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DELIVERABLE 2.3.2 – SYNTHETIC FACTSHEETS OF TESTED SOLUTIONS

–

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Cool Noons

Cool Noons is an innovative project for the way it addresses an urgent and underestimated issue such as the **evolution of urban tourism towards a more sustainable model**. Five pilot cities will be innovative solutions **to improve the visitor experience of tourists and residents during the hottest hours of the day**. The tools and methods used combine scientific accuracy, pragmatism and creativity, thanks to the diversity of the partners involved.

Mission: Enhancing sustainable tourism

Programme priority: Greener MED

Specific Objective: RSO2.4: Promoting climate change adaptation and disaster risk prevention, resilience, taking into account eco-system based approaches

Deliverable number and title (as identified in Jems): D2.3.2 – Synthetic Factsheets of Tested Solutions

Work package number, name of Work Package: WP2 – Testing and monitoring solutions for tourists and inhabitants

Activity number, name of activity: Activity 2.3 – Evaluating the implemented solutions in a cross-cultural and transferability perspective

Partner in charge (author): American College of Greece- Research Center (ACG-RC)

Partners involved: University of Coimbra (supporting partner)

All pilot territories (Ville de Marseille, Câmara Municipal de Lisboa, Imola Faenza Tourism Company, Municipality of Budva, DURA Dubrovnik Development Agency)

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EXECUTIVE SUMMARY

The COOL NOONS project addresses one of the most pressing challenges facing Mediterranean urban destinations: the growing impact of extreme heat on the liveability, accessibility, and attractiveness of cities for both residents and visitors. As heatwaves become more frequent and intense, the hottest hours of the day increasingly reduce the usability of public space, affect thermal comfort, and place pressure on urban tourism systems.

This deliverable, D2.3.2 - Factsheets, compiles the synthetic factsheets developed for the solutions tested within the COOL NOONS pilot territories. In line with the project framework, the factsheets document the implemented solutions through a common structure that captures their rationale, investment profile, observed and/or preliminary impacts based on available monitoring data, and monitoring approach. Their purpose is not only descriptive, but also strategic: they create a shared evidence base that supports comparison across pilot territories and contributes to the wider transferability of results to other Mediterranean cities.

The solutions presented in this deliverable reflect the diversity of urban and tourism contexts addressed by the project. Across the pilots, interventions include nature-based solutions, urban design measures, water-based infrastructure, and digital cultural experiences, demonstrating that effective urban heat mitigation requires locally calibrated responses. All interventions are embedded within or connected to the Cool Noon Paths, ensuring spatial coherence and user-oriented navigation across cooling solutions.

This final edition incorporates a significant enhancement prompted by peer review feedback: to enable genuine transferability, each factsheet now includes enriched operational information covering contractor types, procurement approaches, species palettes, and terms of reference structures. A consolidated Operational Guide (Section 9) synthesises these dimensions across the five pilots. Additionally, this edition introduces a dedicated section (Section 5) organising all tested solutions by intervention type, enabling practitioners to identify relevant approaches by category regardless of pilot location.

PILOTS AT A GLANCE

City	Country	Intervention Type	Total Investment	Key Objective
Marseille	France	Urban Design + NBS + Behavioural	EUR 106,700	Islands of Coolness along tourist routes
Lisbon	Portugal	Nature-Based (NBS)	EUR 45,000	Urban greening and shade in exposed spaces
Imola	Italy	NBS + Urban Furniture + Water	EUR 37,500	Comfortable walkability to key destinations



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City	Country	Intervention Type	Total Investment	Key Objective
Budva	Montenegro	NBS + Shading Structures	EUR 35,000	Coastal cooling nodes for residents and tourists
Dubrovnik	Croatia	Digital / Service-based	EUR 23,000	Indoor cultural cooling refuge (Maritime Museum)



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1. INTRODUCTION

Mediterranean cities are increasingly confronted with the impacts of rising temperatures and more frequent extreme heat events. These trends significantly affect the quality of urban life, the comfort and safety of public spaces, and the sustainability of tourism systems. Heatwaves reduce the usability of public space during the hottest hours of the day, discourage pedestrian activity, and affect both residents and visitors, particularly in areas with high tourist concentration and limited natural shade.

The COOL NOONS project responds to this challenge by exploring practical, place-based solutions that mitigate the effects of heat stress in Mediterranean urban and tourism environments. The project brings together five pilot territories - Marseille, Lisbon, Imola, Budva and Dubrovnik - each of which has implemented one or more locally adapted cooling interventions in public spaces or indoor cultural venues.

Within this framework, Activity 2.2 - Testing and Monitoring focuses on the real-world implementation of selected solutions and the assessment of their effectiveness. Deliverable D2.3.2 forms a key component of the documentation and knowledge-sharing process within the project. The factsheets present essential information on the rationale of each intervention, the type of solution, the investment profile, and the monitoring approach adopted.

A key enhancement in this final edition concerns the operational dimensions of transferability. Feedback from peer review emphasised that genuine transferability requires not just a description of what was done, but practical operational detail: which contractor types were engaged, how procurement was managed, which plant species were selected and why. Each factsheet has been enriched with this information, and Section 9 provides a consolidated Operational Guide.

By consolidating these factsheets into a single deliverable, the project creates a structured evidence base documenting the solutions tested across the five COOL NOONS territories, supporting learning within the partnership, communication to external stakeholders, and the transferability of results to other Mediterranean cities.





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2. METHODOLOGY FOR THE COLLECTION OF FACTSHEETS

In order to ensure consistent and comparable documentation of the pilot interventions implemented within COOL NOONS, each participating city prepared a synthetic factsheet for each solution tested. The factsheets were prepared on the basis of a common reporting template developed by the supervising partner ACG-RC.

To facilitate comparability across the different pilot territories, the project partners agreed on a common reporting template. The template was designed to be both structured and flexible, enabling pilots to document their specific interventions while ensuring the information could be compared across different urban contexts.

A focus group, held on 9 December 2025, facilitated the knowledge sharing and cooperation work between partners. This session proved particularly useful in refining the factsheet template, clarifying expectations around the operational content to be included, and encouraging a consistent level of detail across all contributions.

The information included in the factsheets was provided by the pilot territories based on implementation records, monitoring activities, and local data collected during the testing period. Each factsheet follows a common structure and includes the following key elements:

1. Description and rationale of the solution, explaining the specific urban challenge addressed and the reasons why the solution was selected.
2. Type of intervention (nature-based, urban design, water-based, digital/service, or behavioural/communication).
3. Description of the micro-urban space where the intervention was implemented, including spatial characteristics and urban role.
4. Investment overview and funding sources, including COOL NOONS project funding and local co-financing.
5. Implementation partners and contractors, including the types of organisations involved and the procurement approach used.
6. For nature-based solutions: plant palette and species selection, with ecological and climatic rationale.
7. Environmental, social and economic impacts, including both expected and observed benefits.
8. Monitoring indicators and reporting schedule, including KPIs and the timeframe for data collection.



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3. OVERVIEW OF PILOT SOLUTIONS

The pilot interventions implemented within COOL NOONS reflect the diversity of urban contexts, climatic conditions and tourism dynamics present across the Mediterranean region. The project adopted a place-based approach, allowing each pilot territory to select and implement solutions that respond to the specific challenges of their urban environment. As a result, the solutions cover a broad spectrum of climate adaptation strategies.

Nature-based solutions (NBS) focus on increasing urban vegetation and improving microclimatic conditions. These interventions include tree and shrub planting, climbing plants on pergola structures, soil permeability improvement, and de-waterproofing of tree pits. NBS are represented in Marseille, Lisbon, Imola and Budva.

Urban design and infrastructure interventions aim to improve thermal comfort through physical modifications to public space, including pergola shading structures, seating and picnic furniture, drinking fountains, and pedestrianisation of key routes. These are represented in Marseille, Imola and Budva.

Service-based and digital solutions focus on encouraging the use of existing indoor spaces as cooling refuges, particularly in historic environments where physical interventions are restricted. The Dubrovnik AR Museum experience is the primary example, while Marseille also deployed a behavioural "Gourde Friendly" service alongside its physical interventions.

3.1. Integrated Cooling Approach

The COOL NOONS solutions operate through a combination of physical, behavioural and service-based mechanisms that together improve thermal comfort and the usability of public space.





