CREATING AND MANAGING ARTIFICIAL WATER FEATURES

HAZARD

HEAT

IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

BUILDING IN OPERATION

TERRITORY

AREA OF ACTION

OUTDOORS

COST

€ € €

low medium high

LEVEL OF SKILL

medium

With temperatures rising and heatwaves intensifying and multiplying, designing public and private urban outdoor spaces involves new challenges to provide users with thermal comfort. Water features, involving evaporation, misting, or simply contact, allow people to cool off and help create microclimates by moderating temperature fluctuations. Water, like vegetation, is therefore at the heart of strategies to create cool zones.

IMPACTS

By creating **cool microclimates**, water features help to improve users' outdoor thermal comfort, making landscaped areas **more accessible and attractive**.

The presence or absence of cool areas, including water features, often determines **access** to outdoor spaces **for vulnerable people** (the elderly, families with young children, etc.), who are more affected by rising temperatures.

The intensification of urban heat islands (where temperatures are higher in urban areas than in the surrounding rural areas), will **increase the attraction of** properties and neighbourhoods with cool areas, including water features.

INSTALLATION GUIDE

A variety of cooling systems use water, such as fountains, misters, water mirrors, ponds, water jets, water bodies and other similar solutions. The choice of a system should be based on **criteria of space, frequency of use, performance, water consumption, and budget**. Wherever possible, prioritise the use of non-potable water for these installations. Alternative rainwater management (use of rain gardens, retention basins, etc.) should be introduced to create water points or allow cooling by evaporation of the water contained in the ground.

When installing cooling systems that use water, **their highly localised cooling effect** should be taken into account: beyond a perimeter of 50 metres, the cooling effect of the water is no longer felt. Care should be taken to position the water point close to the areas to be cooled, taking into account any air flows impacting the effectiveness of the system (this can be done using an aeraulic study). To ensure that urban cooling is diversified and better distributed spatially, the creation of water features can be coupled with measures such as greening, reflective road surfaces and soil desealing.

In order to make the most of the cooling power of **natural or man-made water features**, it's important to ensure that they're accessible and attractive by **landscaping their surroundings**: installing picnic areas, grassed areas, children's playgrounds, etc. A similar approach has led to many rivers that were buried in the past, often for health reasons, now being restored.

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WEAK POINTS AND STRONG POINTS

⊕ Creating or redeveloping a water feature (e.g. river banks) can be **costly**, but some smaller features (fountains, misters, etc.) are more affordable.

⊕ By favouring nature-friendly development solutions based on **ecological engineering**, development costs can be reduced and the balance sheet in terms of biodiversity can be very positive.

⊖ The **appearance or multiplication of harmful species** (mosquitoes, amphibians, etc.) is a potential consequence of the creation of water features that should be anticipated. In order to ensure both pleasant cooling for residents and the prevention of these problems, water features should be located at a reasonable distance from the nearest dwellings, while avoiding water stagnation.

⊖ To prevent any **damage caused by water freezing** in the pipes, it's advisable to protect vulnerable water systems from freezing by **burying the pipes at** a sufficient depth (depending on the nature and use of the ground) and **draining them before the onset of extreme cold**.

MALADAPTATION

Maladaptation can result from the following:

Increase in water consumption

High temperatures cause water to evaporate more quickly from water features. This can lead to higher water consumption to maintain the same level of operation. It's crucial to ensure that water features don't exacerbate water shortages during periods of high water demand. At such times, their use should be restricted in order to preserve the availability of water for essential needs. However, intermittent use of these devices can compromise their efficiency and ability to provide adequate cooling. This underlines the need to avoid becoming dependent on water for cooling urban spaces, especially during periods of extreme heat which can overlap with periods of drought and water shortages. It is imperative to combine alternative and complementary solutions for urban cooling.

