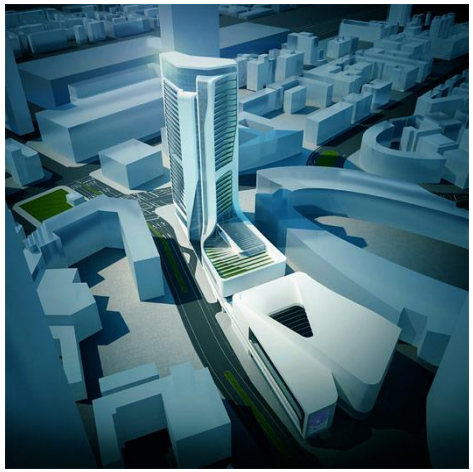
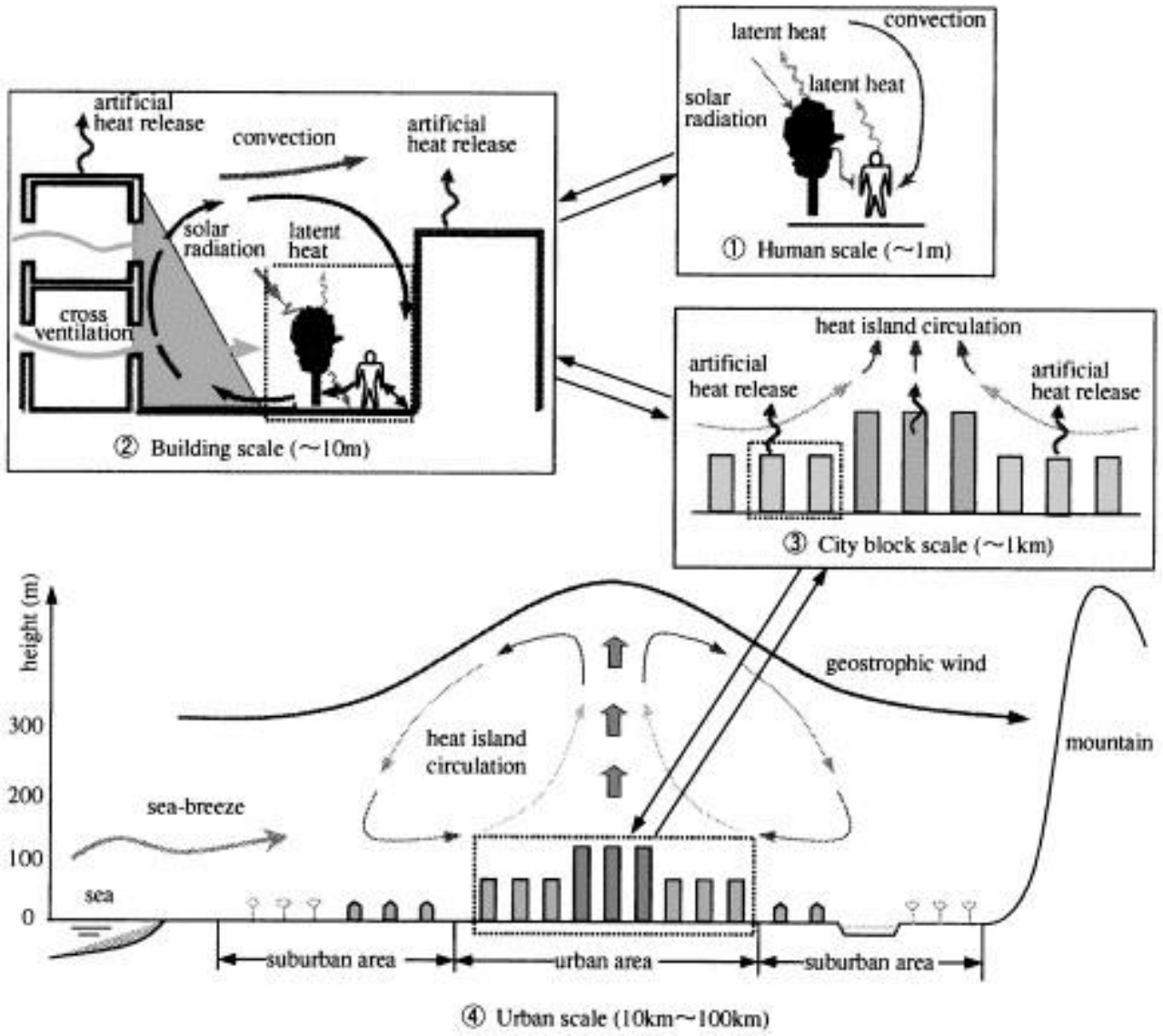
Difference between micro and macro climate



