CREATING AN OASIS COURTYARD

HAZARD

HEAT

RAINFALL AND FLOODS

COASTAL DYNAMICS

GEOTECHNICAL DROUGHTS

IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

TERRITORY

AREA OF ACTION

OUTDOORS

COST

€ € €

low medium high

LEVEL OF SKILL

high

Initiated by the City of Paris, the courtyard oasis concept consists of desealing and planting school playgrounds. The aim is to create a genuine cool island in the urban space and to manage rainwater. These practices can be extended to all types of building courtyard. A courtyard oasis can also be enhanced with water features such as a rain garden or planted ditches.

IMPACTS

Oasis courtyards improve summer comfort in buildings and the surrounding area by creating cool, shaded areas. Desealing the soil allows **vegetation** to grow and **rainwater to infiltrate** into the ground. The cooling sensation is linked to **the phenomenon of evapotranspiration,** provided by the vegetation, which returns moisture from the soil to the atmosphere, and to the **shaded areas** created by trees and shrubs. It is preferable to use a variety of local plant species and to vary the plant strata.

In addition, unlike planted areas, mineral surfaces can have a higher surface temperature, storing heat during the day and releasing it at night, thereby limiting the cooling of the atmosphere. By preventing night-time temperatures from falling, mineral surfaces contribute to the urban heat island effect.

In addition to the effect on heat, desealing the ground **helps to reduce or even prevent flooding caused by run-off**, since rainwater is absorbed into the soil instead of accumulating.

As well as improving the well-being and health of users by cooling the area, the plants in oasis courtyards improve air quality by capturing some pollutants. The filtration capacity depends on the species and the leaf surface area.

INSTALLATION GUIDE

The first step in creating an oasis courtyard is **to** deseal the soil**.** This can be achieved by creating **areas of open ground**, and by installing **draining surfaces** (clay, sand, bark and wood chips, grass paving stones, drainage paving stones, porous concrete, etc.). Planting the area is also essential, preferably retaining existing plants **and/or planting new ones**. Diversifying the plant strata (herbaceous, shrubby and arboreal) helps to cool the space, increase the resilience of the plants, and enhance the plot's potential to host biodiversity. In addition to planting the courtyard, roofs **and** facades **can be planted** to reinforce the **cool island effect**. You can also add water features such as rain gardens or basins.

For the remaining mineral surfaces on the ground or building, the use of materials with high inertia slows down temperature variations, **while** high-albedo materials have beneficial reflective properties. For example, cover a roof that can't be planted with a "cool roof" reflective coating, renovate the building envelope using high-inertia or white materials, and opt for wooden play areas and equipment (slides, benches, etc.).

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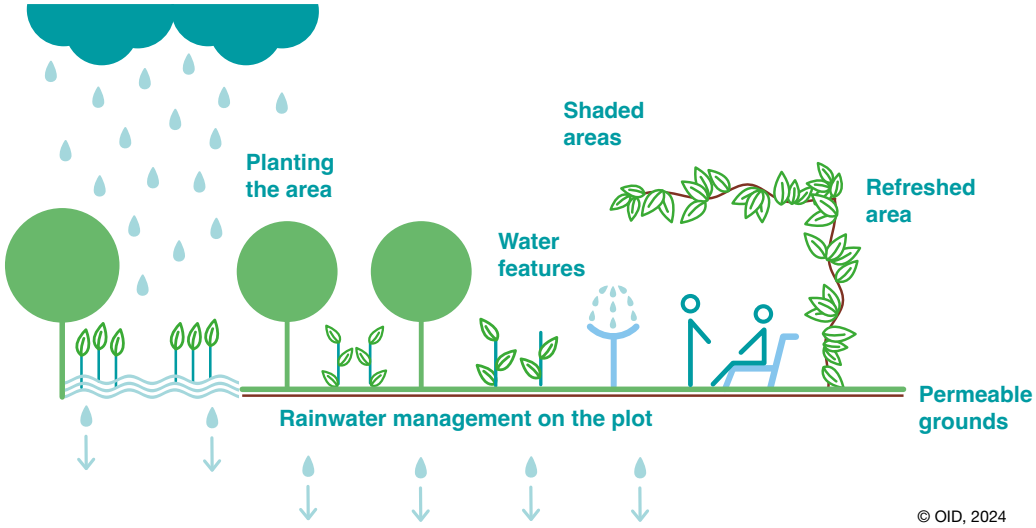
FEATURES OF AN OASIS COURTYARD



WEAK POINTS AND STRONG POINTS

- ⊖ Oasis courtyards require regular maintenance.
- ⊖ This development requires users to adapt their practices because the surfaces are permeable and sometimes dirty.
- ⊖ This type of development is expensive, but costs are coming down as the practice becomes more widespread.
- ⊕ Oasis courtyards are suitable for all types of building activity.
- ⊕ They can offer a refuge for local residents during heatwaves.
- ⊕ These spaces promote well-being in the city and maintain a social link by creating convivial spaces.

