increase in soil permeability), Shade Program, and Blind Walls and Roof Program.
- "Litoral, Passeig de la Mar Bella": This involved modifying the approved transformation project so that the beachfront area could adapt to storms (climate change). A study on future maritime dynamics (2050-2080) indicated the need to move a section of the beach wall back by 20 meters to create more distance from the sea. This also required relocating a municipal football field, but it is considered an example of urban transformation adapted to the consequences of climate change.

FURTHER INFORMATION

[Press release about "PEPI"](#)

[Press release about "Litoral, Passeig de la Mar Bella" \(only in Catalan\)](#)

KEY TAKEAWAYS

- The importance of working on a long-term city strategy, overcoming the temporal periods of political mandates.
- Deploying this strategic vision through small-scale projects that can be implemented in the short term (a steady, incremental approach to change).
- Clear need to incorporate the findings and conclusions from studies on the impacts of climate change into urban transformations, in order to avoid the implementation of temporary solutions during specific episodes (prioritizing an adapted city).

RELEVANCE FOR PARTICIPATING CITIES

- Long-term planning has been drafted or approved in most participating cities. However, some planning tools or mechanisms (especially those referred to urban planning regulations) lack flexibility, which constrains the implementation of some urban solutions.

Sustainable future: Promoting the 2030 Greener Med Agenda in urban areas

Frédéric de Dinechin, Union for the Mediterranean -UfM

ABSTRACT:

Presentation of the Union for the Mediterranean (UfM) 2030 Greener Med Agenda, with 3 main axes, each of which unfolds on key actions and regional projects:

- Green, circular and socially inclusive economy transformation
- Pollution prevention and reduction
- Natural resources protection, preservation, management and restoration

Introduction on the financial mechanisms to promote de Greener Med Agenda in urban areas:

- BMP (Blue Mediterranean Partnership): a multi-donor and multi-partner financial instrument to support Sustainable Blue Economy in the Mediterranean.
- PAMEx-PLIFF (Plan of Action for a Model Mediterranean Sea-Local Investment Finance Facility): a public-private independent finance facility acting as a catalytic financing platform, where both public and private blended funds are jointly mobilized through a single investment and technical assistance body.

UfM (with many other partners) is working on a Strategy for the Water/Energy/Food/Ecosystems Nexus in a source to Sea Mediterranean continuum, with 3 main goals:

- Goal 1. Policy level: to ensure appropriate institutional arrangements, policies, and cooperation frameworks established at country and regional levels.
- Goal 2. Planning and financing: efficient and effective planning, financing and implementation of management and technical solutions
- Goal 3. Informed decision-making: based on science-based knowledge, engagement of capacitated stakeholders, and increased public awareness.

This significant initiative addresses a crucial issue for the region and offers Mediterranean countries an opportunity to transition to a green, circular, and socially inclusive economy making sure that none of the nexus components bears the brunt of the transition.

FURTHER INFORMATION

[Towards 2030: Agenda for a Greener Med](#)

[Draft of the Strategy for the Water-Energy-Food-Ecosystems Nexus in the Mediterranean Source to Sea continuum](#)

KEY TAKEAWAYS

- Holistic, integrated and transversal approach to resource management embodied by the WEFE Nexus represents a paradigm shift in the international development agenda.
- High-level political will to drive inter-sectoral engagement.

RELEVANCE FOR PARTICIPATING CITIES

- The international framework provides a great opportunity for cities to root or consolidate political will, which is a key factor that might interrupt or alter the course of some transformations that require long-term vision.
- Few cities have adopted or implemented the whole WEFE approach, although some have started working transversally with some of the WEFE-topics. Cross-sectoral and multilevel collaboration are difficult to implement within local authorities, mainly due to lack of resources and standardized models for governance.

The European Green Deal: impacts and opportunities for the sustainable transformation of cities

Maria Nuñez, International Union for the Conservation of Nature -IUCN

ABSTRACT: Presentation of key policies of the EU Green Deal that might contribute to resilient cities:

- EU Biodiversity strategy for 2030, with 2 main scopes that directly involve cities:
 - Nature protection:
 - Establishing protected areas for at least 30% of land in Europe (considering that 15% of Natura2000 areas are within cities).
 - Nature restoration:
 - Reducing the use and risk of pesticides by 50% by 2030 (no chemicals and pesticides used in urban green areas).
 - Planting 3 billion trees by 2030.
 - Developing Urban Greening Plans (or Urban Nature Plans) in cities >20.000 inhabitants. Nature-based solutions should be a key concept of these plans. IUCN has developed the Urban Nature Index (UNI) that helps to conceptualise the wide and varied impacts by scale and sector that cities have on ecosystems, whether harmful or protective.
- EU Soil Strategy for 2030, that affects cities by different actions:
 - Investigate the streams of excavated soils generated, treated and reused in the EU, and benchmark the market situation in Member States by 2023. The future law might set obligations on this regard.
 - Limiting land take and soil sealing with a circular use of land, integrating the "land take hierarchy" into Urban Greening Plans.
- New EU Forest Strategy for 2030: it will build on the EU Biodiversity Strategy, recognizing the central and multifunctional role of forests.

FURTHER INFORMATION

[EU Biodiversity strategy for 2030](#)

[Urban Nature Platform](#) (guidance and knowledge to support cities in enhancing and restoring their urban nature and biodiversity)

[IUCN Urban Nature Indexes](#) (intended to help policymakers, stakeholders and local communities understand their impacts on nature, set science-based targets for improvement, and monitor progress using science-based measures)

[EU Soil Strategy for 2030](#)

[EU Forest Strategy](#)

[Guidelines on Biodiversity-Friendly Afforestation, Reforestation and Tree Planting](#) (part II referred to "Tree planting in urban ecosystems")

KEY TAKEAWAYS AND RELEVANCE FOR PARTICIPATING CITIES

- The European Green Deal policies/strategies affect directly city planning (NbS, greening, zero net land take) and city management (excavated soils, contaminated sites). This insight can help guide urban policies in cities outside the European region.

The EU Mission climate-neutral and smart cities

Gabriela Uchoa, NetZeroCities and Eurocities

ABSTRACT: Presentation of the EU Mission for "112 Climate Neutral and Smart Cities by 2030", that requires a transformative change. This EU Mission is coordinated by the NetZeroCities Platform. The 112 cities participating in the mission are actively working on their "journey to climate neutrality", an iterative process that requires transforming outdated ways of operating within municipalities:

- Deep collaboration (involving multiple actors across sectors) instead of top-down single actor leadership.
- Portfolios of actions (addressing simultaneously several levers of change) instead of fragmented actions.
- Understanding systems (mapping interdependencies and identifying barriers, gaps and learnings from the past) instead of isolated analysis.