Micro-climate - The variations in **localized** climate around a building



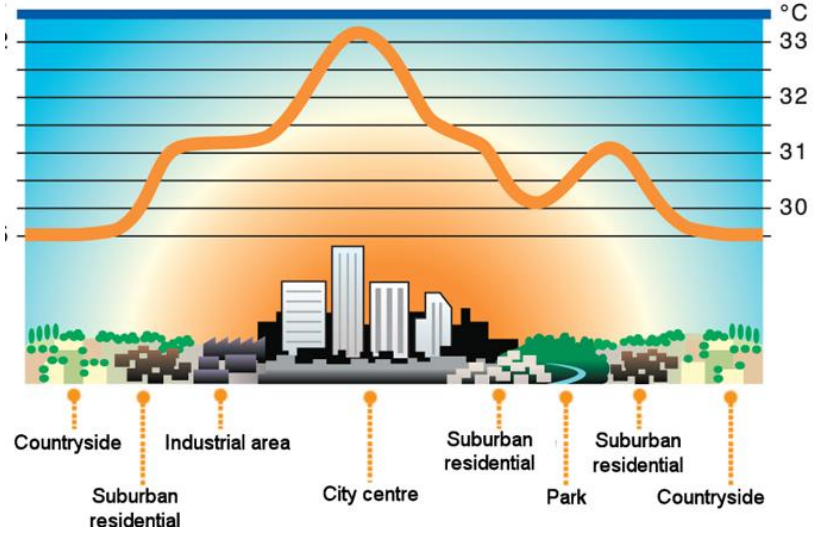
Macro-climate - The climate of a **larger area** such as a region or a country

•The macro and micro climate has a very important effect on both the **energy performance and environmental performance of buildings.**

•The building site affects exposure to the **prevailing wind, the solar radiation the building receives, pollution levels, temperatures and rain penetration.**

Macro climate factors

•Temperature
•Wind
•Humidity
•Precipitation
•Sunshine
•Solar radiation
•Cloud cover



Macro climate affected by

•sun angle exposure
•Topography - the shape of the land
•Vegetation
•Water body

•Physical infrastructure
•Urban layout (land use)
•Building types
•Shapes, height, color
•Material use in building facade
•Energy demand
•Open spaces
•Vehicle pollution