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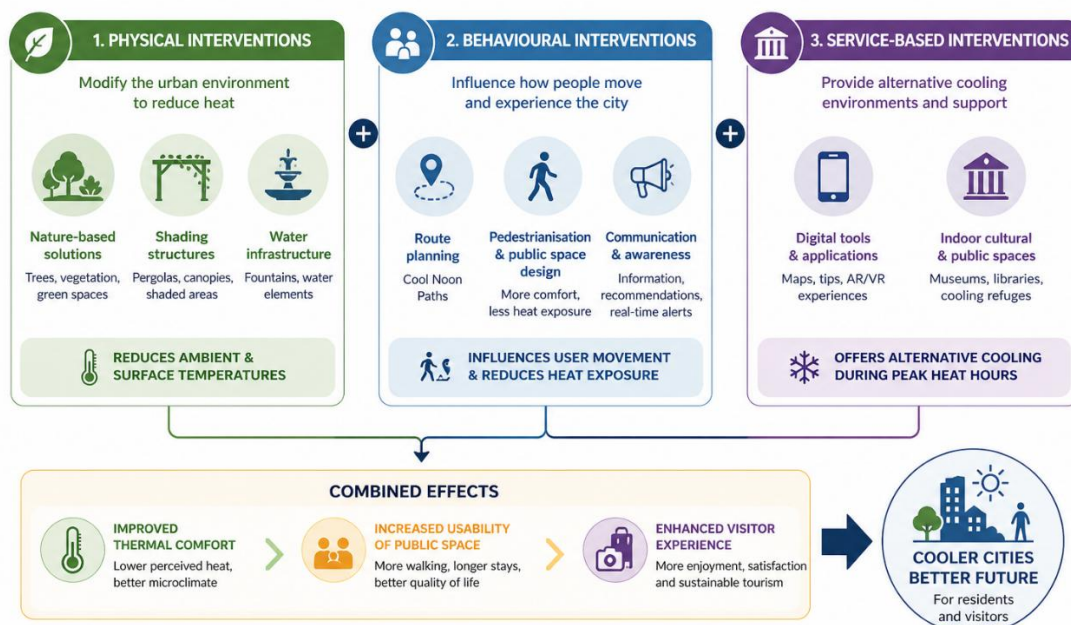
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COOL NOONS INTEGRATED COOLING APPROACH

Physical + Behavioural + Service-based solutions for cooler, more liveable Mediterranean cities



Physical interventions: Nature-based solutions, shading structures and water infrastructure reduce ambient and surface temperatures.

Behavioural interventions: Route planning, pedestrianisation and communication measures influence user movement and exposure to heat.

Service-based interventions: Digital tools and indoor cultural spaces provide alternative cooling environments during peak heat hours.

These combined mechanisms contribute to improved thermal comfort, increased usability of public space, and enhanced visitor experience.

Comparative Overview of Pilot Solutions

City	Country	Main Solution Type	Investment	Interventions	Key Objective
Marseille	France	Urban Design + NBS + Behavioural	EUR 106,700	6 combined	Shaded cooling islands along seafront and tourist routes
Lisbon	Portugal	Nature-Based (NBS)	EUR 45,000	1 (3 locations)	Urban greening and thermal comfort in exposed public spaces



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City	Country	Main Solution Type	Investment	Interventions	Key Objective
Imola	Italy	NBS + Urban Furniture + Water	EUR 37,500	3 (Trees, Benches, Fountains)	Walkable comfort connecting key urban destinations
Budva	Montenegro	NBS + Shading (Pergolas)	EUR 35,000	1 combined	Cooling nodes along exposed coastal pedestrian corridor
Dubrovnik	Croatia	Digital / Service-based	EUR 23,000	1	Indoor cultural refuge during peak heat hours



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4. SYNTHETIC FACTSHEETS OF IMPLEMENTED SOLUTIONS

The following section presents a full synthetic factsheet for each solution implemented across the five COOL NOONS pilot territories. Where a pilot territory implemented multiple distinct solutions (Marseille and Imola), each solution is presented in a separate factsheet. A total of seven factsheets are presented.

4.1 Marseille, France - Islands of Coolness

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Synthetic Factsheet

Islands of Coolness

Marseille

France

*Combined NBS + Urban Design +
Behavioural*

1. SOLUTION SUMMARY

1.1 Objective and Rationale

The pilot in the City of Marseille focuses on the creation of a network of "Islands of Coolness", combining several complementary climate adaptation measures along key pedestrian routes and tourist-frequented public spaces. The solution enhances thermal comfort for both residents and visitors by introducing shade structures, water access points, nature-based elements, and behavioural initiatives.

Marseille is one of the most climatically exposed urban centres in the western Mediterranean. Its seafront promenades, historic districts and tourist corridors suffer from intense solar radiation during summer, with limited existing shade and insufficient public water access. The selected interventions target these specific gaps.

1.2 Type of Solution

Primary type: Combined intervention: Nature-Based Solutions (NBS), Technical/Urban Design, and Behavioural/Communication

The main components are:

9. Pergolas, tables and seats: Shading structures with integrated seating along tourist paths, particularly the Corniche seafront.
10. Drinking fountains: Installation of 3 public drinking water fountains at locations lacking free water access.
11. "Gourde Friendly" network expansion: Free water refill at participating shops - a behavioural initiative complementing physical fountains.



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12. Climbing plants in pots: Installed on pergola frames and in containers, providing freshness, greenery and pollinator habitat.
13. De-waterproofing of tree pits: Allowing rainwater to infiltrate soil around street trees, improving evapotranspiration. Financed by the metropolitan area.
14. Pedestrian routes and car-speed reduction zones: Pedestrianisation and speed reduction as low-cost heat mitigation measures.

1.3 The Micro-Urban Place

The interventions were implemented across several strategic locations: the Corniche seafront (high tourist exposure, minimal shade), Saint-Antoine district (residential area with extended shaded spaces), Cours Julien district (mixed cultural area, climbing plants and pedestrianisation), and Boulevard Longchamp (historical boulevard, de-waterproofing and additional fountain).

1.4 Target Area and Contact

Locations: Corniche seafront, Saint-Antoine district, Cours Julien district, Boulevard Longchamp - Marseille, France

Contact: Margot JACQ, Project Manager | mjacq@marseille.fr | +33 6 63 59 56 43

Further information: <https://www.marseille.fr/environnement/actualites/projet-europeen-cool-noons-pour-des-parcours-de-fraicheur-en-ete>

2. INVESTMENT OVERVIEW

Budget Item	Amount
Implementation of pergolas, tables and seats	EUR 90,000
Climbing plants in pots	EUR 10,000
De-waterproofing of tree pits	Financed by metropolitan area
Installation of 3 drinking fountains	Financed by metropolitan area
"Gourde Friendly" network expansion	EUR 0 (partnership-based)
Pedestrian route improvements	EUR 0 (regulatory measure)
Community Engagement / Promotion	EUR 11,000
Monitoring and Evaluation	EUR 6,000
TOTAL (direct project cost)	EUR 106,700 infrastructure + EUR 17,000 engagement/monitoring

Funding Sources: EU Interreg Euro-MED - COOL NOONS (80%) and City of Marseille co-financing (20%)



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Implementation Partner: Direction de l'Espace Public, City of Marseille; local urban furniture supplier; landscape company specialising in urban greening; COOL NOONS communication officer

Procurement Approach: Public tender for physical infrastructure; direct contract for landscape and greening works

3. PLANT PALETTE

Species selection was guided by three criteria: drought tolerance, suitability to the Mediterranean coastal climate, and effectiveness in a container or pergola-mounted growing environment.

Species (Latin)	Common name	Type	Cooling function	Notes
Hedera helix	Common ivy	Climbing/evergreen	Year-round canopy	Fast establishment; good on pergola frames
Parthenocissus tricuspidata	Boston ivy	Climbing/deciduous	Summer shade, winter light	Ideal for pergola draping; vivid autumn colour
Bougainvillea glabra	Paper flower	Climbing/semi-evergreen	Dense summer canopy	Suited to warm coastal microclimates
Wisteria sinensis	Chinese wisteria	Climbing/deciduous	Spring to summer shade	Fragrant; strong overhead coverage
Lonicera japonica	Japanese honeysuckle	Climbing/semi-evergreen	Shade and evapotranspiration	Supports pollinators; drought tolerant once established

4. KEY IMPACTS

Environmental

Temperature under pergolas measured at approximately -18 degrees C relative to exposed areas during July 2025 monitoring (temperatures between 21 and 27 degrees C recorded under pergolas). Addition of 33 plant pots increasing urban greenery. 144 m2 of new shaded surface. 120 m2 of de-waterproofed area around tree pits.

Social



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Improved access to free drinking water at three new public fountain points. Increased thermal comfort for pedestrians, residents and tourists in shaded areas. Enhanced usability of public space during the hottest midday hours.

Economic

Potential indirect benefits through increased attractiveness and footfall along key tourist routes. Direct economic impact has not yet been formally measured, but improved comfort is expected to support local commercial activity.

Tourism-Urban Policy Interface

The solution strengthens Marseille's strategy for climate adaptation in tourist-intensive areas by linking comfort infrastructure, green spaces and behavioural nudges into a coherent "Cool Path" network, demonstrating that climate adaptation and tourism management can be integrated as mutually reinforcing policies.

Strategic Alignment

The interventions contribute to Marseille's climate adaptation strategy for heat waves (increasing shaded surfaces, green spaces, and "Cool paths" to improve walkability). They align with the EU Green Deal and the European Mission "100 Climate-Neutral and Smart Cities" objectives.