The EU Mission focuses on Climate City Contracts (CCC) as a tool to activate the roadmap to climate neutrality. CCC have 3 interlinked components: Commitments, Action Plan and Investment Plan. Cities with CCC have been rewarded with the EU Mission Label (only available for cities participating in the EU Mission), which will unlock financing resources.

Complementary, the NetZeroCities Platform has a Pilot Programme (not restricted to cities participating in the EU Mission) to test and implement innovative approaches to rapid decarbonisation.

FURTHER INFORMATION

[NetZeroCities Portal](#)

KEY TAKEAWAYS

- CCC might be a useful tool to enhance climate neutrality action. It is highly recommended to build on existing climate plans. Each city should tailor the approach to its unique characteristics and climate context (one of the first steps should be an emission profile analysis to identify high-impact areas for emission reduction).
- The NetZeroCities Portal is an open access that gathers all the knowledge generated (Knowledge Repository) within the EU Mission and provides space for community and peer-to-peer learning (Community Space). Cities worldwide can register and participate in exchanging initiatives but, at this moment, funding opportunities are only for cities participating in the EU Mission.
- The program offers standard indicators and a framework that allows cities to monitor their sustainability progress, helping them structure efforts to address climate change effectively.

RELEVANCE FOR PARTICIPATING CITIES

- Sarajevo is part of the EU Mission.
- Most participating cities (i.e. Irbid) have approved decarbonization action plans, but climate neutrality is not defined or not outlined for 2030. Mitigation and adaptation are not usually considered within a joint urban strategy.
- Amman wonders if non-European cities can join the Mission. Non-Mission cities can get inspired from Mission cities, capitalizing on generated knowledge and best practices and working on tailored local decarbonization strategies to urgently and systematically reduce the carbon footprint of the city. Knowledge transfer must consider discussion and reflection on necessary adjustments or nuances to ensure that lessons-learned from Mission cities address the characteristics of participating cities.
- Tetouan asks about tools to follow up with this kind of plans. The "Climate Transition Map" (that reflects the NZC methodology) emphasizes the need for tracking progress, by means of the MEL framework.
- Tetouan also asks for experiences to involve citizens and other relevant stakeholders. Citizen engagement and behaviour change is a key element for climate neutrality. There have been different approaches to engage with citizens: neighbourhood-based pilot projects (to test sustainability solutions hand in hand with citizens), public engagement and corporate collaboration (public calls to engage local companies in climate plans), communication strategies (raising-awareness campaigns to translate climate neutrality goals into accessible and understandable information).

The Barcelona Convention and the UNEP MAP Istanbul Environment Friendly Cities Award

Josep Canals, MedCities

ABSTRACT:

Presentation of the Barcelona Convention and the UNEP MAP system: The UNEP plays a key role in supporting countries, particularly those in developing regions, by assisting them in implementing sustainable environmental policies that foster long-term ecological health. The UNEP Mediterranean Action Plan (UNEP MAP) outlines a strategic vision for the 2022–2027 period. This plan aims to provide a clear roadmap to assist Mediterranean countries in addressing pressing environmental issues through strategies tailored to the unique characteristics of the region.

The Barcelona Convention and its 7 Protocols adopted in the framework of the Mediterranean Action Plan (MAP) constitute the principal regional legally binding Multilateral Environmental Agreement in the Mediterranean.

It is relevant to mention the provision of science-based assessments, reporting the state of the environment and development in the Mediterranean (Mediterranean Experts on Climate and Environmental Change, MedEC).

Presentation of The Mediterranean Strategy for Sustainable Development (MSSD): this Strategy, also part of the UNEP MAP framework, provides a policy reference framework for sustainability. It is recommended for cities in the region as it includes specific measures and action lines designed to help Mediterranean cities progress toward more sustainable and inclusive development. MedUrbanTools is one of the flagship initiatives of MSSD (led by MedCities).

Presentation of the Istanbul Environment Friendly City Award (IEFCA), co-led by UNEP MAP and MedCities, as another flagship initiative of MSSD: through this award, Mediterranean cities demonstrating a notable commitment to improving quality of life and the urban environment are recognized. Málaga was one of the award-winning cities.

FURTHER INFORMATION

[Mediterranean Strategy for Sustainable Development](#)

[MedECC Reports](#)

[MedUrbanTools](#)

[Istanbul Environment Friendly City Award](#)

KEY TAKEAWAYS

- Strategic framework for the Mediterranean region related to environmental sustainability and social and economic development.
- MedECC reports as suggested lectures to understand the state of the art on the topic.

RELEVANCE FOR PARTICIPATING CITIES

- The international framework provides a great opportunity for cities to root or consolidate political will, which is a key factor that might interrupt or alter the course of some transformations that require long-term vision.

Implications of the EU Nature Restoration Law for Mediterranean cities

Joan Pino, CREAM

ABSTRACT:

Metropolitan urban ecosystems and their biodiversity are key for cities for their conservation value and for the functions/services they provide to society (leisure, regulation, production...). However, their conservation and functionality are affected by some threats that are especially severe in urban areas (climate change, land-use change, urbanization and frequentation of natural areas, frequent wildfires, biotic homogenization...). Whilst the European Restoration Law primarily targets EU Member States, it has direct and indirect implications for local and regional governments and authorities:

- Restoration of urban ecosystems
- Restoration of the natural connectivity of rivers and natural functions of the related floodplains.
- Restoration of pollinator populations
- Restoration of agricultural ecosystems
- Restoration of forest ecosystems

The potential implications of the Law for the Metropolitan Region of Barcelona:

- Metropolitan area dominated by built-up (urban and roads) and woody (forests and scrublands) land cover categories.
- Forests are young and badly structured, showing a need for effective management actions to increase maturity of forest ecosystems.
- Aquatic habitats strongly transformed, showing a need for strong restoration measures.
- Open habitats (scrubs, grasslands and crops) are decreasing, intensively managed or fragmented. It is important to consider restoration of functionality in agricultural ecosystems.
- Interstitial and edge areas should be seen as opportunity spaces (restoring habitats for pollinators and restoring habitat connectivity, together with measures on the surrounding land matrix).
- In the urban space, there are opportunities: increasing green area, increase naturalized area, biodiversity shelters creation, nature activities and other community engaging initiatives.

