EXPLOITING THE AREA'S ADVANTAGES

HAZARD

RAINFALL AND FLOODS

COASTAL DYNAMICS

GEOTECHNICAL DROUGHTS

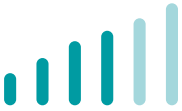
HEAT

COST

€ € €

low medium high

LEVEL OF SKILL



medium

The building's immediate environment plays a fundamental role in its ability to withstand climatic hazards. Some features of the land and terrain can represent risk factors, such as impermeable soils and strong winds. However, others can be resilience factors, such as the presence of water sources or natural relief. Instead of adapting the land to suit the building, an innovative approach is to adapt the building to the land. This approach goes against current practice and aims to take advantage of the positive characteristics of the land to enhance the durability and resistance of buildings.

IMPACTS

More frequent, intense climate hazards such as heat waves, floods and storms make it essential to identify and exploit the advantages of the territory. This **strengthens the resilience of the building** by protecting its integrity (structure, equipment, etc.) as well as the **safety and comfort of its occupants** in the face of climate change.

Adapting buildings to a terrain often involves using bioclimatic architecture to ensure sustainability. In bioclimatic buildings, the layout and design take into account the **climate and the immediate environment** at the design stage, before construction, in order **to reduce energy requirements** for heating, cooling and lighting, and to be **better adapted to climate risks**. This architecture can also take into account the **structural shell requirements and the nature of the soil**. Bioclimatic architecture also employs minimal mechanised technical resources and energy from outside the site. By **reducing the** building's **environmental impact** and cutting energy bills, bioclimatic architecture is a sustainable and cost-effective approach.

INSTALLATION GUIDE

Identify the characteristics of the region and the terrain: this involves gaining a deeper understanding of the local climate and carrying out a detailed analysis of the terrain. The many factors include the presence of relief, vegetation, prevailing wind direction, and summer sunshine.

Carefully locate and orient the building: depending on the topographical features identified above, it's essential to plan the location and orientation of the building carefully. The aim is to minimise the impact of risk factors while exploiting the advantages offered by the site. For example, locating the building close to a water source or vegetation will help to keep occupants cool. On a sloping site, it may be advantageous to design a building that's partially buried to protect it from prevailing winds and temperature variations. In urban environments, the structure and layout of surrounding buildings can also be used to improve the building's resilience (shade cast, for example).

Use available resources for cooling and heating: many areas of land have resources that can be exploited for passive or semi-passive cooling of the building. For example, the proximity of a water table can be an asset for implementing geothermal systems. It's important to take advantage of these natural resources to reduce dependence on traditional heating and cooling systems and so make buildings more resilient to climatic variations.

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Underground house (Druidston Haven, Great Britain)

In addition to these actions, architecture is considered bioclimatic if it meets several of these criteria:

- The **orientation of the site** has been designed to maintain thermal comfort in both winter and summer, for today's climate and the climate of the future. This means maximising sunlight in winter while protecting the building from the sun's rays in summer.

- The **materials** used for construction or renovation come from **natural sources** (wood, straw, raw or baked earth, hemp, etc.).

- **Energy and water self-sufficiency** is maximised, using renewable energy sources and rainwater recovery systems.

- **Climate risks** are taken into account, and the building is adapted to them, with a projection based on IPCC scenarios.

- **Heating and cooling systems are** as energy sufficient as possible.

WEAK POINTS AND STRONG POINTS

⊕ It's easier to exploit the advantages of the territory on **newbuilds**, because you can decide on the layout of the buildings.

⊖ This action often requires a **large amount of free land** to exploit the characteristics of the terrain. This adaptive solution can therefore be difficult to implement in highly urbanised areas.

⊖ It's important to take into account all the climate hazards to which the building is exposed and the advantages and disadvantages of each of the land's characteristics. Some can be both a resilience factor and a risk factor depending on the hazard; the presence of **trees** near the building can limit direct solar gain, but can also **unbalance the moisture content of the soil** and cause problems in the building if the land is prone to shrink-swell.

FIND OUT MORE

ADEME (2022), *Faire la ville dense, durable et désirable*

French Ministry of Ecology (2024), *Guide de l'aménagement durable*

Guide bâtiment durable Brussels (2016), *Implantation et forme des bâtiments : quels choix influencent les effets du vent ?*

OID (2022), *L'architecture bioclimatique et les constructions traditionnelles*

The Shift Project (2022), *Climat, crises : comment transformer nos territoires*

EMI & Acciona Infraestructuras (2015) Guide for bioclimatic design

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