5. MONITORING HIGHLIGHTS

Monitoring Indicator	Detail
Temperature variation	Average -18 degrees C under pergolas vs exposed areas; measured in July 2025 during peak midday conditions (12:00–13:00) at locations: J4, Vieux-port, Corniche Fregier, Gare Saint-Antoine, Bonne-Mere
Shaded area added	144 m2
De-waterproofed area	120 m2
New drinking fountains	3 fountains installed
Greenery added	33 new plant pots on pergola frames and in containers
Reporting Schedule	Temperature monitoring conducted during summer 2025, July, during peak midday conditions (12:00–13:00). Seasonal surveys and annual assessments planned.
Lead Monitoring Body	City of Marseille (Project Manager with intern support)



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4.2 Lisbon, Portugal - Urban Cooling through Nature-Based Interventions

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Synthetic Factsheet

Urban Cooling through NBS in Alvalade and Monsanto

Lisbon

Portugal

Nature-Based Solution (NBS)

1. SOLUTION SUMMARY

1.1 Objective and Rationale

The Lisbon pilot applies nature-based solutions to improve microclimatic conditions in highly exposed public spaces. The objective is to reduce thermal stress during peak summer hours for residents and tourists by implementing small-scale, replicable NBS in urban spaces with high solar exposure.

The interventions introduce vegetation and shaded resting areas in frequently used pedestrian public spaces. All sites are publicly owned and managed by the municipality, enabling direct implementation without land acquisition constraints. By improving shading, microclimatic conditions and the usability of public spaces, the solution tests practical cooling measures that can be replicated across similar Mediterranean cities.

1.2 Type of Solution

Primary type: Nature-Based Solution (NBS)

Urban greening through arboreal and shrub vegetation, creation of shaded resting areas, improvement of soil permeability and enhancement of local microclimatic conditions.

1.3 The Micro-Urban Place and Target Area

Three locations were selected in the Alvalade and Monsanto districts of Lisbon, all publicly owned and managed by the municipality:

15. Logradouro na Rua Mario de Sa Carneiro, Alvalade (38 44'59.6"N 9 08'47.5"W): A residential courtyard-type space in a high-density urban neighbourhood with strong relevance for elderly residents.

16. Jardim da Amnistia Internacional, Monsanto (38 44'06.2"N 9 09'48.4"W): A public garden within the Monsanto forest park, used by residents and visitors.

17. Rua Rosalia de Castro, Alvalade (38 45'12.5"N 9 08'47.4"W): A streetside public space along a residential street with high pedestrian use.

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2. INVESTMENT OVERVIEW

Budget Category	Amount / Source
Total Investment	EUR 45,000
Infrastructure / Equipment	EUR 45,000 (NBS elements, materials, installation)
Design / Service Development	Municipality in-house resources (in-kind)
Community Engagement	Municipality in-house resources (in-kind)
Monitoring and Evaluation	Municipality in-kind + University of Coimbra
Funding Sources	EU Interreg Euro-MED - COOL NOONS and local government (in-kind contribution)
Implementation Partners	Municipal parks department (Lisbon Verde / DMMA); pre-qualified landscape contractors under municipal framework agreement; specialist subcontractor for soil permeability
Procurement Approach	Framework agreement for urban greening works (no new tender required); specialist subcontract for soil permeability improvements

3. PLANT PALETTE

Species selection was developed in consultation with municipal landscape services and local botanists, targeting drought-resistant, climate-adapted plants appropriate to the Atlantic-Mediterranean context of Lisbon.

Species (Latin)	Common name	Type	Cooling function	Notes
<i>Celtis australis</i>	European nettle tree	Deciduous tree	Dense summer canopy	Fast-growing; excellent urban heat resilience
<i>Cercis siliquastrum</i>	Judas tree	Small deciduous tree	Shade; spring blooms	Tolerates poor soils; native to Mediterranean basin
<i>Olea europaea</i>	Olive tree	Evergreen tree	Year-round partial shade	Iconic; highly drought-tolerant once established
<i>Pistacia lentiscus</i>	Mastic shrub	Evergreen shrub	Ground-level shade	Dense, robust; minimal maintenance
<i>Lavandula angustifolia</i>	English lavender	Perennial shrub	Evapotranspiration	Drought resistant; aromatic; understory use



Species (Latin)	Common name	Type	Cooling function	Notes
Festuca glauca	Blue fescue	Ornamental grass	Ground cover	Low water demand; tolerates heat and compaction

4. KEY IMPACTS

Environmental: Reduction of ambient and surface temperatures during peak heat periods; increase in urban greenery and soil permeability; local mitigation of urban heat island effects through shade and natural evapotranspiration.

Social: Improved thermal comfort for residents, pedestrians and tourists; increased usability of public spaces during summer daytime hours. Positive effects on vulnerable groups, particularly elderly populations in the Alvalade areas.

Economic: Enhanced urban attractiveness and public space quality, with indirect positive effects on local activity and urban vitality.

Strategic Alignment: Aligned with Lisbon's climate action framework, including European projects DECA and UP2030, and the city's Climate Contract (climate neutrality by 2030).

5. MONITORING HIGHLIGHTS

KPI	Measurement approach
Shaded area created or enhanced (m2)	Pre/post measurement of shaded areas
Surface temperature differences (degrees C)	Before and after intervention temperature comparison
User perception of thermal comfort	Qualitative surveys during summer monitoring periods
Reporting Schedule	Seasonal monitoring during summer periods; annual assessment; comparative analysis between shaded and non-shaded areas
Lead Monitoring Body	Lisbon Municipality (DMMA) and University of Coimbra



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4.3 Imola, Italy - Tree Planting in Urban Squares

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Synthetic Factsheet

Tree Planting in Public Squares (Piazzale Michelangelo and Piazza Gramsci)

Imola

Italy (Metropolitan City of Bologna)

Nature-Based Solution (NBS)

1. SOLUTION SUMMARY

1.1 Objective and Rationale

This solution addresses heat stress, lack of shade, and the mitigation of urban heat in key public spaces of Imola. During the hottest hours of summer days, exposed squares and parks become uncomfortable, deterring pedestrian use and affecting residents and tourists alike. Five trees were planted in two strategic public spaces to provide shade and contribute to the mitigation of urban heat.

1.2 Type of Solution

Primary type: Nature-Based Solution (NBS)

The intervention involves planting trees to provide shade and contribute to the mitigation of urban heat. The trees enhance microclimatic cooling, improve comfort for residents and tourists, and contribute to the development of a continuous Urban Green Infrastructure connecting the train station, historic centre and Autodromo.

1.3 The Micro-Urban Place and Target Area

The solution is implemented in two key public spaces in Imola: Piazzale Michelangelo (4 trees planted) and Piazza Gramsci (1 tree planted). These areas are important spots in the mobility network, located along the main pedestrian route connecting the Train Station, the historic centre and the Autodromo - used both as everyday spaces for residents and as transit corridors for event visitors.

Target locations: Piazzale Michelangelo (4 trees) and Piazza Gramsci (1 tree), Imola city centre

Contact: Alice Menegatti, Citta Metropolitana di Bologna |
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Action Plan:

https://www.cittametropolitana.bo.it/progetti_europei/Documenti_ita/Imola_presentazione_progetto_cool_noons_citta_piu_verdi_e_vivibili

Solution map:

<https://www.google.com/maps/d/u/0/viewer?mid=1IEUZqQXW5EfM67MwFmRYHsYCT6dSsO0>



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2. INVESTMENT OVERVIEW

Budget Category	Amount
Infrastructure / Equipment (5 trees + 4 fountains + installation)	EUR 25,000 (shared with fountains component)
Funding Sources	EU Interreg Euro-MED - COOL NOONS and local municipal co-financing
Implementation Partners	Municipality of Imola (Technical Services); local landscape contractor; Citta Metropolitana di Bologna
Procurement Approach	Simplified competitive procedure for landscape works

3. PLANT PALETTE

Species were chosen in consultation with the municipal green infrastructure office and a local arborist, selecting drought-tolerant, high-canopy deciduous trees suited to the Po Valley sub-continental Mediterranean climate.

Species (Latin)	Common name	Type	Cooling function	Notes
Tilia cordata	Small-leaved lime	Deciduous tree	Dense summer canopy; evapotranspiration	Excellent urban resilience; fragrant in June; classic avenue tree
Platanus x acerifolia	London plane	Deciduous tree	Large canopy; high evapotranspiration	Very robust; tolerates pollution and compaction
Celtis australis	European nettle tree	Deciduous tree	Medium canopy; drought tolerant	Adapted to Po Valley conditions; good for pedestrian squares
Gleditsia triacanthos 'Skyline'	Honeylocust (thornless)	Deciduous tree	Light filtered shade; nitrogen fixation	Tolerates heat, drought, salt; compact crown

4. KEY IMPACTS



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Environmental: Five trees increased shaded areas and vegetation in key public spaces, contributing to mitigation of urban heat and improved thermal comfort. The partly grass-covered ground at Piazzale Michelangelo already offers some permeability; the new trees build on this with additional canopy and evapotranspiration capacity.

Social: The new trees improve thermal comfort and perceived well-being for residents and tourists. They provide shaded spots along the path connecting the train station to the Autodromo, improving walkability during the hottest hours.

Economic: The trees increase the attractiveness and use of public spaces during the hottest hours, supporting tourism and local activities. Shaded areas encourage walking and cycling, extending the period during which public spaces are comfortably usable.

Tourism-Urban Policy Interface: By integrating shade and vegetation into everyday public spaces, the trees improve quality of life for residents while also serving the large numbers of visitors passing through during major events at the Autodromo.

Strategic Alignment: Contributes to Imola's Climate Adaptation and Mitigation strategy and Urban Green Infrastructure plan. Supports Agenda 2030 goals (particularly Goals 10 and 13) and EU Green Deal objectives.