FURTHER INFORMATION

[The proposed EU Nature Restoration Law: what role for cities and regions?](#)
Network Nature Policy Brief

KEY TAKEAWAYS

- At a metropolitan scale, nature restoration should embrace the vision of green infrastructure and focus on large ecosystems providing ecosystem essential functions and services (forests, open habitats and aquatic habitats).
- A strong focus should be placed on ecosystem functionality: pollinators (marginal habitats), landscape and regional connectivity (black spots and barriers) and fluvial connectivity and functioning.

RELEVANCE FOR PARTICIPATING CITIES

- The conclusions regarding how this law would affect the planning and management of the natural heritage in the Metropolitan Area of Barcelona may serve as inspiration for other cities seeking to incorporate restoration issues into their strategies for enhancing green spaces and biodiversity. It is important to note that the regulations approved at the European level, which impose requirements on their member states (Sarajevo), also set future trends for regions outside the EU.

2.3.2 Green cities: planning resilient cities

Urban public health: the benefits of nature in urban environments

Mark Nieuwenhuijsen, ISGlobal

ABSTRACT:

There is available evidence of beneficial effects of urban green spaces, such as: improved mental health and cognitive function, reduced cardiovascular morbidity, reduced prevalence of type 2 diabetes, improved pregnancy outcomes and reduced mortality. According to a study conducted in 1.000 European cities, implementing green measures could prevent up to 43.000 deaths annually (if achieving WHO recommendations on access to green space).

Policies related to urban design have significant health benefits. Some examples: superblocks (667 annual premature deaths avoidable), green corridors (14% less cases of self-perceived mental ill health, 13% less visits to mental health professionals, 13% less antidepressant use, 8% less of the use of tranquilisers or anxiolytics, 45 M€/year of savings in direct/indirect mental health costs).

On the other hand, green spaces improve the urban heat island effect: increasing 30% of tree coverage in cities can reduce the temperature of urban environments by up to 1.3°C and prevent 1/ of the premature deaths attributable to urban heat islands in summer.

3-30-300 rule might stand as a general reference for green space planning in cities: 3 trees from every people's window, 30% of tree cover in the neighbourhood and 300m distance to the nearest park. In Barcelona, meeting the rule is associated with a 23-76% reduction in mental health indicators.

FURTHER INFORMATION

[Urban Planning, Environment and Health](#)

KEY TAKEAWAYS

- Scientific research holds the health argument for re-naturing and greening cities, as well as an argument for climate policies.
- Multi sectorial and systemic approaches are needed to address current problems and find solutions (urban planning, climate action, environmental quality, health...)

RELEVANCE FOR PARTICIPATING CITIES

- Málaga states that urban transformations such as superblocks or pedestrianizations may initially provoke some resistance, based on the argument that it is a measure that does not reduce traffic (only redistributes it) and citing impacts on businesses. However, Barcelona's experience shows that the effect on the commercial fabric is precisely positive, despite initial reluctance, as the measure promotes proximity and attracts citizens and visitors. Regarding traffic, these operations to transform the priority use of public space cannot be understood in isolation but must be part of an urban strategy to promote sustainable mobility that enhances more sustainable mobility alternatives (on foot, by bicycle, or by public transport), while penalizing or discouraging private vehicle trips. It is crucial to open an informative, participatory, and dialogical process with the neighbourhood and association networks to facilitate the acceptance of these types of measures, seeking to incorporate adaptations that fit the reality (for example, allowing and maintaining access to parking for residents).
- Málaga also points out that the 3-30-300 rule is being adjusted for different contexts. It is a general reference that cities might use as a desired scenario, but it must be downscaled and tailored to each city's reality. The ultimate goal is to maximize urban green spaces and elements.
- Antalya sees an important potential in the health evidence, as a relevant tool to foster and communicate some interventions in the public space.

Urban nature: promoting transformative change with nature-based solutions

Corina Basnou, CREAM

ABSTRACT:

Nature-based solutions (NbS) are solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions.

Some research teams advocate for a participatory and community-engaged approach to the planning and implementation of NbS. A powerful example is Barcelona Urban Agriculture Observatory: a platform to centralise and disseminate on the benefits of urban gardens. It included biomonitoring environmental health using plants to better understand the persistence of heavy metals in the allotment's edible plants (concluding it doesn't pose any risk to human health).

FURTHER INFORMATION

[Urban Agriculture Observatory: Social and Ecosystem services](#)

[Urban Agriculture Observatory: Barcelona Urban Allotments Analysis](#)

KEY TAKEAWAYS

- Plants can be used to assess environmental health (biomonitoring of environmental health using plants)
- Citizen science reinforce knowledge and improve science-policy-practice.
- Importance of implementing NbS with a process based on data (indicators) and telling a meaningful story.

RELEVANCE FOR PARTICIPATING CITIES

- Citizen science initiatives can act as an alternative mechanism to collect information that allows for certain monitoring of specific initiatives. Additionally, this type of citizen involvement action reinforces habit changes.



Barcelona City Council's Sustainable Urban Planning Model

Mariona Ferrandiz, CREAM

ABSTRACT:

NbS stand as a powerful tool/approach to address the different social, economic and environmental challenges that Mediterranean cities face. NbS might adopt different forms in cities: urban forests (vertical forest, peri-urban forests, urban forest parks, urban trees...), climate resilient streets, building solutions, urban farming spaces...

General recommendations to implement NbS in cities:

- Think and design locally (place-specificity)
- Evidence-based (knowledge and prioritization)
- Work at school scale (if kids are involved it is more likely that people take care, and it is properly conserved).
- Involve people and co-design with local people.
- Measure KPI and communicate results.

Some relevant resources for inspiration and knowledge sharing:

- Urban Green UP Project: database with implemented NbS in different European cities, including KPIs and outcome assessment.
- Planning and delivering Nature-based Solutions in Mediterranean cities: IUCN assessment of 18 NbS projects in Mediterranean cities.
- CARDIMED Project: includes an impact evaluation of NbS
- Uforest alliance: with training opportunities related to urban forestry.
- NbS knowledge databases: European database with relevant resources.