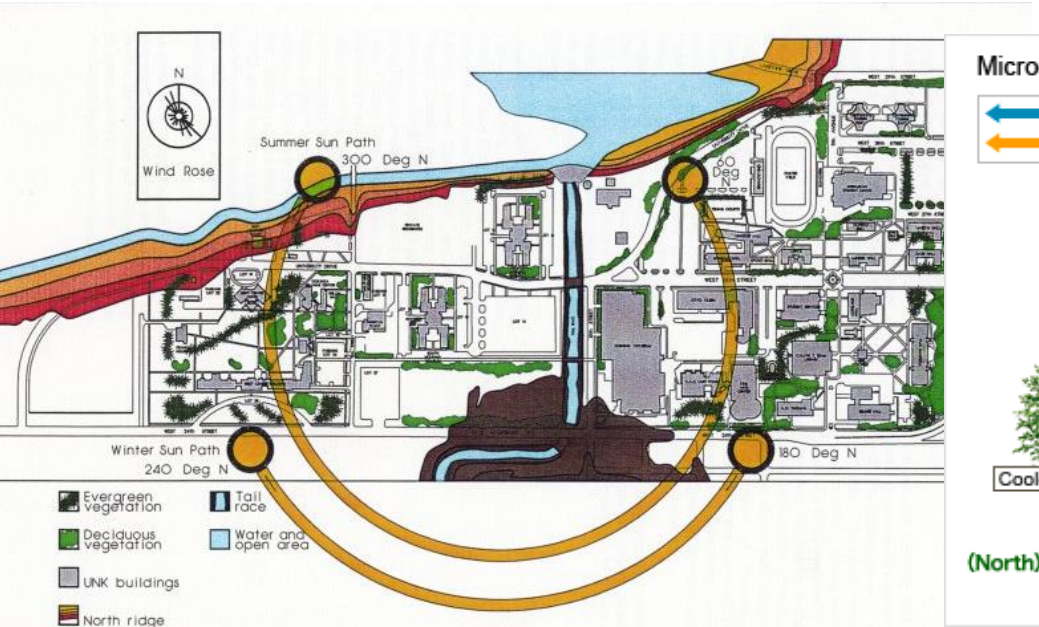
Micro-Climate – Effects of Buildings

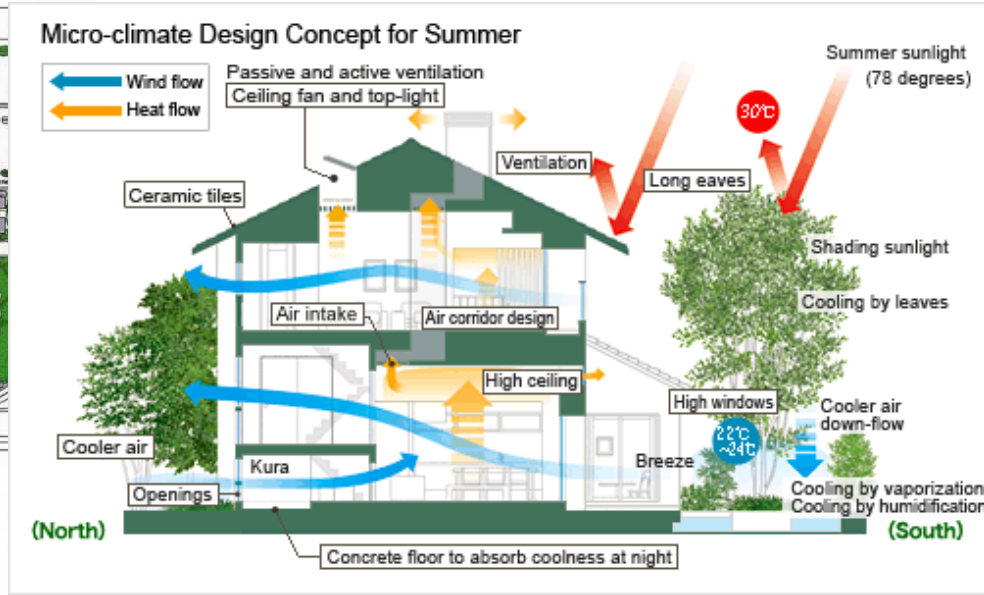
Buildings themselves create further micro-climates by **shading the ground, changing wind flow patterns**.

One example of how buildings affect the local climate is the **heat island effect** in large cities where the average temperature is higher than the surrounding area:

