PLANTING AROUND THE BUILDING

HAZARD

HEAT

RAINFALL AND FLOODS

STORMS AND STRONG WINDS

IMPLEMENTATION STEP

CONSTRUCTION

BUILDING IN OPERATION

TERRITORY

AREA OF ACTION

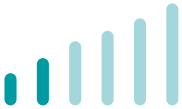
OUTDOORS

COST

€ € €

low medium high

LEVEL OF SKILL



low

Vegetation is often planted around buildings for aesthetic reasons, but it can also be a key part of climate change adaptation strategies. Trees, hedges and shrubs enable buildings nearby to benefit from the ecosystem services they provide, particularly by regulating temperature or air quality, and perpetuating natural water cycles by maintaining the soil's absorption capacity.

IMPACTS

Vegetation affects the urban environment by modifying its radiative, thermal, hydric and aerodynamic properties.

Plants effectively limit urban heat islands (higher temperatures in urban environments than in rural areas) and thermal discomfort for residents in summer. Trees **provide shade** for surrounding buildings and infrastructure (1), help to limit air heating by **reflecting solar radiation** (2), and cool outdoor spaces by releasing moisture from the ground into the air through **evapotranspiration** (3).

In addition, vegetation helps to combat flooding by encouraging **the infiltration of water** (4) into the ground thanks to woven root networks and by absorbing some of the excess water in the event of heavy rain.

Finally, planting vegetation around a building limits the force of the wind by acting as a **windbreak**, and protects it in the event of storms (5).

INSTALLATION GUIDE

- **Take into account the expected benefits**: if the main objective is thermal regulation, opt for deciduous trees (which lose all their leaves for part of the year) to allow maximum light in during the winter, while limiting solar radiation in the summer.

- **Choose the right location:** trees planted on the west/south-west side will maximise the building's solar gain in winter and minimise it in summer, while trees planted in front of a façade exposed to prevailing winds will protect the building in the event of a storm (hedges and shrubs are preferable to limit the risk of being uprooted).

- **Adapt the species to current and future local characteristics:** the urban environment can be harsh, so pay particular attention to the choice of plant palette to ensure the success of the operation, especially in the context of climate change. Open-ground planting as part of a desealing strategy will have greater positive impacts and more resistance.

- **Plan post-planting care**: planting trees requires special care in terms of watering, monitoring, etc. for at least five years, a period that needs to be taken into account when establishing the budget for the operation.

- **Management method**: ecological management consists in implementing maintenance practices that respect the environment and biodiversity. This method is less costly and corresponds more closely to the environmental quality of natural areas.

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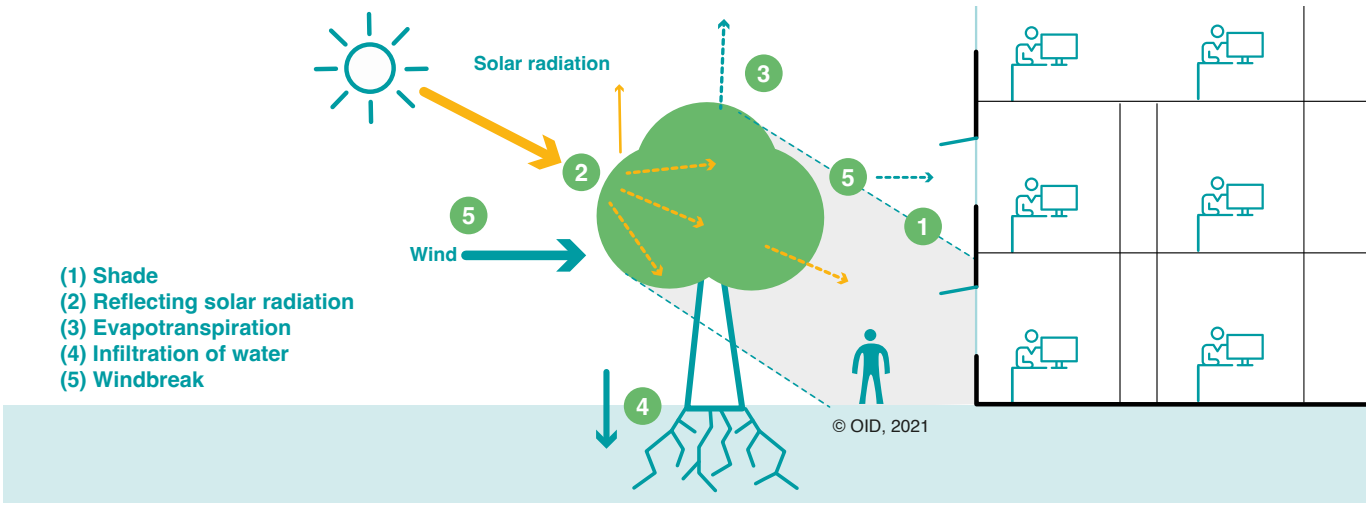
As a result, the benefits of planting are amplified.