FURTHER INFORMATION

[Urban Green UP Project](#)

[Planning and delivering Nature-based Solutions in Mediterranean cities First assessment of the IUCN NbS Global Standard in Mediterranean urban areas](#)

[CARDIMED Project](#)

[Uforest alliance](#)

[NbS knowledge databases](#)

KEY TAKEAWAYS

- Small and medium-sized cities lack access to resources and knowledge to support them in implementing NBS alongside and instead of "traditional grey infrastructure solutions.

RELEVANCE FOR PARTICIPATING CITIES

- A common way to address citizen engagement within participating cities is through public consultation on some decisions (i.e. Antalya). There's a range for improvement related to deeper or more impactful engagement mechanisms that might provide a greater behavioural change.
- Malaga has implemented water drainage systems and increased open surface under the urban trees to improve water efficiency.
- Amman has implemented NbS to collect water in certain areas so that the city does not become flooded.

The 2021-2023 Nature Plan of the Barcelona City Council

Izaskun Martí, Barcelona City Council

ABSTRACT:

Barcelona Nature Plan is structured in 3 lines and 2 transversal areas (knowledge and governance):

- Line 1. More greenery and biodiversity: new parks (Glories), transforming streets (Cristòfol de Moura, which includes traffic-calming, green public spaces and SUDS), superblocks (Sant Antoni), green axes (Consell de Cent), gardens (Jardins de Pla i Armengol), neighbourhood transformation (Marina del Prat Vermell), blind walls transformation competition, green roof competition...

- Line 2. Conserving and improving greenery and biodiversity: evolved management of herbaceous plants, installation of wildlife structures, enhancement of spontaneous flora

- Line 3. With and for city residents: "Hand to Green" program, to engage citizens in urban agriculture and place ownership and maintenance.

The Nature Plan relies on a Greenery Model map that detects where green is needed (considering equity, walkability, connectedness...). This Plan aims at increase greenery 160 Ha from 2015-2030.

FURTHER INFORMATION

[Barcelona Nature Plan](#)

KEY TAKEAWAYS

- Importance of an even distribution of green areas, which means prioritizing greenery interventions in areas with less green access.
- Importance of stakeholder engagement and involvement to amplify greenery interventions. Scholars are a very impactful target-group.

RELEVANCE FOR PARTICIPATING CITIES

- Any urban strategy that includes the incorporation of greenery in Mediterranean cities must consider water needs, given the widespread context of drought that will worsen in the future. It is crucial to select species with low water requirements, implement strategies to retain water in green areas (i.e. collecting rainwater), consider efficient irrigation systems, and foresee alternative water resources for irrigation.
- Málaga has implemented a stormwater collecting system that makes 80% of urban vegetation independent of external water contribution.



Promoting green areas through public-private partnerships

Joan Delgado, Barcelona City Council

ABSTRACT:

In densely built Mediterranean cities, integrating the private sector into urban greening strategies is essential to overcoming space limitations and ensuring the effective and widespread implementation of nature-based solutions.

Barcelona has committed to intervention strategies that promote the implementation and maintenance of private green spaces, leveraging the potential of regulatory instruments and urban planning regulations within the administration's jurisdiction. Some examples:

- Planning parameters for new urban developments (occupation, ecological return index, underground constructions, rainwater management, etc.) to achieve non-built spaces with specific characteristics to promote and increase green and green public areas.
- Other bonding mechanisms for urban improvement plans or modifications of the urban masterplan (new conditions for obtaining the licenses areas, ecological return index -permeability-, rainwater harvesting and rediving to SUDS...) to obtain new buildings with specific construction characteristics that promote and increase green.
- Ecological Return to Urban Space Index (IDEEU), a metric designed to evaluate and enhance the ecological contribution of built environments. Barcelona has integrated the IDEEU (Ecological Return to Urban Space Index) into its urban planning framework to encourage the incorporation of green infrastructure in private and public developments.
- Definition of an urban planning designation to protect certain urban green spaces and prevent their development (Key 8a: "Protected Private Green Zone"). In these areas, an agreement is promoted in which the City Council assumes maintenance responsibilities in exchange for the property owner's obligation to allow public access to the space.
- Get Green program, which promotes initiatives to encourage Barcelona's residents, organizations and businesses to foster and preserve the city's biodiversity and green spaces.
- Other specific actions to promote greenery in existing buildings: campaigns to promote greenery in the built environment (roofs, facades, party walls, balconies...) and municipal grants.

FURTHER INFORMATION

[MPGM \(modification of the metropolitan masterplan\) for the urban and environmental improvement of Gràcia neighbourhoods](#) (only in Catalan)

[Cession of municipal spaces for community use to foster greenery and biodiversity](#)

[Hands on green](#)

KEY TAKEAWAYS

- There are opportunities to enhance urban green on private areas, through urban planning, campaigns, municipal grants, etc.

RELEVANCE FOR PARTICIPATING CITIES

- Urban planning and regulations pose a barrier for the vast majority of participating cities, with rigid parameters and regulations that do not allow for the incorporation of certain sustainability solutions. Modifying these instruments is complicated.

2.3.3 Blue cities: efficient water management

Water management in resilient cities: addressing drought and the valorisation of nonconventional water

Wolfgang Gernjak, ICREA and ICRA

ABSTRACT:

There is no such thing as zero risk. Risks need to be known, and adequate mitigation strategies implemented. Risk communication is also important on public policies.

When it comes to water, treatment requirements should be based on tolerable risk.

There are different water sources for cities:

Conventional water sources - rainfall

- Surface water
- Groundwater

Non-conventional water sources

- Imported water
- Desalinated water: it stands as an important water source to navigate drought episodes. Reverse osmosis is the core Technology.
- Stormwater: quantity is variable and requires risk management, but it might represent an important annual volume of water, and it can be harvested close to the final use.
- Greywater: it also requires risk management as well as dual-piping system in buildings, but it is climate resilient, with steady volumes and can be harvested close to the final use.
- Reclaimed water: quality might be compromised, but it is climate resilient, with steady volumes and steady contamination.

FURTHER INFORMATION

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KEY TAKEAWAYS

- Non-conventional water sources are required in water scarce regions. There are many solutions, and it is recommended to use many of them to test which ones suit better.

RELEVANCE FOR PARTICIPATING CITIES

- The presentation clearly emphasized the need to consider risk in water resource planning and enables cities to have a comprehensive view of the various water sources to be considered.



Sustainable Urban Drainage Systems (SUDS): innovative solutions for resilient cities

Marc Teixidó, IDAEA, CSIC and UPC

ABSTRACT:

The Mediterranean area is particularly affected by water crisis (water scarcity). Solutions for “thirsty” areas might include water conservation, water reuse, seawater desalination and/or stormwater harvesting.

