ADAPTING VEGETATION TO THE CLIMATE

HAZARD

RAINFALL AND FLOODS

COASTAL DYNAMICS

GEOTECHNICAL DROUGHTS

HEAT

WILDFIRES

STORMS AND STRONG WINDS

IMPLEMENTATION STEP

TERRITORY

AREA OF ACTION

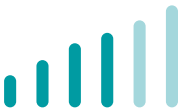
OUTDOORS

COST

€ € €

low medium high

LEVEL OF SKILL



medium

Climate change adaptation solutions for buildings often involve greening, which makes the composition of the plant palette particularly important. Local physical characteristics, such as the exposure, the soil composition and the intensity of prevailing air currents, influence the type of vegetation suited to a site. Given the longevity of certain plants (trees, perennials, etc.), it's also important to think about how the climate is likely to develop in the second half of the 21st century when choosing plants, to ensure their long-term survival and effectiveness.

IMPACTS

The success of greening (roof, facade, around the building, …) depends on the **choice of plants**. Ignorance of the issues involved can lead to excess plant mortality or an inability to take advantage of ecosystem services (e.g. over-consumption of water by walls planted with exotic plants). Taking account of local conditions (soil, climate, water availability, etc.), **extends the lifespan of vegetation and allows it to grow thicker and higher**. Climate change also puts more pressure on vegetation, particularly the increased frequency and intensity of extreme climate events and **the arrival of new, potentially invasive plant species**. To ensure the long-term effectiveness of greening strategies, these changes need to be taken into account now.

INSTALLATION GUIDE

Plants should be selected bearing in mind the following:

- **The local micro-climate**: ambient temperatures and potential extremes, atmospheric pressure, rainfall, sunshine (light and shade, presence of reflective surfaces and glass facades), humidity, wind speed. These characteristics vary according to natural or man-made topography (e.g. presence of mountains or buildings).
- **Soil and substrate characteristics**: degree of compaction, pH, humidity, pollution, etc.
- **Changes in climate hazards**: climate change increases the frequency and intensity of heat waves, droughts, floods, violent winds, etc.

In addition, while not invasive, some species, particularly Mediterranean ones, sometimes adapt to heat waves and droughts better than local species. Combating urban heat islands requires making a **trade-off between water-intensive plants**, which generate more evapotranspiration and therefore cool down temperatures, **and drought-resistant plants**, which are more resilient but sometimes have less cooling capacity.

Covering the soil with perennials and shrubs limits the development of grass and other weeds, which grow a very dense root system on the soil surface. Grass roots limit water infiltration into the lower layer of soil where tree roots are found. It's therefore advisable to develop a ground cover of perennial or shrubby plants to prevent water stress in the tree stratum.

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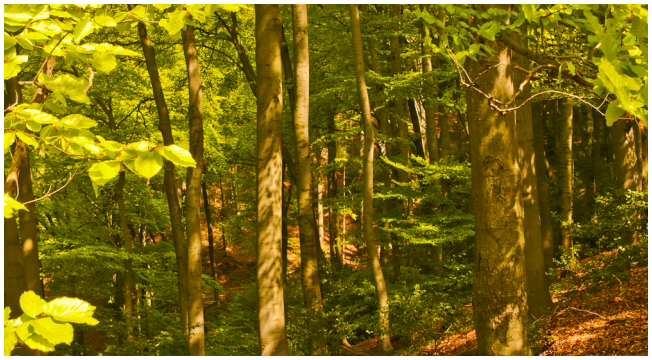

Beech forests, which are widespread in the northern half of France, are particularly vulnerable to climate variations and the proliferation of certain parasites.

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Generally speaking, **high plant density** encourages the resilience of vegetation and maximises its cooling power.

In the face of the proliferation of invasive species and parasites, a **diverse plant palette** is vital to maintain a high degree of resilience: no single species should constitute more than 5 to 10% of the total (on the scale of a district or town).

WEAK POINTS AND STRONG POINTS

⊖ **It's difficult to accurately assess the positive effects** of a revegetation strategy. They are not immediate, and climate changes and hazards, usages, etc. can have a considerable impact on the survival of local vegetation.

⊖ The decision to use non-local species to **anticipate the effects of climate change can sometimes conflict with the objective of promoting local biodiversity**. This issue has spawned a major debate in the scientific community, pitting the advocates of anticipatory adaptation against the defenders of local heritage.

⊕ It's advisable to **refer to guides** (see the *Sesame* study developed by the city of Metz, or the "Tree and Climate" study currently being carried out by the city of Paris)

⊕ **Seek help from local bodies** (Regional Biodiversity Agencies), naturalist associations and some local authorities.

CONCEPT / DEFINITION

- Indigenous species: species found in the geographical area that it occupies or is able to occupy naturally, without human intervention.
- Endemic species: native species that only exist in that geographical area (conservation issue).
- Exotic species: species not indigenous to the study area, and therefore introduced by humans, intentionally or otherwise.
- Invasive alien species: alien species that threaten native biodiversity (ecosystems, natural habitats or local species).

REAL-LIFE EXAMPLE

ICADE

LOCATION : *PARC DU MILLÉNAIRE*, AUBERVILLIERS
SURFACE AREA : 60 HA
USE : TERTIARY, COMMERCIAL
COST : N/A

As part of the "*Parc du Millénaire*" project, ten years ago Icade began adapting its vegetation to climate change. This involved a study based on climate projections, carried out by Icade in collaboration with *Météo France*, *CDC Biodiversité* and *Société Forestière*. This led to the development of a plant palette highly resistant to water stress and wide temperature variations. The study is now used as a basis for all the Group's projects, alongside other criteria such as biodiversity, carbon footprint (local purchases are prioritised) and the allergenic nature of some species. Although taking adaptation into account in the planting strategy initially led to additional costs (more species, higher tree density, etc.), it subsequently reduced expenditure on upkeep (less watering, lower maintenance, etc.), and revitalised the area by creating an attractive space, particularly in hot weather.

FIND OUT MORE

Trees & Design Action Group (2016), Trees in Hard Landscapes: A Guide for Delivery

City of Metz, Metz Métropole and *CEREMA* (2019), *Projet SESAME*

ADEME, Plantes & Cités CEREMA (2023), *Projet AVEC*

IPCC & IPBES (2021), Biodiversity And Climate Change, IPBES-IPCC co-sponsored workshop report

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