5. MONITORING HIGHLIGHTS

KPI	Detail
Number of trees planted and surviving (target: 5)	Post-installation assessment and annual survival check
Shaded area created	Measurement of canopy projection at maturity
Temperature variation	Thermal imaging during summers 2024 and 2025
User perception surveys	Surveys during summers 2024 and 2025; tourists and residents
Heat risk exposure (Risk = P x V x E)	Combined peril x vulnerability x exposure index
Reporting Schedule	Data collection during summers 2024 and 2025; co-creation workshops with citizens and local associations
Lead Monitoring Body	Municipality of Imola, Area Blu (urban planning support), Villaggio Globale (technical team), Citta Metropolitana di Bologna



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4.4 Imola, Italy - Urban Benches and Resting Furniture (Giardino Bernabe)

COOL NOONS

Synthetic Factsheet

Urban Benches and Resting Furniture in Giardino Bernabe

Imola

Italy (Metropolitan City of Bologna)

Technical / Urban Design Solution

1. SOLUTION SUMMARY

1.1 Objective and Rationale

This solution enhances the comfort and usability of public spaces by providing resting points along key urban routes in Imola. By installing benches and picnic tables in strategic locations, the intervention addresses the lack of seating infrastructure in spaces used by commuters, students, residents and tourists along the main route between the Train Station and the Autodromo.

Two picnic tables with integrated seating were installed in Giardino Bernabe, a public garden that is a strategic rest point along the main pedestrian route from the Train Station to the Autodromo. The garden features existing tree canopy which provides natural shade for the new furniture.

1.2 Type of Solution

Primary type: Technical / Urban Design Solution

Although benches do not directly modify the microclimate, they support more sustainable use of shaded public space by providing comfortable resting opportunities and encouraging people to remain in thermally comfortable zones provided by existing trees.

1.3 The Micro-Urban Place and Target Area

The benches and tables are installed in Giardino Bernabe, a public garden in Imola, accessible from the historic centre along pleasant tree-lined avenues. It is a strategic rest point on the pedestrian and cycling route connecting the historic centre with the Train Station and the Autodromo, used by both daily commuters and event visitors.

Target location: Giardino Bernabe, Imola city centre

Contact: Alice Menegatti, Citta Metropolitana di Bologna |
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2. INVESTMENT OVERVIEW

Budget Category	Amount
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Furniture and furnishings (2 picnic tables + benches + installation)	EUR 12,500 (part of combined Imola investment of EUR 37,500)
Funding Sources	EU Interreg Euro-MED - COOL NOONS and local municipal co-financing
Implementation Partners	Municipality of Imola (Technical Services); urban furniture supplier from pre-approved municipal catalogue
Procurement Approach	Direct procurement from pre-approved municipal supplier; simplified procedure given low contract value

4. KEY IMPACTS

Environmental: Benches support more sustainable use of shaded areas by encouraging people to rest under existing tree canopy rather than seeking less comfortable locations. They do not directly modify the microclimate but amplify the benefit of existing shade.

Social: The benches and tables provide comfortable spaces for residents, students, and visitors to rest, meet, and socialise, enhancing the social quality of the garden. Particularly beneficial for elderly users and families during warm periods.

Economic: The benches encourage residents and visitors to spend more time in the area, indirectly benefiting nearby businesses. Improved usability as a resting point along the main event route supports a positive experience for the large volume of Autodromo event visitors.

Tourism-Urban Policy Interface: Imola receives large numbers of visitors for Autodromo events. Benches and tables in a strategic garden along the main access route improve the quality of the pedestrian experience and support the city's commitment to walkable, climate-resilient tourism infrastructure.

Strategic Alignment: Aligns with Imola's climate adaptation and urban infrastructure strategy; supports EU Green Deal and Agenda 2030 objectives (Goals 10, 11, 13).

5. MONITORING HIGHLIGHTS

KPI	Detail
Number of benches and tables installed	2 picnic table sets (including integrated seating)
User perception surveys	Surveys during summers 2024 and 2025 with tourists and residents
Thermal pictures	Conducted during monitoring summers to assess use of shaded space
Co-creation workshops	With citizens and local associations during 2024-2025



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Reporting Schedule	Summers 2024 and 2025; annual review
Lead Monitoring Body	Municipality of Imola, Area Blu, Villaggio Globale (technical team), Citta Metropolitana di Bologna



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4.5 Imola, Italy - Public Drinking Fountains

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Synthetic Factsheet

Public Drinking Water Fountains at Key Urban Squares

Imola

Italy (Metropolitan City of Bologna)

Technical / Water-Based Solution

1. SOLUTION SUMMARY

1.1 Objective and Rationale

This solution addresses the lack of public water points and the high risk of dehydration during extreme heat waves in Imola. The selected areas were highly exposed to heat stress and lacked free water access. Four public drinking fountains were installed at the most exposed and highly frequented public spaces, providing immediate physiological cooling through hydration.

1.2 Type of Solution

Primary type: Technical / Urban Design Solution (Water-based)

The solution involves installing public drinking water fountains connected to the public water network, providing a sustainable and maintenance-supported source of drinking water. This infrastructure is managed by Hera S.p.A., the local water utility, under a service agreement.

1.3 The Micro-Urban Place and Target Area

The solution is implemented in four strategic areas of Imola: Piazza Medaglie d'Oro, Piazza Saffi, the Rocca Sforzesca area, and Viale Dante. These spaces are primary transit and pedestrian points of the city, highly exposed to the sun and lacking natural shade and water access. They serve as key stopping points for both residents and tourists.

Target locations: Piazza Medaglie d'Oro, Piazza Saffi, Rocca Sforzesca area, Viale Dante - Imola

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2. INVESTMENT OVERVIEW

Budget Category	Amount
Infrastructure / Equipment (4 fountains + installation)	EUR 25,000 (shared: 5 trees + 4 fountains, installation)



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Funding Sources	EU Interreg Euro-MED - COOL NOONS and local municipal co-financing
Implementation Partners	Municipality of Imola (Technical Services); Hera S.p.A. (water utility) for connection and maintenance; Citta Metropolitana di Bologna
Procurement Approach	Service agreement with water utility Hera S.p.A.; direct procurement for fountain units

4. KEY IMPACTS

Environmental: The four drinking fountains provide a sustainable water source, reducing reliance on single-use plastic bottles. Water availability along paved, high-traffic routes supports thermal comfort through hydration and contributes to a more complete heat adaptation strategy.

Social: The fountains improve thermal comfort and public health for residents, tourists, Autodromo event visitors, and vulnerable groups. Free hydration access reduces heat-related health risks, especially for elderly persons and children, and contributes to social inclusiveness.

Economic: Free drinking water increases the attractiveness and usability of public spaces during the hottest hours, indirectly supporting local commerce and tourism. Making key routes more comfortable encourages longer stays in the city centre and extended use of public spaces during summer events.

Tourism-Urban Policy Interface: By providing free water access in high-traffic transition areas, this solution strengthens the city's commitment to climate resilience and sustainable mobility linking the train station to the Autodromo.

Strategic Alignment: Supports Imola's Climate Adaptation and Mitigation strategy. Aligns with EU Green Deal and Agenda 2030 Goals 6 (Clean Water), 10 (Reduced Inequalities) and 13 (Climate Action).

5. MONITORING HIGHLIGHTS

KPI	Detail
Number of drinking fountains installed	4 fountains at strategic locations across Imola
User perception surveys	Surveys during summers 2024 and 2025; residents and tourists
Thermal pictures	Conducted at key monitoring periods
Heat risk exposure (Risk = P x V x E)	Combined index: Peril x Vulnerability x Exposure



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Reporting Schedule	Data collection summers 2024 and 2025; co-creation workshops with citizens and local associations
Lead Monitoring Body	Municipality of Imola, Area Blu, Villaggio Globale (technical team), Citta Metropolitana di Bologna



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4.6 Budva, Montenegro - Coastal Cooling Nodes

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Synthetic Factsheet

Coastal Cooling Nodes

Budva

Montenegro

*Nature-Based + Urban Shading
(Combined)*

1. SOLUTION SUMMARY

1.1 Objective and Rationale

This solution reduces thermal stress in highly exposed coastal pedestrian areas by installing four shade structures (pergolas) and planting Mediterranean trees and shrubs along a coastal pedestrian corridor. The intervention addresses the dual challenge of intense direct solar radiation and the near-total absence of natural shade in Budva's most-frequented coastal public spaces, which are heavily used by residents and international tourists throughout the summer season.

1.2 Type of Solution

Primary type: Combined Nature-Based and Technical Urban Design solution

Pergolas provide immediate structural shade, while newly planted Mediterranean coastal trees and shrubs provide growing natural shade and evapotranspiration benefits over time. The combination ensures both short-term comfort improvement and long-term ecological benefit.

1.3 The Micro-Urban Place and Target Area

The intervention is located in a coastal pedestrian corridor characterised by high solar exposure due to the open seafront setting and the near-total absence of existing vegetation. The selected locations have the highest pedestrian activity along tourist routes, adjacent to the beach and connected to the historic old town.