Stormwater stands as an alternative local water resource, so SUDS (sustainable urban drainage systems) might be an ideal blue/green infrastructure. There are many types of SUDS, which show variable treatment capacity (the urban water cycle path has pollutants).

Presentation of ASSETWATER and URBPOL research projects:

- SUDS provide means of heavy metal removal.
- SUDS provide means of emerging contaminant removal
- SUDS could become decentralized water treatment systems

FURTHER INFORMATION

[ASSET project: assessing sustainable urban drainage system \(SUDS\) efficiency to reduce urban runoff water contamination](#)

KEY TAKEAWAYS

- SUDS hold promise in reducing contaminant load, however some compounds remain elusive.

RELEVANCE FOR PARTICIPATING CITIES

- Irbid shares concerns about the decontamination capacity of SUDS. In Barcelona SUDS are implemented to increase both pollutant retention and water retaining capacity.
- Although initial investment costs might be considerable, SUDS are proven long-term solutions.
- Scientific research is being conducted to assess which SUDS-solutions suit better for mediterranean cities.
- Amman states they have implemented many different SUDS because water scarcity is one of their main urban challenges. It is important to rely on a portfolio of actions rather than one-big-expensive project.
- Water conservation measures should still be ranked as high priority.



Application of the WEF E concept in urban planning: Water, Energy and Food for green cities

David Smith, We&B

ABSTRACT:

The WEF E approach recognises the interconnectedness of water, energy, food, and ecosystems, which are commonly managed or addressed in silos, and aims at creating synergies between these sectors. For cities, the WEF E approach is an opportunity to address self-sufficiency.

In the context of urban planning, the WEF E Nexus means integrating water, energy, food, and ecosystem considerations into the design, management, and operation of cities. WEF E solutions are diverse (optimising water use through recycling and reuse initiatives, investing in infrastructure that minimises water losses, incorporating renewable energy sources, energy recovery from wastewater treatment, vertical farms, community gardens, restoration of natural ecosystems within cities, increasing green spaces...).

The implementation of the WEF E approach presents important challenges to overcome (cross-sectoral collaboration, institutional strictures, resource constraints, public engagement...) but has many potential benefits (overcoming high energy demands, overcoming water scarcity, improving food security, climate resilience, environmental benefits, economic benefits...).

The WEF E4MED Nexus Community of Practice (NCoP) offers cities access to valuable resources and benefits, including specialised knowledge, demonstrators, collaboration and funding opportunities, training sessions, webinars, and other related information on WEF E initiatives.

FURTHER INFORMATION

To join the NCoP: [WEFE4MED](#)

KEY TAKEAWAYS

- WEF E application requires stakeholder communication and engagement from initial stages. Collaboration between actors is essential.
- WEF E application requires holistic view and intersectoral collaboration.
- Participating cities are encouraged to join the WEF E NCoP, an initiative to exchange knowledge, share best practices, and address the critical interconnections between water, energy, food and ecosystems to help scale successful models.

RELEVANCE FOR PARTICIPATING CITIES

- Few cities have adopted or implemented the whole WEF E approach, although some have started working transversally with some of the WEF E-topics. Cross-sectoral and multilevel collaboration are difficult to implement within local authorities, mainly due to lack of resources and standardized models for governance.
- Antalya mentions that using wastewater might be controversial for citizens. It is important to include communication and awareness rising but also verification strategies to increase acceptance.

Drought Management in the Metropolitan Area of Barcelona

Maria Huerta, Barcelona Metropolitan Area -AMB

ABSTRACT:

Presentation of the Water Cycle Strategic Plan for the Metropolitan Area of Barcelona (2022), aimed at ensuring water supply (quantity and quality). It is a roadmap to reduce the water deficit that Barcelona could suffer from, with objectives set for the year 2050. When the strategic plan was published, Barcelona entered a critical state of drought (from 2022 to 2024).

Presentation of the Water Management on Drought Episodes for the Metropolitan Area of Barcelona. On drought episodes:

- Water saving requirements for different water usages.
- Alternative sources of water: desalinated water and reclaimed water.
- Indirect recharge.

AMB has analysed the cost of in action: if no measures had been applied, AMB would have spent 339 days without water in reservoirs.

FURTHER INFORMATION

[Metropolitan Water Cycle](#)

KEY TAKEAWAYS

- Defining a strategy to be prepared for drought episodes is essential to guarantee water supply in urban areas.

RELEVANCE FOR PARTICIPATING CITIES

- Some cities (i.e. Málaga) report difficulties in convincing certain sectors (agriculture and livestock) of the need to implement water restriction measures.



Drought management in the city of Barcelona and the mobilization of alternative water resources

María José Chesa, Barcelona City Council

ABSTRACT:

Barcelona Water Cycle (BCASA) is a municipal 100% public company integrated into the Area of Ecology, Urban Planning and Mobility at Barcelona City Council. Its purpose is to manage the city's entire water cycle and provide services directly and indirectly relating to that cycle and the city's beaches, coast and urban environment.

In response to the increasing drought episodes in the city, BCASA and the Barcelona City Council developed a Drought Management Protocol in 2018. This protocol establishes the procedures for managing drought situations and includes a Civil Protection Plan to address these cases effectively and ensures a multisectoral and multilevel framework involving partnerships to address water stress.

The declaration of the drought situation, the total water consumption remained below the maximum limit set by the national authorities. Additionally, implementing alternative water sources such as SUDS or greywater reuse, as well as developing comprehensive water cycle master plans, can significantly reduce municipal water consumption.

FURTHER INFORMATION

[Alternative water resources plan](#)

KEY TAKEAWAYS

- Defining actions to reduce the effects of water scarcity and ensure a well-coordinated response during drought situations.
- Promoting citizen awareness and engagement is crucial in maintaining water consumption below regulatory limits during drought periods.

RELEVANCE FOR PARTICIPATING CITIES

- Cities need to define key stakeholders and work on the organizational and functional structure so that the holistic vision might be addressed.



2.3.4 Technical visits

Cristóbal de Moura Street Izaskun Martín, Barcelona City Council

ABSTRACT: The [Cristóbal de Moura green axis](#) is a pioneering project and a model for implementing the “green street” strategy in Barcelona. In addition to the traditional benefits of increasing biodiversity in the city, it incorporates sustainable and passive rainwater management through Sustainable Urban Drainage Systems (SUDS).