Insufficient cooling

As the frequency and intensity of heatwaves increase, the demand for artificial water features for cooling may also increase. If they are not sized to meet this growing demand, they may not be able to provide sufficient cooling. Furthermore, as temperatures rise and atmospheric humidity increases, the effectiveness of evaporation as a cooling process decreases, impacting on the ability of these systems to provide effective cooling.

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MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- PLACE WATER FEATURES CLOSE TO THE AREAS TO BE COOLED
- LANDSCAPE THE SURROUNDINGS OF WATER FEATURES TO MAKE THEM MORE ATTRACTIVE

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/− : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS	INTERPRETATION
+/− Distance between building and nearest water source (m)	To be minimised
+/− Number of water features available per number of people	To be maximised
+/− Percentage of essential recommendations followed (%)	The maximum number of recommendations must be implemented
+/− Monthly water consumption (m^3)	Must correspond to the availability of water resources

INDICATORS OF RESULTS	INTERPRETATION
+/− Number of people using the water feature per day	Balance between visitor numbers and capacity
+/− Comparison between outdoor temperature near the water feature and that of a control situation* (°C)	Outdoor temperature near the water feature < control situation*
+/− Percentage of users satisfied with external thermal comfort (%)	To be maximised

**The control situation is defined by the parameters set to isolate the influence of the adaptive action (similar conditions: weather, time of measurement, space, etc.).*

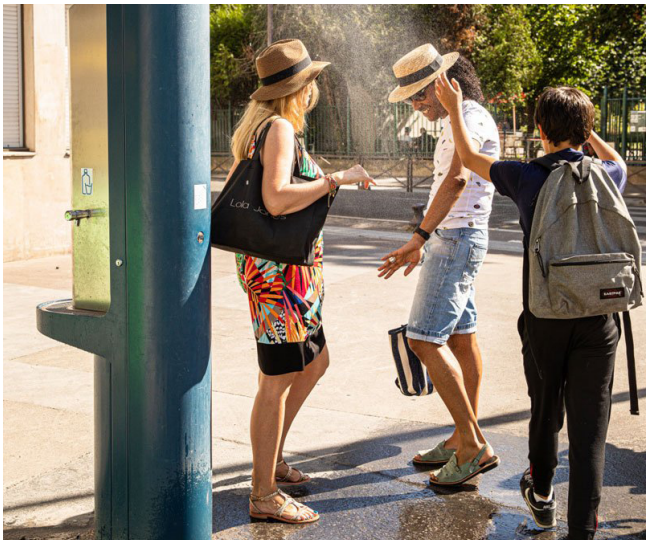
FIND OUT MORE

AdaptaVille (2022), *Installer un mobilier urbain brumisant et modulable*

Observatoire National sur les Effets du Réchauffement Climatique (*ONERC*) (2023), *Vagues de chaleur dans un contexte de changement climatique*

Plus fraiche ma ville (2023), *Jeux d'eau* (water features)

City of Paris (2018), Mapping of cool islands in Paris



Dual-purpose misting and drinking device

Source: Eau de Paris

REAL-LIFE EXAMPLE

CITY OF PARIS

LOCATION: RUE CHARLES MOUREU, 13TH ARRONDISSEMENT OF PARIS

SURFACE AREA: N/A

USE: PUBLIC

INSTALLATION COST: €12,000 - €15,000 FOR A DUAL-PURPOSE MISTING AND DRINKING SYSTEM

As part of its strategy to keep Paris cool, the City of Paris has set up various water-based cooling systems (misters, fountains, water ramps, etc.). Among the 2,000 or so water features that make up the city's network, misters are particularly popular with users. They have a significant refreshing effect, albeit on an occasional basis, and are a fun activity that encourages social interaction. They result in a limited increase in water consumption of around 170 litres per month, thanks in particular to the fact that they're operated by a press button. However, health legislation requires regular maintenance and checks, resulting in significant maintenance costs of around €13,000 per year. Although this type of system alone cannot create a cool island, which requires a combination of shading devices, vegetation or light-coloured coverings, it can relieve users during very hot periods, and can easily be implemented by property developers at building level.

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