FIND OUT MORE

ADEME (2020), Végétaliser : agir pour le rafraîchissement urbain

HENDEL, M. (2020), Formation OASIS – Comment rafraîchir sa cour ? Rôle des matériaux urbains

City of Paris (2023), Les cours oasis

Architecture research laboratory (*LRA*) Toulouse (2015), Ilots de Fraicheur Urbain

Wallonie environnement SPW (2020), Gestion durable des eaux pluviales a la parcelle en zone urbanisable en région wallonne - Fiche n°15 : Les revêtements de sol perméables

MALADAPTATION

Maladaptation can result from the following:

Unsuitable vegetation

The choice of plant palette is a major factor to avoid maladaptation. **Cooling capacity varies from one plant species to another** (Arboclimat decision support tool). Biotope coefficients per surface area, which are widely used to assess biodiversity, don't take this capacity into account and are therefore not a sufficient indicator to assess the effectiveness of an oasis courtyard. **An in-depth analysis of the plant palette is required**.

Evapotranspiration is also linked to plant irrigation. Trees under water stress actually tend to limit cooling in the city by trapping infrared solar radiation, which increases exposure to heat. **The choice of plant palette** must therefore be **based on the evapotranspiration potential of the species and its vulnerability to water stress**.

Vulnerability of water resources

When plants are under water stress, users tend to irrigate heavily. Depending on the drought situation, it's important to avoid over-watering so as not **to transfer water vulnerability** to other domestic or agricultural uses, for example.

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MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- USE LOCAL SPECIES AS MUCH AS POSSIBLE
- ADAPT THE PLANT PALETTE TO CURRENT AND FUTURE CLIMATES
- USE CEREMA'S SÉSAME TOOL TO CHOOSE TREES ACCORDING TO THE ECOSYSTEM SERVICES REQUIRED
- MAKE PART OF THE PLANTED AREA ACCESSIBLE TO BUILDING USERS
- INSTALL WILDLIFE REFUGES (WOOD PILES, ROCK PILES, BIRD NESTING BOXES, ETC.)
- FOR WETLANDS AND/OR WATER AREAS, FAVOUR PERMEABLE, NATURAL OR SEMI-NATURAL ENVIRONMENTS (PONDS) RATHER THAN TOTALLY ARTIFICIAL STRUCTURES (ORNAMENTAL FOUNTAINS).

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/– : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS		INTERPRETATION
+/–	Leaf surface area in relation to courtyard area (%)	To be maximised while taking into account the minimum space required for tree development
+/–	Water surface area (pond, fountain, etc.) in relation to courtyard surface area (%)	To be maximised
+/–	Calculation of the biotope coefficient per surface area of the plot	To be maximised
+/–	Share of potential shaded area in relation to the surface area of the oasis courtyard (surface area of the canopy and areas protected from direct sunlight) (%)	To be maximised
+/–	Number of plant strata	To be maximised
+/–	Permeable ground surface area in relation to the total surface area of the plot (%)	To be maximised
+/–	Surface area with an albedo less than or equal to 0.4 in relation to the total area of the plot (see Criteria section, in "Choosing high-albedo wall and roof coatings") (%)	To be maximised
+/–	Coefficient of open land on the plot	To be maximised
+/–	Percentage of essential recommendations followed (%)	To be maximised

INDICATORS OF RESULTS		INTERPRETATION
+/–	Comparison between the temperature in the oasis courtyard and a control situation* (e.g. nearby public space in summer or equivalent) (°C)	Temperature in the oasis courtyard < temperature in control situation
+/–	Impact on the urban heat island depending on the plant species chosen, calculated using Arboclimat (see Tool section, in "Planting around the building").	Best possible cooling rate
+/–	Heat flows linked to the building's activity discharged outdoors (air conditioning, kitchens, servers, etc.) (W/m²)	To be minimised

**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.).*

Providence Elementary school. Source: CAUE of Paris

REAL-LIFE EXAMPLE

CITY OF PARIS

VILLE DE PARIS

BUILDING : ELEMENTARY SCHOOL PROVIDENCE, 13TH IN PARIS
SURFACE AREA : 665 M² OF PLAYGROUND
USE : EDUCATION
COST : 350,000€

As part of its different strategies to deal with climate change, the City of Paris has been transforming school's playgrounds into cool islands since 2017. The 745 schools of Paris offer a real opportunity. The Providence elementary school, in the 13th arrondissement of Paris, was retrofitted in 2021. Of the 665m² accessible to children, 285m² have been made permeable. Also, 60m² have been transformed into planted areas, with areas of open ground, perennials and shrubs. This newly established vegetation contributes to the cooling effect and is also accessible to children. Climbing plants on metal cables have been added and allow the facade to be refreshed and cladded. Unfortunately, the slopes of the impermeable surfaces of the courtyard could not be modified to redirect runoff water to the vegetation, but a gutter in the main building was diverted to a rainwater collector, allowing the watering of the planted areas. Each Oasis courtyard is unique but must respect common principles, namely: desealing and recovering a living soil to better manage rainwater, disconnecting from the network and enriching the soil, favouring natural, bio-sourced and reused materials, greening the courtyard on all levels, offering a variety of fun activities.

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