- **Activities in the vicinity**: a tree planted in a busy area requires particular surveillance. Pruning avoids the risk of falling branches, and clearing limits the risk of slipping in autumn.

ECOSYSTEM SERVICES PROVIDED BY VEGETATION NEAR A BUILDING



WEAK POINTS AND STRONG POINTS

⊖ Some plant species **have allergenic properties** and harm people's health.

⊖ In streets lined with high buildings, too high a density of trees can prevent **the cooling of the streets at night by preventing winds from circulating and concentrating pollution particles** at ground level.

⊖ In areas at **risk of clay shrinkage and swelling**, trees planted too close to buildings could damage the water stability of the soil, leading to cracks in the building. In this case, species that require little water are more suitable.

⊖ Finally, in order to limit the risk of collisions with wildlife present on the site, it is preferable **to avoid planting trees in front of reflective glass surfaces**, and to favour the installation of solar protection devices.

⊕ The presence of plants in people's everyday environment enhances their **sense of well-being** and improves their mental, physical and social **health**.

⊕ Carrying out a study of the site and its spatial composition helps to avoid the risks of clay shrinkage and swelling, and the sequestration of pollutants and hot air.

⊕ It's a low-cost, low-impact way to cool the surrounding area.

MALADAPTATION

Maladaptation can result from the following:

Unsuitable plant palette

A good knowledge of the local environment is essential in order to understand what already exists and make the right design choices. Unlike indigenous species, exogenous species are not naturally present in the region and are not necessarily adapted to biotic factors (interactions between living organisms) and abiotic factors (physico-chemical environmental conditions). Plants subject to water stress, for example, tend to limit atmospheric cooling by trapping infrared solar radiation. They can also disrupt local biodiversity by competing with it. Species whose "introduction and/or spread threatens biological diversity" are referred to as invasive alien species.

Environment not resilient to climate change

In the face of climate change, it is necessary to anticipate changes in local environmental conditions when choosing plant species, so as to maximise the resilience of the area. Some scientists therefore point to the relevance of planting exogenous species that are adapted to climate projections rather than indigenous species. Importantly, the choice of plant palette needs to be based on vulnerability to water stress in order to increase the resilience of land in the face of climate change.

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MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- USE CEREMA'S SÉSAME TOOL TO CHOOSE TREES ACCORDING TO THE ECOSYSTEM SERVICES REQUIRED
- USE LOCAL SPECIES AS MUCH AS POSSIBLE
- ADAPT THE PLANT PALETTE TO CURRENT AND FUTURE CLIMATES
- MAKE PART OF THE PLANTED AREA ACCESSIBLE TO BUILDING USERS
- INSTALL WILDLIFE REFUGES (WOOD PILES, ROCK PILES, BIRD NESTING BOXES, ETC.)
- CALL ON THE SERVICES OF AN ECOLOGIST

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/− : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS	INTERPRETATION
+/− Number of plant strata	To be maximised
+/− Surface area of open land in relation to surface area of the plot (%)	To be maximised
+/− Calculation of the plot's biotope coefficient	To be maximised
+/− Impact on urban heat islands according to plant species using the Arboclimat tool	To be maximised
+/− Percentage of users who consider the greening project to be positive compared to the pre-project situation	To be maximised
+/− Diversity of plant species (exact number or estimate depending on diversity)	To be maximised
+/− Surface area of foliage in relation to the surface area of the plot	To be maximised
+/− Percentage of essential recommendations followed (%)	To be maximised

INDICATORS OF RESULTS	INTERPRETATION
+/− Comparison between temperature in planted areas and that in a control situation* (e.g. nearby artificial public space) (C°)	Temperature in planted areas < control temperature
+/− Rainfall abatement of the plot (%) (see definition section, "Creating a green roof").	To be maximised
+/− Leakage rate onto public roads (l/s.ha) (see definition section, "Creating a green roof").	To be maximised
+/− Percentage of users who consider that planting around the building enhances their well-being	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.).*

TOOL

- The Sésame tool developed by Cerema can be used to identify trees according to the ecosystem services required and the characteristics of the site. Note that using the tool does not replace the services of an ecologist!
- ArboClimat: available on the Ademe platform. Use it to create simulations of urban tree planting and assess the impact on various indicators, such as the capacity to store carbon, the impact on urban heat islands, the benefit for biodiversity, etc.

FIND OUT MORE

Herrera Environmental Consultants (2008), The effects of trees on stormwater runoff

Nature4Cities (2020), Street tree

ARB (Regional biodiversity agency) (2016), *Guide de gestion écologique des espaces collectifs publics et privés*

Cerema (2022), *L'arbre, l'essence de la ville – L'outil Sesame pour faire les bons choix*

Trees & Design Action Group (2014), Trees in Hard Landscapes : A Guide for Delivery

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