City Actions to Tackle Extreme Heat

BEBRIT
Extreme Heat Risk Project

OUTDOOR COOLING SOLUTIONS

Impact of Urban Trees on Reducing Ambient Temperatures

Adding trees and hedges in urban areas can significantly reduce peak ambient temperatures, with reductions ranging from 0.2 to 5.0 °C and a median reduction of about 1 °C. This cooling effect occurs through evapotranspiration, where trees release vapor into the atmosphere, increasing relative humidity and enhancing thermal comfort. Tree canopies also reduce direct solar radiation. When planting new trees, it's important to consider the quantity, species, and positioning, as trees with sparse leaves are more effective at cooling than those with scattered leaves, and dense areas benefit more than open spaces. More research is needed to ensure trees can endure future extreme heat. Examples include **Sydney**, **Australia**, which planted 5 million trees, and **Riyadh**, **Saudi Arabia**, with a large-scale project planting 7.5 million trees, leading to a temperature reduction of 2-15°C.

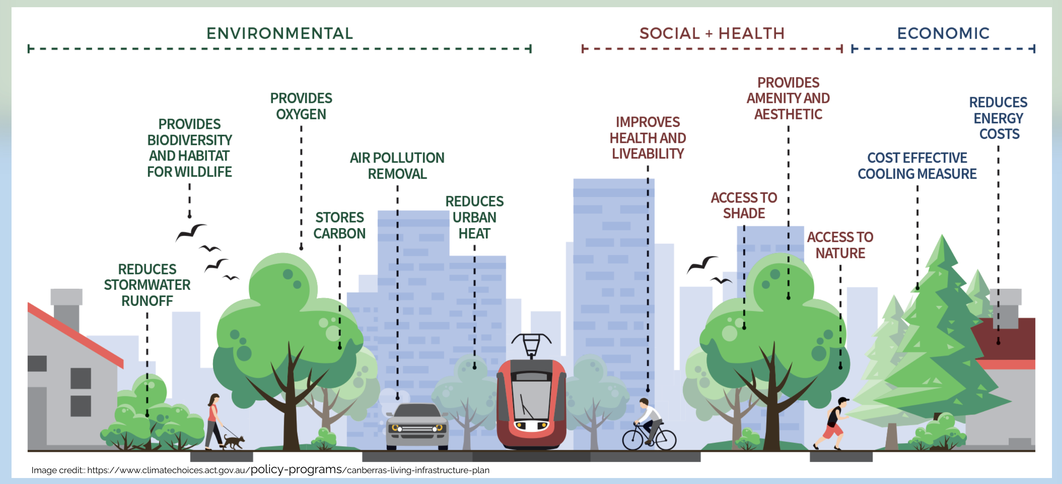


Image credit: https://www.climatechoices.act.gov.au/policy-programs/canberras-living-infrastructure-plan

Medellín's Green Shady Corridors

The "Green Shady Corridors" initiative in **Medellín**, **Spain** aims to enhance the city's environmental and social landscape. Launched in 2017, this network of 30 green corridors spans 20 kilometres (about 12.4 miles). It integrates new bike lanes and walkways, providing shaded, eco-friendly routes throughout the city. The project's impact has been significant, notably reducing the urban heat island effect by 2 degrees Celsius (3.6 degrees Fahrenheit) since 2018. By implementing these green corridors, Medellín is not only improving the urban environment but also enhancing the quality of life for its residents.

Creating Cool Islands in Paris

As heat waves increasingly grip cities in summer, **Paris** has created an interlinked network of cool 'islands' where citizens can seek refuge from the heat of the summer. In the city's fight against the urban heat island effect, the spaces are typically 2°C to 4°C cooler than surrounding streets thanks to water and/or vegetation which offer improved climate resilience and liveability for the citizens of Paris.


Source: DHA Photo

Cooling Streets with Water Jets

During the summer, as temperatures approached 40°C, residents of **Turkey**'s northwestern province of **Edirne** found a respite thanks to an initiative by provincial Governor Recep Gürkan. While much of Turkey grappled with oppressive heat, Edirne's downtown pedestrian area, Saraçlar Street, transformed into a refreshing oasis. This revitalization was made possible by the installation of 200 water jets that spray cool water onto pedestrians, providing much-needed relief in the sweltering weather. The bustling street, lined with shops, now offers a cooling respite and a more comfortable environment for locals and visitors alike.

Cooling Effects of Urban Parks in Cities Worldwide

Urban parks reduce air temperatures within parks and their surroundings by exerting the **cooling island effect**, significantly mitigating the urban microclimate. Increasing tree coverage to 30% in neighbourhoods through parks and green corridors lowers surface temperatures by 7-10°C. Cities with large urban parks that help reduce urban heat islands include **New York City** (Central Park**), London** (Hyde Park), **Tokyo** (Yoyogi Park), **Sydney** (Centennial Park), and **São Paulo** (Ibirapuera Park)

Boosting the Number of Public Fountains

Several cities are proactively enhancing their public infrastructure to provide relief during extreme heat. **Paris** is expanding its network of public water fountains, including the installation of "fontaines Wallace," which provide free potable water across the city. **Barcelona** has increased the number of drinking fountains, especially in high-traffic areas and parks, to ensure residents and tourists stay hydrated. **Melbourne** has implemented a strategy to install more public water fountains as part of its Urban Water Strategy, addressing the need for accessible drinking water during extreme heat conditions.