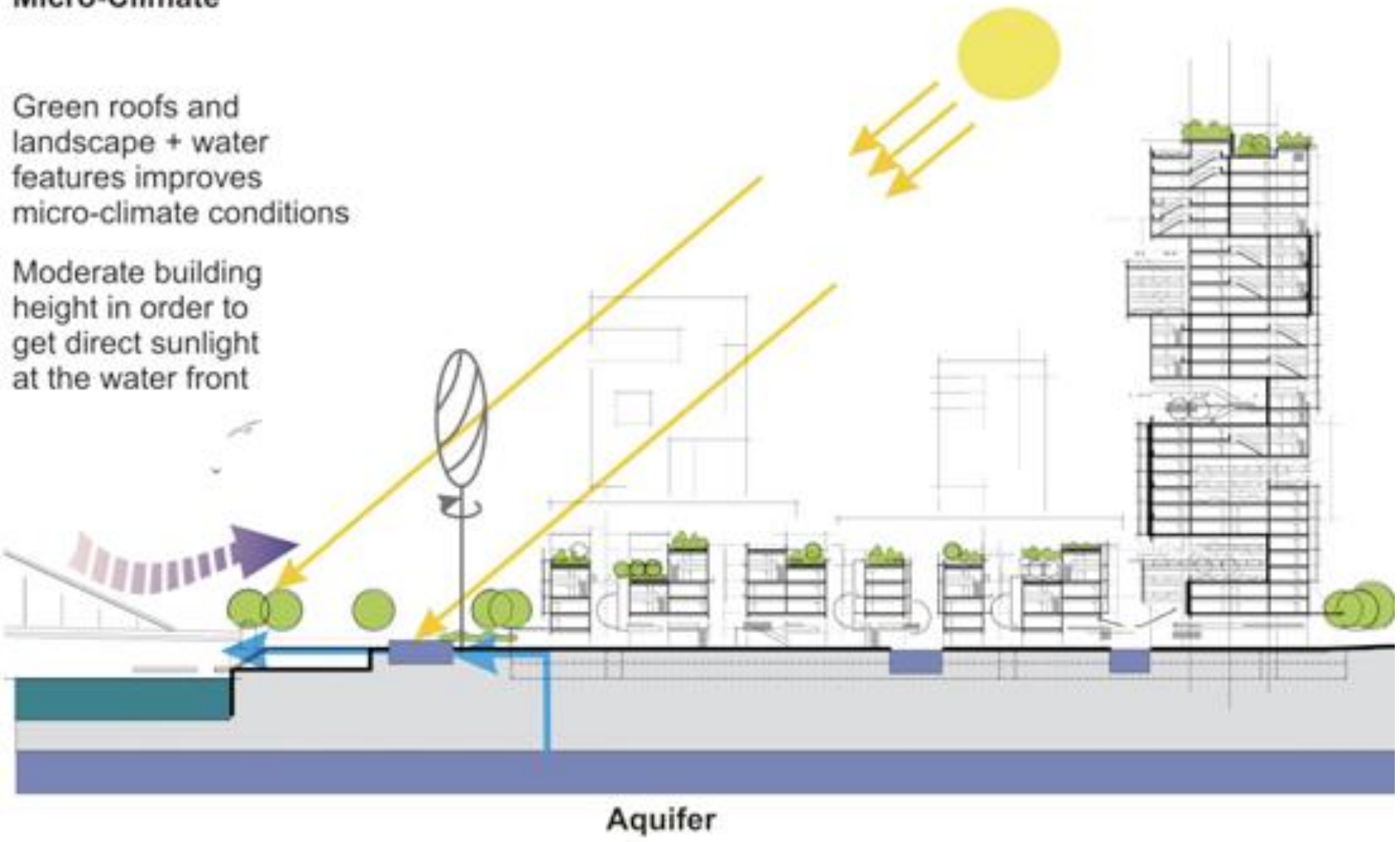
Solar energy absorbed and re-emitted from **building surfaces, pavements roads** etc. creates a warming effect on the surrounding air. Also the large quantities of **buildings break up the wind flow,** reducing wind speeds and causing the warm air to remain stagnant in the city. This also causes **increased pollution as well as temperatures.**

The presence of local high rise buildings can degrade the local climate as **wind speed at ground level** can be significantly increased, while extensive **shadows block access to sunlight for long periods**, increasing space **heating costs** in surrounding buildings.