The SUDS techniques employed include: bioretention areas, permeable pavements, floodable garden beds, and underground detention-infiltration tanks. These SUDS are capable of capturing, treating, retaining, and returning runoff to the ground through infiltration for a design rainfall event with a 10-year return period. This applies not only to the 17.900 m² of urbanized surface (of which 3,500 m² are green spaces) but also to the rooftops of adjacent buildings. Rainfall over a surface of 32.000 m² is managed within this green axis, which has a rainwater storage capacity of more than 2.200 m³.

FURTHER INFORMATION [Urban Ecology: Second stage of the revamp to Carrer Cristobal Moura \(Barcelona\)](#)
[Cristobal de Moura Green Axes project \(Barcelona\)](#)

RELEVANCE FOR PARTICIPATING CITIES

- The costs of the intervention are identified as the main barrier to replicating the project in other cities. Barcelona points out that, although the cost is higher, the intervention should be assessed as a whole, considering its co-benefits. Maintenance costs are covered by the City Council’s own staff.
- Regarding the public acceptance of pedestrianization measures, participating cities share a certain level of uncertainty. Evaluations of pedestrianization projects in Barcelona indicate that, although opposing voices are initially heard, these interventions ultimately encourage consumption and enhance the vitality of the area. Nevertheless, such operations cannot be implemented citywide but rather in specific areas, relying on a process of listening to and engaging with citizens and key stakeholders.
- Cities also show interest in obtaining data on vandalism. Barcelona reports that no higher rates of vandalism have been observed and that, in any case, the mechanism to reduce it is through sanctions.



Meridiana Avenue Joan Delgado, Barcelona City Council

ABSTRACT: The Barcelona City Council envisions the comprehensive transformation of [Meridiana Avenue](#) into a civic axis for the city and the surrounding neighbourhoods, with phased projects. The visited phase corresponds to the final section. Traffic lanes were reduced (one lane per direction) as well as the width of the remaining lanes to decrease traffic flow and facilitate traffic calming (reducing vehicle speed), while also incorporating a bike lane.

In the transformation project, the integration of greenery is proposed as a central element for building roadways and public spaces (not merely as green zones). On an avenue like this, it is necessary to incorporate at least four rows of trees for greenery to have a significant presence. Although the garden beds are not configured as Sustainable Urban Drainage Systems (SUDS) because infiltration is not possible (due to the metro and train lines underneath), they help reduce water velocity.

FURTHER INFORMATION [Meridiana project presentation](#) (only in Spanish)

RELEVANCE FOR PARTICIPATING CITIES

- The participating cities raise questions regarding the costs. Barcelona indicates that the City Council has fully covered the costs because it involves consolidated urban land. For the final section, funding support was provided through Next Generation funds.



Consell de Cent Green Axis

Jana Miró, Barcelona City Council

ABSTRACT:

Consell de Cent Street has been transformed into a shared-use platform with pedestrian priority along a 3 km stretch between Plaça de Joan Miró and Passeig de Sant Joan, with extensions on the perpendicular streets Girona, Comte Borrell, and Rocafort. It exemplified the new 21st-century street model: re-naturalized, with a significantly reduced number of cars (AADT below 2.000 vehicles/day), which can circulate at a maximum speed of 10 km/h.

The street has no traffic restrictions, as the new traffic directions prevent continuous routes, which drastically reduced the number of cars. Previously, cars dominated the space, but now they are the guests. Thanks to the vitality it gained after its renovation, Consell de Cent has become one of the most attractive streets in the Catalan capital.

A competition to select the transformation design was carried out, gathering over 70 proposals for green axes and squares, which assessed individually. The competition guidelines are public and can serve as an example for other cities.

FURTHER INFORMATION

[Superblock Barcelona dossier](#)

[Urban Planning and Infrastructures. Contest to design the Barcelona superblock](#)

RELEVANCE FOR PARTICIPATING CITIES

- Some cities express concerns that reducing parking spaces for cars might lead to conflicts with residents and individuals working in urban freight distribution. Barcelona is committed to fostering a healthy and safe city, and in this regard, reducing public space allocated to motorized traffic in favor of active mobility and community coexistence is considered a health-promoting measure.
- Regarding parking, pedestrianization or traffic-calming interventions always respect access to private parking and ensure delivery access through regulated loading and unloading zones. Emphasis is placed on the importance of intensive dialogue and communication with the local community.



BCASA Control Center

Jordi Oriol Grima, Barcelona City Council

ABSTRACT:

Barcelona Cicle de l'Aigua, SA (BCASA) is the company created by the city council to manage the entire water cycle in Barcelona and to provide activities directly or indirectly related to this cycle, the beaches, the coastline and the environment.

BCASA operates a Control Center that centralizes the management of various aspects of the water cycle: sewer systems, groundwater utilization, beaches, irrigation, fountains, and the alert system for the Besòs River Park.

The remote management system receives real-time information on the operation of various facilities and services, enabling immediate action to anticipate potential issues and ensuring more efficient management of services and resources.

Another key function is to forecast, communicate, and coordinate alerts and emergencies related to the water cycle, which may involve activating warning and protection protocols for citizens.

FURTHER INFORMATION

[BCASA sustainability summary 2023](#) (only in Catalan, pages 75-79)

RELEVANCE FOR PARTICIPATING CITIES

- The visit is an applied example of a monitoring and control mechanism used in water cycle and risk management, which can serve as inspiration for participating cities interested in developing and implementing such tools to improve urban management.



Sustainable Urban Drainage Systems La Marina del Prat Vermell

Anna Llopart-Mascaró, Barcelona City Council

ABSTRACT:

La Marina del Prat Vermell is a new neighbourhood under development in Barcelona, Spain that is structured to include sustainable practices. The central feature of the neighbourhood will be a large greenspace, [Parc de les Tretze Roses](#), with a meadow, that will act as a tank for filtering rainwater.

The transformation pays special attention to water. Being one of the city's lowest areas, special care has been taken with the flowerbeds, which function as SUDS (Sustainable Urban Drainage Systems). These are depressed green areas where rainwater, instead of being directed to the sewer system, can accumulate and infiltrate the subsoil.

This process primarily replenishes underground aquifers while simultaneously irrigating the neighbourhood's vegetation, which is adapted to its condition as a floodplain. At street level and around the surrounding buildings, this abundant vegetation helps mitigate high summer temperatures and reduces energy demand for cooling in summer... illustrating how everything is interconnected.