Target area: Pedestrian coastal walkway and adjacent public spaces, Budva Municipality, Montenegro

Contact: Milos Ivanisevic, External Expert | milos.ivanisevic26@gmail.com

2. INVESTMENT OVERVIEW

Budget Category	Amount
Total Investment	EUR 35,000

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Infrastructure / Equipment (pergolas + trees + installation)	EUR 34,901.35
EU Funding (Interreg Euro-MED - COOL NOONS)	EUR 28,000
Municipal Co-funding	EUR 7,000
Implementation Partners	City of Budva - Secretariat for Urban Planning; local outdoor structure contractor; coastal horticulture company; local environmental NGO (monitoring)
Procurement Approach	Public tender for pergola structures; simplified procedure for planting works

3. PLANT PALETTE

Species selection was guided by the specific constraints of the Adriatic coastal microclimate: high solar radiation, salt-laden winds, dry summers and shallow rocky soils. All selected species have demonstrated tolerance of these conditions.

Species (Latin)	Common name	Type	Cooling function	Notes
<i>Pinus halepensis</i>	Aleppo pine	Evergreen tree	Year-round partial shade; windbreak	Native to Mediterranean coast; salt-tolerant; fast-growing
<i>Quercus ilex</i>	Holm oak	Evergreen tree	Dense year-round canopy	Extremely durable; native to Adriatic coast; long-lived
<i>Tamarix gallica</i>	French tamarisk	Deciduous shrub/tree	Shade and evapotranspiration	Highly salt-tolerant; ideal for seafront locations
<i>Nerium oleander</i>	Oleander	Evergreen shrub	Dense summer foliage; windbreak	Drought-tolerant; NB: toxic if ingested - place away from children
<i>Teucrium fruticans</i>	Tree germander	Evergreen shrub	Ground-level shade and cover	Salt and drought tolerant; fragrant; low maintenance

4. KEY IMPACTS



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Environmental: The pergolas and newly planted Mediterranean trees and shrubs increase shaded surface area and reduce radiant heat exposure in the coastal corridor. The combination of structural shading and growing vegetation is expected to produce measurable temperature reductions, while salt-tolerant species contribute to improved biodiversity along the coast.

Social: The solution enhances thermal comfort for pedestrians, beachgoers, elderly residents, and tourists. By providing shaded resting areas along the busiest tourist walking route, the intervention improves the quality of the coastal visitor experience and makes the seafront more accessible during the hottest midday hours.

Economic: By improving comfort along a key tourist route, the intervention supports local businesses and extends the duration of outdoor activities during hot periods. Enhanced attractiveness of the coastal corridor is expected to contribute positively to the local tourism economy.

Tourism-Urban Policy Interface: The solution strengthens the connection between tourism management and urban climate adaptation, addressing a gap in the city's outdoor infrastructure that was negatively affecting both resident quality of life and tourist satisfaction.

Strategic Alignment: Aligns with Montenegro's climate adaptation priorities, Budva's sustainable tourism strategy, and EU Green Deal objectives. Contributes to Agenda 2030 Goals 11 (Sustainable Cities) and 13 (Climate Action).

5. MONITORING HIGHLIGHTS

KPI	Detail
Shaded surface area added (m2)	Pre/post measurement of shaded corridor area
Temperature variation (degrees C)	Measurement under pergolas vs. exposed areas
User perception surveys	Seasonal surveys with pedestrians, tourists and residents
Visitor flow during peak heat hours	Observation and counting methodology
Reporting Schedule	Monitoring conducted during the summer implementation period; seasonal surveys
Lead Monitoring Body	Municipality of Budva / local environmental NGO (monitoring support)



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4.7 Dubrovnik, Croatia - Augmented Maritime Heritage Experience

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Synthetic Factsheet

Augmented Maritime Heritage Experience at the Maritime Museum

Dubrovnik

Croatia

Digital / Service-Based Solution

1. SOLUTION SUMMARY

1.1 Objective and Rationale

The Dubrovnik pilot explores an alternative approach to addressing heat stress in tourism-oriented urban environments: rather than modifying outdoor public spaces, it uses digital cultural enrichment to encourage visitors to move into naturally cooler indoor spaces during the hottest hours of the day. The solution reduces outdoor heat exposure indirectly by creating a compelling reason to visit a thermally comfortable indoor venue.

Dubrovnik's UNESCO World Heritage status places significant restrictions on physical modifications to public spaces in the historic old town, making conventional urban greening or shade infrastructure highly constrained. The digital solution represents a context-appropriate response to this challenge.

1.2 Type of Solution

Primary type: Service-based and digital solution

The core element is a mobile application with audio guide and augmented reality (AR) content enhancing the visitor experience at the Maritime Museum of Dubrovnik, located in St. John's Fortress. The app is available on Google Play and the App Store. Tablet devices are available on-site for visitors preferring not to use their own devices.

1.3 The Micro-Urban Place and Target Area

The solution is anchored in the Maritime Museum, in St. John's Fortress at the entrance to the old harbour of Dubrovnik. The museum is an air-conditioned indoor venue functioning as a natural "cool refuge" during peak heat hours. The intervention enhances the cultural offer to increase attractiveness as a destination during the hottest part of the day.

Target location: Maritime Museum of Dubrovnik, St. John's Fortress, Old City of Dubrovnik (UNESCO World Heritage Site)

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App link (Android): <https://play.google.com/store/apps/details?id=com.CulexXRStu>



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2. INVESTMENT OVERVIEW

Budget Category	Amount
Total Investment	EUR 23,000
Equipment and digital / technical development	EUR 23,000
EU Funding (Interreg Euro-MED - COOL NOONS)	EUR 19,166.67
DURA co-funding	EUR 3,833.33
Implementation Partners	Dubrovnik Development Agency - DURA (lead partner); Maritime Museum of Dubrovnik (venue and content); Croatian digital agency specialising in cultural tourism technology (app development)
Procurement Approach	Competitive negotiated procedure for digital development; direct procurement for tablets; MoU with museum for sustained operation

4. KEY IMPACTS

Environmental: The solution addresses heat stress through visitor behaviour change rather than physical infrastructure. By redirecting visitors to a thermally comfortable indoor venue during peak heat hours, it reduces outdoor heat exposure without requiring any modification to the UNESCO-protected historic fabric.

Social: The digital enhancement significantly improves the visitor experience at the Maritime Museum, creating a richer and more engaging cultural offer that motivates visits even during the hottest period of the day. The AR content and audio guide make the museum accessible to a broader audience, including younger visitors and international tourists.

Economic: The enriched digital offer is expected to increase visitor numbers to the Maritime Museum during previously low-attendance peak heat hours, with potential positive effects on museum revenue and the broader visitor economy of the historic centre.

Tourism-Urban Policy Interface: The Dubrovnik pilot demonstrates that service-based and digital solutions can complement physical cooling infrastructure, particularly in contexts where physical interventions are restricted. It illustrates how cultural assets can be activated as climate adaptation resources.

Strategic Alignment: Aligned with Croatia's national tourism and cultural heritage strategies, Dubrovnik's urban development plans, and EU strategies for sustainable tourism and cultural heritage digitisation. Contributes to EU Green Deal objectives and the European Bauhaus initiative.



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5. MONITORING HIGHLIGHTS

KPI	Detail
Visitor numbers during peak heat hours	Monthly tracking of museum attendance during 11am-3pm period
User perception surveys	Thermal comfort and satisfaction surveys administered to museum visitors
Digital application engagement metrics	Session duration, most-visited AR points, language preferences, total downloads
Indoor visit duration	Average time spent in the museum by users of the digital experience
Reporting Schedule	Monthly monitoring during summer 2025; annual review; comparative analysis vs pre-pilot patterns
Lead Monitoring Body	Dubrovnik Development Agency (DURA)



5. SOLUTIONS BY INTERVENTION TYPE

This section organises the solutions tested across all five COOL NOONS pilot territories by intervention type, enabling practitioners and decision-makers to identify relevant approaches based on the type of action they are considering rather than by pilot location. For each intervention type, key characteristics, pilots involved, typical investment range and main design considerations are summarised.

5.1 Nature-Based Solutions (NBS)

NATURE-BASED SOLUTIONS | TREE PLANTING, URBAN GREENING, CLIMBING PLANTS, SOIL DE-WATERPROOFING

Nature-based solutions represent the most widely deployed intervention category across the COOL NOONS pilots, featuring in Marseille, Lisbon, Imola and Budva. NBS interventions operate by increasing vegetation cover, shading, and evapotranspiration, thereby reducing both surface and ambient temperatures.

Key characteristics

18. Long-term cooling benefit: vegetation continues to grow and provide increasing shade and evapotranspiration benefits over time.
19. Multiple co-benefits: biodiversity support, pollinator habitat, improved air quality, and aesthetic enhancement of public space.
20. Place-specific design: species selection must be adapted to local climate, soil conditions, and maintenance capacity.
21. Maintenance requirement: a minimum two-year establishment maintenance contract is strongly recommended to reduce mortality risk.