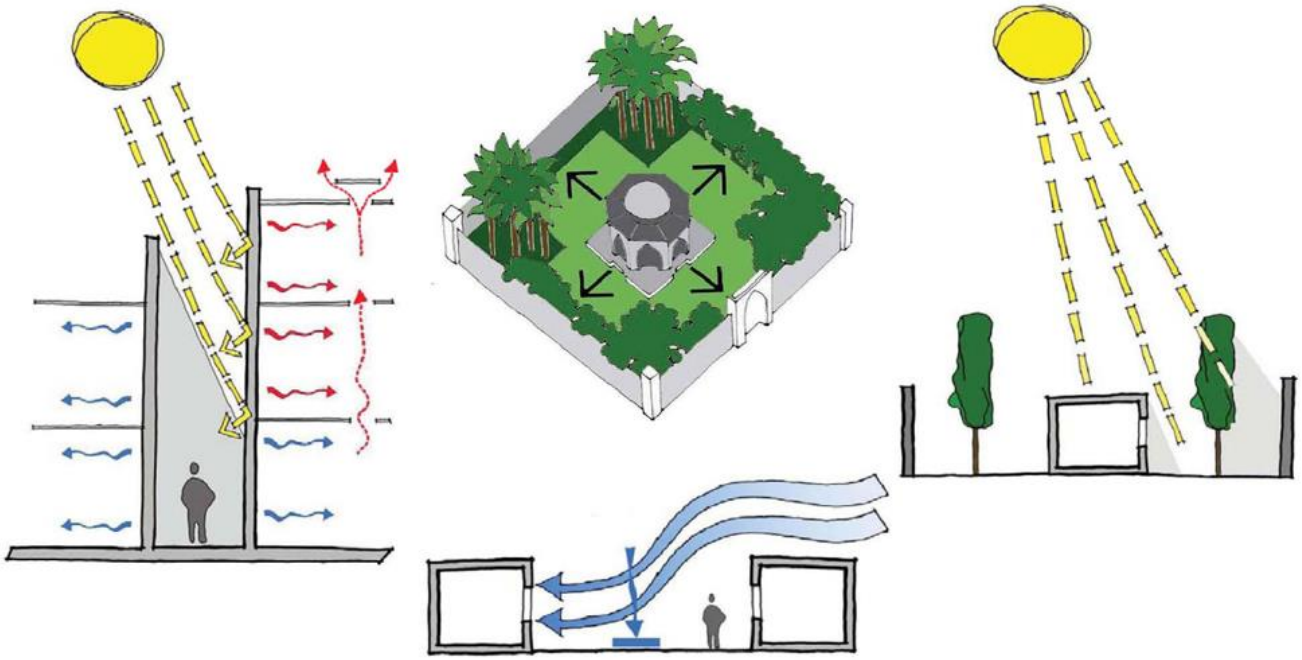




Example


Micro-Climate
Green roofs and landscape + water features improves micro-climate conditions
Moderate building height in order to get direct sunlight at the water front
Aquifer

Example



Microclimate
Courtyard building typology to provide local shading
Vegetation/ native planting for passive cooling and shading
Water features to provide evaporative cooling
Heavy weight building elements to provide thermal mass and night cooling ventilation
Narrow street to provide shading

Evaporative cooling towers to enhance microclimates conditions of the central space.
The water used in the cooling towers will come from a recycling system.