As for infrastructures, La Marina del Prat Vermell will also include a centralised heating and cooling network and the generation of renewable energy in public spaces and buildings, in order to save 20% in energy. Projects under way also include various blocks of public housing.

FURTHER INFORMATION

[How is Marina del Prat Vermell being transformed in Barcelona.](#)

RELEVANCE FOR PARTICIPATING CITIES

- This technical visit can serve as inspiration for cities planning new urban developments, where the incorporation of Sustainable Urban Drainage Systems (SUDS) from the initial phase can result in neighbourhoods where water resource management is integrated as a key element of urban green design.



Waste Water Treatment Plant (WWTP)

El Prat de Llobregat

ABSTRACT:

The wastewater treatment plant (WWTP) and water regeneration station (ERA) in El Prat de Llobregat is one of the largest and most modern sanitation and regeneration facilities in Europe. It has the capacity to treat 420 million litres per day, equivalent to the water usage of 2 million inhabitants and their associated economic activities.

It is one of the few metropolitan water facilities that have water reuse processes. The reuse of water produces reclaimed water that is utilized for purposes other than human consumption (which requires higher quality), such as irrigation, urban cleaning, industrial and environmental uses, and aquifer recharge.

In a typical year, the primary sources for potable water production supplying the metropolitan area of Barcelona are surface water (44%) and Ter (34%), followed by groundwater (14%) and desalinated water (8%). In a drought year, the sources are distributed as follows: desalinated water (33%), reclaimed water (25%), groundwater (23%), and surface water (19%). Therefore, reclaimed water is a key contribution considering the projected water deficit in the future, estimated at 130 hm³/year by 2050.

This station has a treatment capacity to meet an annual demand over 50 hm³, nearly equivalent to the nominal capacity of the desalination plant. With a design flow rate of 3.25 m³/s, this water regeneration station (ERA) carries out the following types of treatment:

- Physical and chemical treatments, including microfiltration and disinfection.
- Ultrafiltration combined with reverse osmosis.

The Metropolitan Area of Barcelona manages this sanitation system.

FURTHER INFORMATION

[El Prat de Llobregat EDAR facilities and equipment](#) (only in Catalan)

[WEFE4MED Water reutilisation station El Prat de Llobregat](#)

RELEVANCE FOR PARTICIPATING CITIES

- This facility is at the forefront at the European level as it not only treats water but also regenerates it, meaning it carries out additional processes to achieve higher water quality, allowing it to be used for other purposes. The processes and treatments can serve as inspiration for cities looking to work on water regeneration as a strategy for urban or metropolitan water resilience.



2.3.5 Co-design workshop

2.3.5.1 Workshop objectives and structure

For the workshop, a dynamic activity was designed to apply the knowledge and insights gained to the practical case of the city of Bethlehem, addressing the initial situation presented. To achieve this, the technique of futures design was employed—a methodology that combines foresight, creativity, and strategy to explore possible future scenarios. Instead of merely predicting what lies ahead, it enables participants to imagine, create, and shape the desired future.

The first part of the activity aimed to have groups envision the city of Bethlehem in 2040 as a distant temporal horizon on which a desired vision could be projected. Secondly, participants were asked to discuss specific actions that should begin to be planned in the short and medium term to achieve the defined strategic vision.

In this exercise of translating concepts into specific actions, participants drew not only on the knowledge gained during the course but also on their own experiences and expertise. Additionally, they were asked to identify, if applicable, barriers that might be preventing the effective implementation of the proposed interventions.



3. Conclusions

The topics covered during the BAMB presentations allowed cities to learn about Barcelona's approach to key aspects for increasing urban resilience to known climate-related risks (mainly related to water scarcity and high temperatures):

- 1) The need to integrate adaptation/resilience in a transversal and interconnected manner with city strategies (mainly those related to urban transformation but also to mitigating emissions caused by the city itself),
- 2) The potential of greenery and NbS as multifunctional tools to improve the quality of life, well-being, and health of citizens and to reduce urban vulnerabilities,
- 3) The management of water resources and drought alert or emergency episodes.

The potential for transferring these references to cities requires understanding the main barriers or challenges expressed by the participating cities, which are presented in this section, along with a preliminary identification of possible lines of work to be developed to facilitate a transformation of cities centred around climate resilience. It is essential to state that resilience requires solutions tailored to the unique circumstances and challenges of each city.

Successful adaptation should go beyond isolated investments, requiring a fundamentally different way to address planning. Cities should lay on the idea that adaptation and development are deeply interconnected and mutually reinforcing: effective adaptation leads to positive development outcomes, and achieving strong development requires taking effective adaptation actions.



3.1 Challenges and barriers to overcome

Barriers to implementing nature-based solutions (NbS):

Nature-based Solutions (NbS) are considered essential tools for effectively conserving, managing, and restoring natural or modified ecosystems that address societal challenges (such as climate change, food security, water security, and natural disasters) while ensuring the well-being of people and biodiversity.

Limited understanding of specific NbS cost-effectiveness: There's a general understanding that, although NbS can be cost-effective in the long term, initial costs can deter adoption. In addition, lack of data quantifying the economic returns of NbS in similar urban contexts is pointed out as a discouraging element, diminishing the perception of feasibility. Additionally, existing experiences in similar cities do not involve performance and effective tracking systems, which could provide relevant insights for upscaling NbS.

Siloed governance and lack of policy frameworks: Traditional structures in city governments are based on sectoral silos, which can be a barrier to the implementation of approaches as transdisciplinary and intersectoral as NbS. Governance for NbS in the urban landscape must not only be transdisciplinary and intersectoral, but also systemic. Besides, there is a general absence of policies or regulations promoting NbS in urban planning.

Regulatory constraints or limitations and lack of incentives: Environmental and heritage protection laws and building regulations and planning permits often limit the number of potential opportunities for NBS implementation. Besides, within the cities there is no known local regulation or incentive to enhance NbS proliferation.

Limited available space and competing land uses: Often, NbS require more space than traditional "grey" solutions, so they may be competing with other uses for space allocation, considering that these cities present highly urbanized areas with dense population and a general lack of open space.

Inadequate planning regulations and bylaws: Some cities face relevant challenges associated to their current planning instruments and regulations, which are incapable of facilitating the provision of open public spaces, and mainly focused on the development of the built-up areas. Furthermore, no policies are currently main-streamed within the regional spatial planning system that guide the planning, designing, constructing, and managing the open public spaces in cities and towns.