Pilots and interventions

Pilot	NBS Component	Species selected	Location type
Marseille	Climbing plants in pots; de-waterproofing of tree pits	Hedera helix, Bougainvillea, Wisteria, Lonicera	Pergola frames; street trees
Lisbon	Tree and shrub planting in urban spaces	Celtis australis, Cercis siliquastrum, Olea europaea, Pistacia lentiscus, Lavandula	Urban courtyards and gardens
Imola	Tree planting in public squares	Tilia cordata, Platanus x acerifolia, Celtis australis, Gleditsia triacanthos	Piazzale Michelangelo, Piazza Gramsci



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Pilot	NBS Component	Species selected	Location type
Budva	Tree and shrub planting in coastal corridor	Pinus halepensis, Quercus ilex, Tamarix gallica, Nerium oleander, Teucrium fruticans	Coastal pedestrian promenade

Design considerations

22. Select drought-tolerant species appropriate to the specific Mediterranean sub-zone (coastal Adriatic, Atlantic-Mediterranean, or sub-continental Mediterranean).
23. Ensure adequate soil volume for tree establishment; consider de-waterproofing or soil decompaction where necessary.
24. Plan for long-term maintenance through framework agreements or service contracts with landscape contractors.
25. Document species, planting densities and locations in an as-planted plan for future reference and maintenance.

5.2 Urban Design and Shading Infrastructure

URBAN DESIGN AND INFRASTRUCTURE | PERGOLAS, BENCHES AND TABLES, PEDESTRIANISATION, CAR-SPEED REDUCTION

Urban design and shading infrastructure interventions provide immediate thermal comfort benefits by physically modifying public spaces to reduce solar exposure and improve usability. Unlike NBS, these interventions provide shading from day one of installation and do not require an establishment period. Their effectiveness is highest in very exposed open spaces with no existing vegetation.

Key characteristics

26. Immediate effect: shading structures provide cooling benefit from day one of installation.
27. Spatial specificity: most effective in highly exposed locations with high pedestrian use and no natural shade.
28. Structural durability: pergola and seating infrastructure must be designed for durability and wind resistance, particularly in coastal environments.
29. Urban integration: furniture and structures must be compatible with the urban design standards and aesthetic requirements of each location.

Pilots and interventions



Pilot	Urban Design Component	Specifications	Location
Marseille	Pergolas, benches and tables	Structural pergolas with climbing plant frames; weather-resistant furniture	Corniche seafront, Saint-Antoine district
Marseille	Pedestrian streets and car-speed zones	Regulatory measure; no infrastructure investment	Cours Julien district
Imola	Benches and picnic tables	2 picnic table sets with integrated seating	Giardino Bernabe
Budva	Pergola shading structures	4 pergola structures along coastal pedestrian corridor	Coastal promenade, Budva

Design considerations

30. Size pergola structures to maximise shaded area per unit cost; combine with climbing plants to enhance thermal effect and visual integration.
31. Select furniture materials appropriate to the urban climate (salt resistance for coastal locations; UV resistance across all Mediterranean settings).
32. Consider pedestrianisation and traffic calming as zero-cost or low-cost complements to physical infrastructure.
33. Ensure structural certification and liability arrangements for pergola structures before installation.

5.3 Water-Based Solutions

WATER-BASED SOLUTIONS | DRINKING FOUNTAINS, GOURDE FRIENDLY NETWORK, DE-WATERPROOFING OF TREE PITS

Water-based solutions address both the physiological aspect of heat stress (dehydration) and, in the case of permeable surface works, the microclimatic aspect through improved evapotranspiration. Drinking fountains are among the most cost-effective interventions for improving public health outcomes during heat waves.

Key characteristics

34. Public health benefit: free drinking water reduces dehydration risk, particularly for elderly persons, children and tourists.
35. Sustainability co-benefit: public fountains reduce single-use plastic bottle consumption.
36. Low maintenance cost once connected to the public water network; utility service agreements ensure ongoing supply and maintenance.
37. De-waterproofing tree pits improves soil permeability, supporting tree health and reducing surface runoff.



Pilots and interventions

Pilot	Water Component	Scale	Notes
Marseille	Drinking fountains	3 new fountains	Financed by metropolitan area; Corniche and Boulevard Longchamp
Marseille	"Gourde Friendly" water refill network	Expansion of partner shop network	Free water refill for visitors with reusable bottle; zero financial cost
Marseille	De-waterproofing of tree pits	120 m2 de-waterproofed area	Financed by metropolitan area; improves evapotranspiration
Imola	Drinking fountains	4 new fountains	Key squares and pedestrian routes; connection managed by Hera S.p.A.

Design considerations

38. Locate fountains at the highest-footfall points on tourist and pedestrian routes, not just where infrastructure connection is technically easiest.
39. Coordinate connection works with the water utility early in the procurement process to avoid implementation delays.
40. Behavioural initiatives such as the "Gourde Friendly" network can be deployed as low-cost complements to physical water infrastructure.

5.4 Digital and Service-Based Solutions

DIGITAL AND SERVICE-BASED SOLUTIONS | MOBILE APPS, AUGMENTED REALITY, INDOOR CULTURAL COOLING REFUGES

Digital and service-based solutions represent an emerging and highly context-specific category of urban heat adaptation. Rather than modifying the physical environment, they influence visitor and resident behaviour, encouraging the use of existing thermally comfortable indoor spaces during the hottest hours. This approach is particularly relevant in historic city centres where physical interventions are constrained by heritage protection regulations.

Key characteristics

41. No physical modification to public space: ideal for UNESCO or otherwise protected urban environments.
42. Behaviour change mechanism: works by creating a compelling cultural or recreational reason to be indoors during peak heat.
43. Digital infrastructure requirement: app development, device provision and content management require specialist contractors with cultural technology expertise.



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- 44. Scalability: the digital asset (app, AR content) can be updated and enriched at lower marginal cost than physical infrastructure.
- 45. Monitoring advantage: digital tools generate rich engagement data (session duration, user location, return visits) not available from physical interventions.

Pilots and interventions

Pilot	Digital Component	Investment	Key contractor type
Dubrovnik	Mobile app with AR content and audio guide for Maritime Museum	EUR 23,000	Cultural technology digital agency

Design considerations

- 46. Ensure the indoor venue is genuinely thermally comfortable (air-conditioned or naturally cool) before investing in digital attraction tools.
- 47. Develop content in multiple languages to serve international tourist audiences.
- 48. Agree intellectual property ownership of digital assets upfront with the museum or venue partner.
- 49. Plan for post-pilot maintenance: software updates, content refreshes and hosting must be budgeted beyond the initial development cost.

5.5 Behavioural and Communication-Based Solutions

BEHAVIOURAL AND COMMUNICATION SOLUTIONS | GOURDE FRIENDLY, PEDESTRIANISATION, COOL PATHS PROMOTION

Behavioural and communication-based solutions address urban heat by influencing the choices and movements of residents and visitors without requiring major physical infrastructure. They are typically low-cost, rapidly deployable, and reversible, making them attractive as first-response measures or complements to longer-term physical interventions.

Key characteristics

- 50. Very low or zero financial cost: most behavioural measures rely on partnership agreements, regulatory changes or communication campaigns.
- 51. Rapid deployment: can be implemented within days or weeks rather than months.
- 52. Dependent on behaviour change: effectiveness relies on voluntary uptake; measurement requires specific survey approaches.
- 53. High complementarity: most effective when combined with physical interventions that enable the desired behaviour change.

Pilots and interventions



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Pilot	Behavioural Component	Scale / Coverage	Notes
Marseille	"Gourde Friendly" water refill network	Partner shops along key tourist routes	Free water refill for visitors with reusable bottle; zero cost
Marseille	Pedestrian street activation and car speed reduction	Cours Julien district and adjacent streets	Regulatory measure; no infrastructure investment required

Design considerations

54. Map the existing network of indoor and commercial spaces that could serve as cool refuge points before designing a behavioural programme.
55. Use visual signage or a digital map to communicate the location of cool refuge points, water refill spots and shaded routes.
56. Engage local business associations and cultural venues as active partners: their buy-in is essential for network-based approaches.
57. Measure uptake through customer counts, survey data or partner reporting to assess effectiveness and justify continuation.



6. MONITORING FRAMEWORK AND INDICATORS

Monitoring activities constitute an important component of the COOL NOONS project, providing the evidence base necessary to assess the effectiveness of the tested solutions and to support knowledge-sharing across the partnership. Within Activity 2.2, pilot territories implemented monitoring activities capturing both environmental and social impacts of their interventions. Where baseline measurements were not available due to implementation constraints, comparative assessments were conducted using control locations and user perception data to ensure the robustness of findings.

To support comparability across pilots, a common set of KPIs was identified and incorporated into the factsheets. These indicators were designed to be measurable with available resources and comparable across different intervention types and urban contexts. The framework addresses three main dimensions: environmental (physical and climatic impacts), social (use and perception of public space), and operational/behavioural (visitor behaviour and utilisation of cooling spaces).

Cross-Pilot Monitoring Indicators

Indicator	Marseille	Lisbon	Imola	Budva	Dubrovnik
Temperature variation (shaded vs exposed)	Yes	Yes	Yes	Yes	No
Shaded area added (m2)	Yes (144 m2)	Yes	Yes	Yes	No
Number of trees / plants installed	Yes (33 pots)	Yes	Yes (5 trees)	Yes	No
De-waterproofed / permeable surface (m2)	Yes (120 m2)	Yes	No	No	No
Number of drinking fountains installed	Yes (3)	No	Yes (4)	No	No
User perception surveys (comfort, usability)	Yes	Yes	Yes	Yes	Yes
Visitor flow during peak heat hours	Yes	No	Yes	Yes	Yes
Digital application engagement metrics	No	No	No	No	Yes
Indoor visit duration (museum)	No	No	No	No	Yes
Heat risk exposure index (P x V x E)	No	No	Yes	No	No



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7. COMPARATIVE INSIGHTS ACROSS PILOT SOLUTIONS

The pilot interventions within COOL NOONS provide valuable insights into how Mediterranean cities can address urban heat stress through a diverse range of approaches. A comparative analysis of the five pilot solutions reveals several key observations.