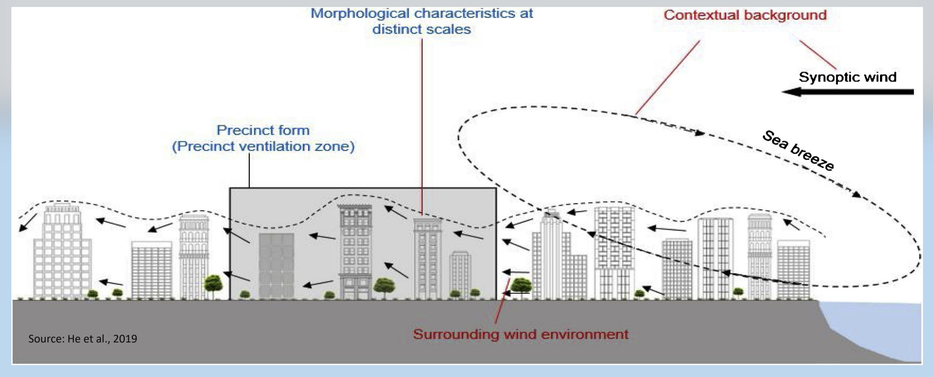
Using Ancient Technology

Seville is building canals beneath the streets with vertical shafts that bring cool air to the surface, lowering the temperature at street level. The underground tunnel systems are called qanats, They were developed more than 2000 years ago in Persia

Natural Wind Ventilation Corridors in Urban Planning

Creating or allowing natural wind ventilation corridors in cities helps dissipate heat, air pollution, and small particulate matter. When designing these corridors, it is crucial to consider the trade-off between accelerating breezes and risking extreme wind events. Ventilation corridors need to be integrated into planning processes at an early stage. Prioritizing corridors that connect open spaces and promote cooling from existing blue and green features, such as lakes, rivers, and extensive forests, can enhance their effectiveness in mitigating urban heat. Several cities have used this:

- ✓ **Singapore**: Known for its extensive greenery, Singapore has incorporated wind corridors into its urban planning to enhance natural ventilation and reduce heat.
- ✓ **Seoul, South Korea**: The Cheonggyecheon Stream restoration project created a natural ventilation corridor, significantly improving air quality and reducing urban temperatures.
- ✓ **Hong Kong**: The city has developed urban wind paths to improve air circulation and reduce heat, utilizing its coastal geography to enhance natural breezes.
- ✓ **Stuttgart, Germany**: The city has long implemented ventilation corridors, leveraging its topography to channel cool air from surrounding hills into the city, improving air quality and reducing heat.
- ✓ **Melbourne, Australia**: Through its urban forest strategy, Melbourne has integrated green corridors that facilitate natural wind flow, helping to cool the city and improve air quality.



Source: He et al., 2019

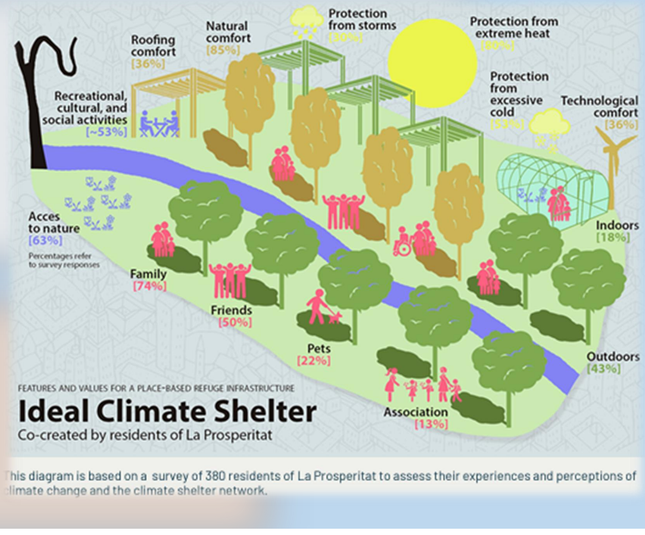
White - the Colour to Combat Urban Heat


Source: LA Street Services

Urban materials, including concrete, asphalt, glass, and tiles, significantly affect heat management due to their albedo values, which determine their colour and reflectivity. Materials with high albedo, being lighter and more reflective, can lower surface temperatures, while those with low albedo absorb heat, exacerbating the urban heat island (UHI) effect. Replacing conventional materials with cooler alternatives can reduce temperatures by 6–9 °C, and up to 10 °C for asphalt and concrete. In **Los Angeles**, authorities began applying a white seal coat to streets in 2019 to combat UHI. This reflective coating helps lower surface temperatures by 10-15 °F, reduces heat absorption, and cuts air conditioning costs, despite its high installation cost of $40,000 per mile.

Climate Shelters

These spaces offer respite during extreme climate events, maintaining a temperature of 26 °C, and must be accessible to all citizens with resting areas, seats, and drinking water. **Barcelona** developed a Climate Shelter Policy Brief based on scientific findings (Amorim-Maia et al., 2023).



Cooling with Permeable Pavements

Sidewalks and asphalt, made from gravel or crushed rocks, can exceed 60 °C in summer. Permeable pavements are ideal, filtering 90% of rainwater, reducing heat, and aiding plant growth.

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