Lack of integration with existing infrastructure: Difficulty in adapting existing buildings and infrastructure to accommodate NbS.

Citizen resistance: The success of many NbS interventions seems to relate to local community acceptance. In this sense, the mainstreaming of effective communications and participatory mechanisms is seen as a key mechanism for assuring citizen-level ownership of NbS projects.

Barriers to implementing solutions to increase water resilience:

Centralized governance: Water management in the Mediterranean region remains predominantly top-down, with national governments making most decisions. Local and regional authorities, despite being responsible for managing many consequences, have limited involvement in policy development.

Financial constraints: Building water resilience often demands substantial investments, such as for desalination plants, which can be prohibitively expensive. Donors typically fund only the initial project phases, leaving local and regional authorities struggling to finance smaller, less profitable projects. While innovative financing options (e.g., green bonds, PPPs, climate finance) are emerging, local authorities lack the expertise to access or manage these resources effectively.

Rapid urbanization: High urbanization rates, particularly in Israel, Jordan, and Lebanon, complicate long-term water infrastructure investments. The management of water resources by urban areas significantly impacts the broader water cycle, making sustainable urban planning crucial for achieving SDG 6 on clean water and sanitation.

Limited public awareness: Public understanding of water issues remains inadequate. While citizens express concern over immediate challenges like freshwater scarcity, they often fail to grasp the broader and long-term impacts of climate change on water resources. There's a general unwillingness of citizens to use reused water.

Technical capacity gaps: Implementing water-related projects requires advanced technical expertise, which is often lacking in smaller municipalities. Capacity-building initiatives, involving both national authorities and the private sector, are critical for addressing this gap. Additionally, insufficient enforcement of water regulations further hampers progress.

Other barriers or challenges affecting cities potential to deploy urban resilience:

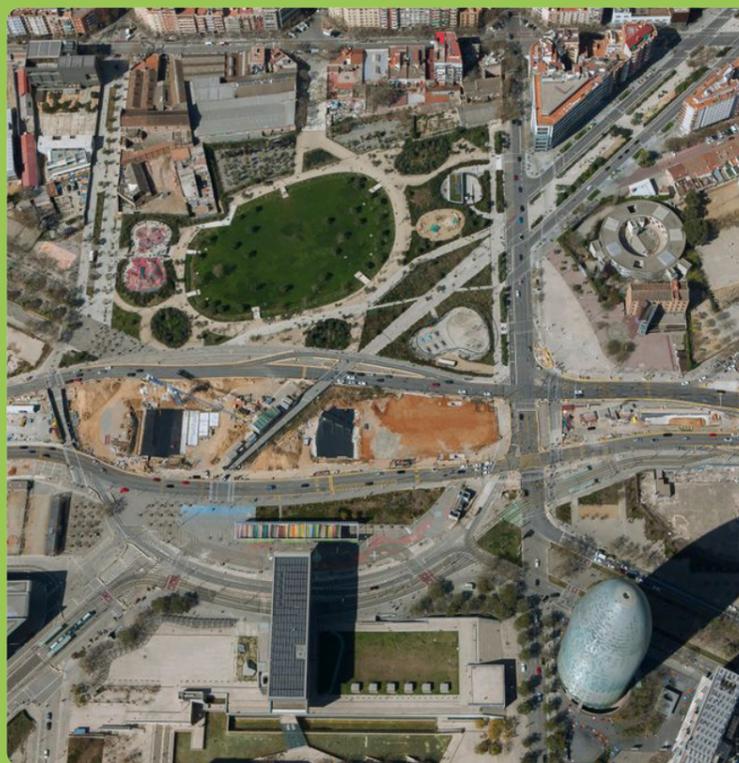
Lack of political commitment and long-term vision: Short-term political agendas and short-term planning frequent changes in local or regional administrations can impede long-term planning and do not create the sustained political will required for the implementation of some resilience solutions. This is mainly due to a lack of alignment between short-term political timelines and long-term delivery of the benefits.

Difficulty in coordinating external adaptation initiatives: Adaptation efforts often involve agents outside the city government. It is difficult to align, coordinate and track these external actions. Achievements not captured, information scattered, progress against targets of action plans unclear

Low public awareness and engagement: Limited public awareness of climate risks and resilience measures reduces community engagement in urban resilience initiatives. Also, there's a general sense of uncertainty of the best incentivizing strategies for behavioural change.

Insufficient financing mechanisms: Funding remains a critical challenge for urban resilience projects, particularly for local authorities. Small-scale projects are often overlooked by financial institutions due to low profitability, and there is limited experience in accessing international climate finance or innovative financing tools.

Informal settlements often lack basic infrastructure and services, making them particularly susceptible to climate hazards. This is reinforced by unplanned migration, which add stress on receiving areas, while displaced people living in temporary shelters and without community support networks are among the most vulnerable to climate and weather extremes.



3.2 Potential next steps to address cities' challenges and barriers

The following is a preliminary list of action areas that, in response to the identified needs, could facilitate the implementation of urban resilience actions in the participating cities:

Nature-based Solutions (NbS)

- Defining a common framework for documenting diverse NBS practices across cities, to ensure comparability and drive learnings.
- Providing peer-to-peer activities between mentoring-cities (those with transferable or scalable expertise) and learning-cities.
- Encouraging and supporting systematic cost-effectiveness analyses that consider NbS in comparison to other infrastructure.
- Developing public procurement criteria that accounts for differences between NbS and conventional grey solutions.

Governance & engagement

- Providing tools and methodologies to estimate social, ecosystem and economic costs of inaction.
- Enhancing multisectoral and multilevel governance by providing methods and tools.
- Providing coaching and training on new, innovative financing instruments and partnerships with the private sector.
- Setting up groups or regional alliances to pool the development and operating costs of some solutions (i.e. renewable energy infrastructure), which will make these projects more affordable and large-scale implementation feasible.
- Set institutional arrangements that anchor the linkages among the various non-state actors and systematically capture their achievements.

Other

- Deploying of 2-3 pilot-cases regarding adaptation of local regulations to allow the introduction of NbS or water-resilience solutions or even to make it mandatory. Also consider the limitations of heritage preservation.
- Diving deeper into the ancient wisdom embedded in traditional architectural practices, water cities for centuries.
- Creating a small discussion group to identify specific support to integrate climate resiliency in informal settlements or areas with high forcibly displaced populations.



BAMM participants at the Barcelona City Council, October 2024





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