A first observation concerns the effectiveness of relatively small-scale interventions. Measurable temperature reductions of up to 18 degrees C were recorded under pergola structures in Marseille - a striking result achieved at moderate cost, demonstrating that targeted shade structures combined with climbing plants can generate highly significant microclimatic improvements even in the most exposed urban spaces.

A second insight relates to the importance of combining multiple cooling strategies. The Marseille pilot, combining six distinct but complementary interventions, demonstrates the added value of a layered approach: shade infrastructure, vegetation, water access, and behavioural nudges work together to create a more comprehensive and resilient cooling system than any single measure alone.

The pilot experiences also highlight the central role of nature-based solutions. Vegetation-based interventions in Marseille, Lisbon, Imola and Budva all produced positive environmental outcomes, with the added advantage of growing benefits over time. Species selection is a critical factor: drought tolerance, salt resistance and low maintenance requirements must all be considered. Differences in user perception across pilot territories highlight the importance of cross-cultural evaluation when assessing thermal comfort and behavioural adaptation, as climatic, social and cultural factors influence how heat is experienced and managed.

At the same time, the project demonstrates that service-based and behavioural solutions can complement physical cooling interventions. The Dubrovnik pilot shows how cultural assets can be activated as cooling refuges without requiring any modification to the protected historic fabric.

The comparative analysis also reinforces the importance of the operational and procurement dimension of transferability. Cities with standing framework agreements for urban greening were able to deploy interventions more rapidly and with less administrative burden than those requiring open competitive tendering for small contracts. Limitations

While the pilot interventions provide valuable insights, several limitations should be acknowledged. In some cases, baseline data prior to implementation was not available, limiting direct before–after comparison. Monitoring periods were relatively short and focused on peak summer conditions, which may not capture long-term impacts. Behavioural indicators rely partly on self-reported data, which may introduce bias. Finally, the full benefits of nature-based solutions will only materialise over time as vegetation matures.

Summary of Key Findings



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- 58. Small-scale interventions can significantly improve thermal comfort: the Marseille pilot recorded up to -18 degrees C temperature reduction under pergola structures.
- 59. Nature-based solutions provide long-term cooling benefits; species selection adapted to local climate is a critical success factor.
- 60. Urban design interventions provide immediate shading and improve usability of public spaces, particularly along routes with high pedestrian and tourist use.
- 61. Water-based solutions offer complementary benefits: physiological cooling through hydration and improved soil evapotranspiration capacity.
- 62. Digital and cultural services can complement physical cooling, especially in historic environments with heritage protection constraints.
- 63. Tourism management and climate adaptation policies should be integrated, as the most heat-exposed areas are often the most visitor-intensive.
- 64. Procurement readiness (framework agreements) is a practical enabler of faster and more cost-effective deployment.
- 65. Operational detail - contractor types, plant palettes, terms of reference - is essential for genuine transferability and should be documented systematically.



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8. POLICY IMPLICATIONS AND LESSONS LEARNED

The implementation of the pilot interventions provides valuable insights for policy makers, urban planners and tourism authorities in Mediterranean cities.

Integration of cooling strategies in urban planning

The pilot experiences demonstrate that urban climate adaptation can be integrated into everyday public space planning without requiring dedicated climate programmes. Tree planting, fountain installation and shade structure provision can all be integrated into routine maintenance and capital works programmes, prioritising thermally exposed, pedestrian-intensive locations.

Nature-based solutions as long-term investment

Vegetation-based interventions require upfront investment and a multi-year establishment period but deliver growing cooling benefits over time. Policy frameworks should reflect this long-term value by building maintenance contracts and multi-year monitoring commitments into every planting project from the outset.

Designing for extreme heat usability

The pilots demonstrate the importance of designing public spaces that remain usable during extreme heat. Urban design interventions introducing shading structures, resting areas, and free water access substantially improve the usability of public space. Public space design standards should incorporate thermal comfort as an explicit criterion alongside accessibility, safety and aesthetics.

Cultural assets as cooling refuges

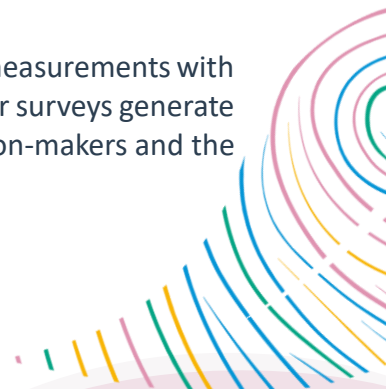
The Dubrovnik pilot illustrates the potential of cultural and heritage spaces to serve as cooling refuges, supporting climate adaptation in contexts where physical interventions are restricted. Policy makers should consider actively promoting indoor cultural venues as part of heat wave preparedness strategies.

Integrating tourism and climate adaptation

Greater coordination is needed between tourism management policies and climate adaptation strategies. Joint planning processes, shared data and integrated public space investment can produce better outcomes for both residents and visitors.

The value of monitoring

The monitoring framework demonstrates the value of combining environmental measurements with user perception surveys. Even simple temperature measurements and short visitor surveys generate valuable evidence for communicating the effectiveness of interventions to decision-makers and the public.





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Key Policy Recommendations

66. Integrate urban cooling strategies into public space planning, particularly in areas with high pedestrian activity and visitor concentration.
67. Prioritise nature-based solutions as long-term climate adaptation measures; develop and maintain approved plant palettes for each climatic sub-zone.
68. Design public spaces that remain usable during extreme heat, incorporating shading structures, resting areas and access to water as standard elements.
69. Activate indoor cultural and heritage spaces as cooling refuges, especially in historic city centres where physical interventions may be limited.
70. Strengthen coordination between tourism management and climate adaptation policies, ensuring measures benefit both residents and visitors.
71. Invest in monitoring and data collection to evaluate performance and support evidence-based decision making.
72. Build procurement readiness by establishing standing framework agreements with landscape, urban furniture and greening contractors.
73. Document operational details - contractor types, plant palettes, terms of reference, procurement procedures - as part of every pilot, not as an afterthought.



9. OPERATIONAL GUIDE FOR TRANSFERABILITY

This section responds directly to the observation that genuine transferability requires not just a description of what was done, but practical operational detail enabling other cities to replicate similar interventions. It draws together the operational intelligence gathered across all five COOL NOONS pilots.

9.1 Types of Contractors and Implementation Partners

Across the five pilots, six main categories of implementation partner were involved. Understanding the roles and procurement routes for each type is essential for cities wishing to replicate COOL NOONS solutions.

Contractor / Partner Type	Role in COOL NOONS pilots	Typical procurement route	Key selection criteria
Landscape / greening contractor	Tree planting, shrub installation, soil preparation, de-waterproofing, containerised plants (Marseille, Lisbon, Imola, Budva)	Public tender (larger contracts); simplified procedure or framework agreement (smaller)	Demonstrated urban tree planting experience; post-planting maintenance offer; nursery relationships
Urban furniture supplier	Pergolas, benches, picnic tables, drinking fountains (all pilots except Dubrovnik)	Direct procurement (low value); or public tender with design specification	Catalogue compatibility with urban standards; structural certification; durability
Water utility / network operator	Connection of drinking fountains to public water network (Imola: Hera S.p.A.; Marseille: metropolitan area)	Service agreement or direct commission (as public utility)	Technical capacity for network connections; liability for post-installation maintenance
Digital development agency	Mobile app, AR content, audio guide, analytics dashboard (Dubrovnik)	Competitive negotiated procedure	Portfolio in cultural/tourism technology; multilingual capacity; app store certification
Academic / technical monitoring partner	Temperature measurements, user surveys, data processing (Lisbon with University of Coimbra; Imola with Area Blu / Villaggio Globale)	Research collaboration agreement or small service contract	Urban climatology expertise; established monitoring protocols; data analysis capacity
Environmental NGO / community organisation	Monitoring support, community engagement, local communication (Budva, Marseille)	Grant or service agreement	Local knowledge and community trust; capacity to mobilise volunteers for survey collection



9.2 Model Terms of Reference Structures

The following templates illustrate the key elements to include in terms of reference for the two main types of contracted work in COOL NOONS-type interventions.

ToR Template A: Urban Greening and Tree Planting Works

Section	Content Guidance
1. Context and objective	Brief description of the urban space to be greened; heat stress challenge being addressed; expected outcomes in terms of shaded area and species count.
2. Scope of works	Site preparation (soil decompaction, drainage); supply and planting of trees/shrubs per approved plant palette (specify species, container size, minimum stem girth); tree guards and staking; post-planting watering for establishment (minimum 2 years); maintenance guarantee covering plant replacement if mortality exceeds threshold (e.g. 10% in year 1).
3. Plant palette and specifications	Approved plant list as annex: Latin name, minimum height at delivery, minimum container volume (litres), provenance requirements (local or regional nursery preferred).
4. Site access and coordination	Working hours restrictions (avoiding peak tourist periods); coordination with other municipal works; protection of existing vegetation.
5. Deliverables and reporting	As-planted plan; photographic record pre/during/post planting; planting completion certificate; maintenance log template.
6. Selection criteria	Technical capacity (min. 3 years in urban greening); proposed plant nursery (quality certificate required); price (indicative: 60% quality / 40% price); post-planting maintenance offer.

ToR Template B: Digital Cultural Experience Development

Section	Content Guidance
1. Context and objective	Description of the indoor cultural venue; heat stress challenge; objective of redirecting visitor flow during peak heat hours; expected number of users during pilot period.
2. Scope of works	Mobile application development (specify OS); minimum AR interaction points (e.g. 10); audio guide in minimum 3 languages; content management system for venue staff; visitor analytics dashboard (session duration, most visited AR points, total downloads).
3. Content development	Responsibility for curatorial content; intellectual property ownership of digital assets; language review by native speakers; accessibility requirements.



4. Hardware (if applicable)	Specification for tablets: number of units, protective cases, charging station, asset tagging and theft prevention.
5. Hosting and maintenance	Server hosting (cloud provider, uptime guarantee); bug-fix SLA during pilot; post-pilot support arrangement (specify minimum duration).
6. Selection criteria	Portfolio of cultural/heritage technology projects; multilingual capacity; app store certification experience; price (indicative: 70% quality / 30% price).

9.3 Consolidated Plant Palette for Mediterranean Urban Greening

The following consolidated palette draws together species used across the four nature-based pilots (Marseille, Lisbon, Imola, Budva) and adds contextual notes to support adaptation to similar cities. Species are grouped by Mediterranean climatic sub-zone.

Coastal Mediterranean and Adriatic (Marseille, Budva)

Species	Type	Drought	Salt	Canopy	Notes
<i>Pinus halepensis</i>	Tree	Very high	High	Medium	Native; fast; year-round shade
<i>Quercus ilex</i>	Tree	Very high	High	Dense	Long-lived; excellent shade
<i>Celtis australis</i>	Tree	High	Moderate	Medium	Urban-tough; flexible use
<i>Tamarix gallica</i>	Shrub/tree	Very high	Very high	Light	Seafront locations only
<i>Nerium oleander</i>	Shrub	Very high	High	Dense	Toxic; keep away from children
<i>Hedera helix</i>	Climber	Moderate	Low	Dense on support	Pergola ideal; evergreen
<i>Parthenocissus tricuspidata</i>	Climber	Moderate	Low	Dense	Deciduous; rapid pergola coverage
<i>Bougainvillea glabra</i>	Climber	High	Moderate	Dense	Frost-free zones only
<i>Teucrium fruticans</i>	Shrub	Very high	High	Low-ground	Understory; aromatic; low maintenance

Atlantic-Mediterranean (Lisbon)

Species	Type	Drought	Salt	Canopy	Notes
<i>Celtis australis</i>	Tree	High	Moderate	Medium	Excellent for squares



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Species	Type	Drought	Salt	Canopy	Notes
Cercis siliquastrum	Small tree	High	Low	Light-medium	Spring blooms; native to Med
Olea europaea	Tree	Very high	Moderate	Partial-dense	Iconic; slow-growing
Pistacia lentiscus	Shrub	Very high	Moderate	Dense-ground	Evergreen; robust
Lavandula angustifolia	Perennial	High	Low	Low	Aromatic; pollinator support
Festuca glauca	Grass	High	Low	Ground cover	Minimal care; heat tolerant
Wisteria sinensis	Climber	Moderate	Low	Dense overhead	Pergola ideal; fragrant

Sub-Continental Mediterranean (Imola and Po Valley cities)

Species	Type	Drought	Salt	Canopy	Notes
Tilia cordata	Tree	Moderate-high	Low	Dense	Classic avenue tree; fragrant
Platanus x acerifolia	Tree	High	Moderate	Very dense	Large; pollution tolerant
Celtis australis	Tree	High	Moderate	Medium	Flexible; suits tight squares
Gleditsia triacanthos Skyline	Tree	High	Moderate	Light-filtered	Compact crown; thornless; fast
Robinia pseudoacacia	Tree	High	Low	Medium	Fast; nitrogen-fixing; check local invasiveness
Lonicera japonica	Climber	Moderate	Low	Dense on support	Pergola; fragrant; semi-evergreen

9.4 Step-by-Step Replication Guidance

For cities wishing to replicate one or more COOL NOONS solutions, the following steps provide a practical implementation pathway based on the experience of the five pilot territories.

Step 1: Local heat mapping and site identification

Map areas with high solar exposure during midday hours combined with high pedestrian use. Priority sites combine thermal exposure with social significance (tourist routes, event approach corridors, residential neighbourhoods with vulnerable populations). Tools including local meteorological data, satellite-based urban heat island mapping, and pedestrian footfall counts can support this analysis.



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Step 2: Solution selection based on site typology

Match the solution type to site constraints: nature-based solutions for open squares and pedestrian corridors with planting space; pergola and furniture interventions for highly exposed sites needing immediate shade; water fountains for long pedestrian routes without existing water access; digital solutions for historic protected sites where physical interventions are restricted. A combination of approaches, as demonstrated in Marseille and Imola, delivers the most comprehensive results.

Step 3: Plant palette development (for NBS)

Consult local landscape professionals and the COOL NOONS consolidated plant palette (Section 9.3) to develop an approved species list for your climatic context. Confirm species availability from local or regional nurseries. Specify minimum container sizes and stem girths. Include a survival threshold and replacement obligation in the planting contract (typically 10% mortality in year 1 triggers replacement at contractor cost).

Step 4: Procurement preparation

Identify the most appropriate procurement route given the estimated contract value and your city's procurement regulations. Use existing framework agreements where possible to reduce lead times. Prepare clear terms of reference using the COOL NOONS templates as a starting point (Section 9.2). Engage the water utility early if drinking fountains are planned.

Step 5: Implementation and supervision

Ensure a named municipal officer or project manager is responsible for works supervision. Document the as-built condition with photographs and as-planted plans. Establish a maintenance schedule and assign responsibility for post-installation care, particularly for newly planted vegetation during the establishment period.

Step 6: Monitoring

Deploy the monitoring framework described in Section 6, adapting indicators to the solution type. Conduct baseline measurements before implementation so that post-installation data can be compared. Where a technical monitoring partner is available, consider a formal collaboration agreement.

Step 7: Documentation for transferability

Prepare a factsheet for your solution using the COOL NOONS template, including all operational details (contractor type, procurement approach, plant palette, species performance, monitoring results). Share the factsheet with COOL NOONS and with regional or national climate adaptation networks to contribute to the wider evidence base.

9.5 Replication Readiness Matrix

The table below provides an overview of the relative complexity, cost and transferability of the main intervention types tested within the COOL NOONS project.



<i>Intervention</i>	Complexity	Cost	Implementation Time	Transferability
<i>Nature-based solutions (tree planting)</i>	Medium	Medium	Medium-term	High
<i>Urban shading structures (pergolas)</i>	Medium	Medium	Short-term	High
<i>Water-based solutions (fountains)</i>	Low	Low	Short-term	Very High
<i>Digital / AR solutions</i>	High	Medium	Medium-term	Medium
<i>Behavioural / communication measures</i>	Low	Very Low	Very short-term	Very High

This matrix supports decision-makers in selecting appropriate interventions based on local capacity, budget and implementation timelines.



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CONCLUDING REMARKS

This deliverable demonstrates that the COOL NOONS pilot territories have successfully tested a diverse and complementary set of solutions for improving thermal comfort in Mediterranean urban environments. From the layered "Islands of Coolness" approach in Marseille, to the urban tree planting in Lisbon and Imola, to the coastal cooling nodes of Budva, and the innovative digital refuge strategy in Dubrovnik, each pilot has contributed evidence of what works, in what context, at what cost, and with what operational requirements.

This final edition represents a significant step forward in terms of practical usefulness. By enriching each factsheet with information about contractors, procurement routes, plant species, monitoring results, and terms of reference structures, the document moves beyond a descriptive record toward a genuinely operational knowledge transfer tool. Cities considering similar interventions can access not just inspiration but practical instruction.

The diversity of solutions tested across the five pilots reflects a core insight of the project: there is no single solution to urban heat stress in Mediterranean cities. The right response depends on the urban context, heritage protection constraints, the profile of visitors and residents, the available budget, and the institutional capacity of the implementing city. Nature-based solutions, urban design measures, water infrastructure, digital cultural tools, and behavioural interventions each have a role to play - and the most effective urban heat adaptation strategies will combine several of these approaches in a coherent, locally calibrated response.

As Mediterranean cities face increasingly intense and frequent heat events in the years and decades ahead, the experience documented here provides a tested, operational reference for climate-responsive urban planning. The evidence generated by the COOL NOONS pilots is available to all cities willing to act. The COOL NOONS framework demonstrates that climate adaptation in tourism-intensive urban environments can be operationalised through scalable, evidence-based and context-sensitive interventions.