SOLAR GAIN REJECTION

Building orientation

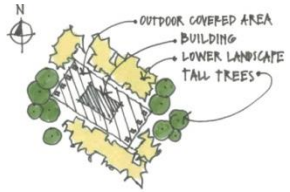
Landscape

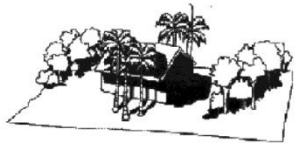
Roof system

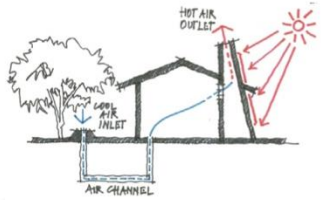
Reflective surfaces

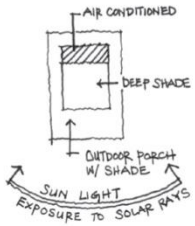
shading

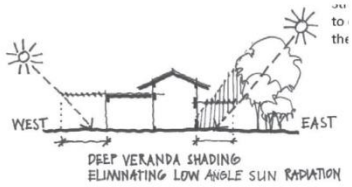
Thermal mass



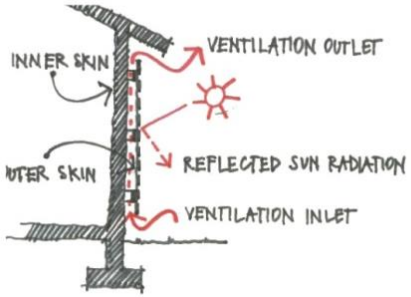








INSULATION



AIR MOVEMENT

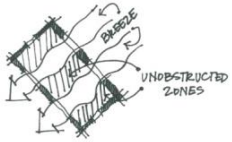
Building form

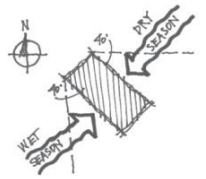
Building elevation

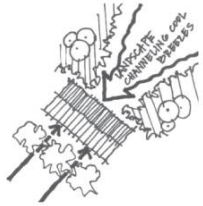
Natural ventilation

Channel landscape planti

Cross ventilation





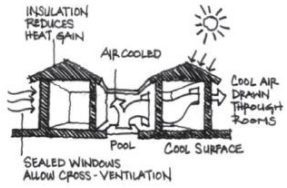


EVAPORATIVE COOLING

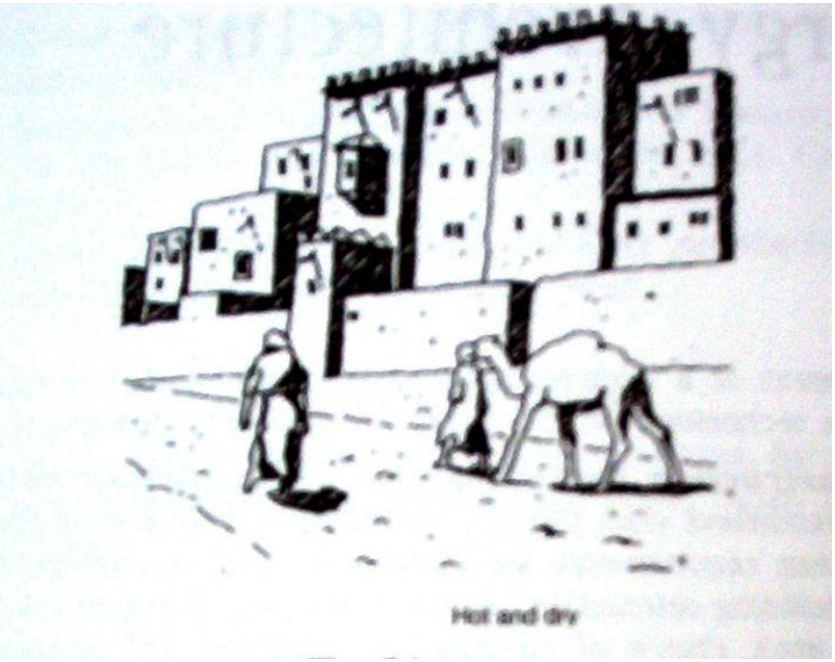
Water elements

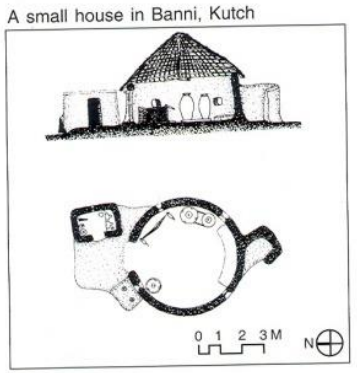
Zones of natural cooling

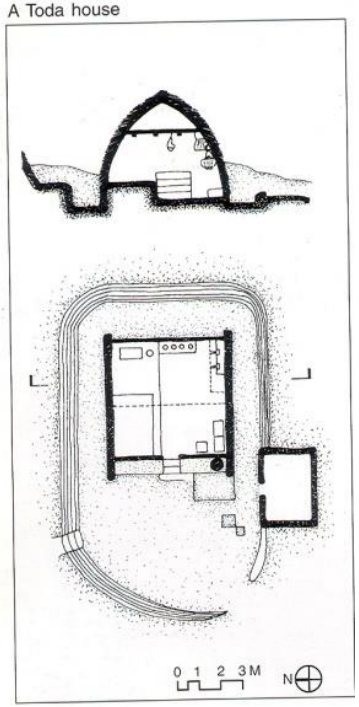
Elevated position

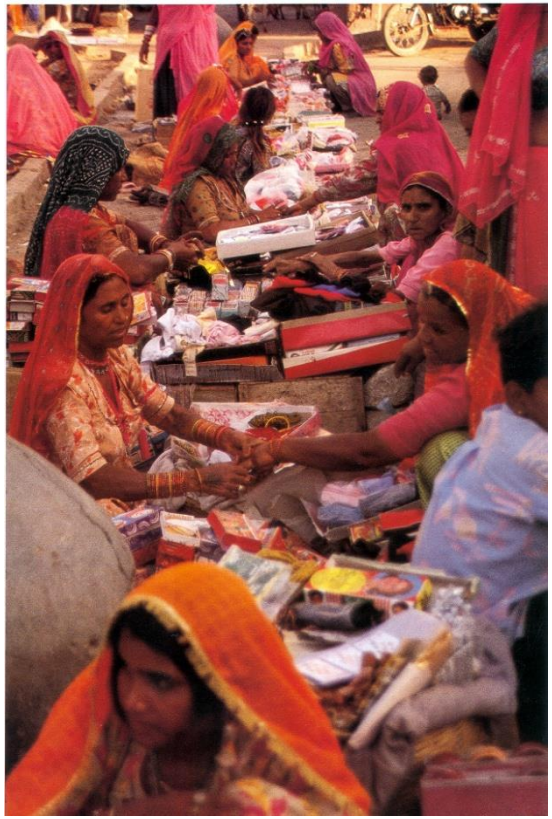


TRADITIONAL ARCHITECTURE



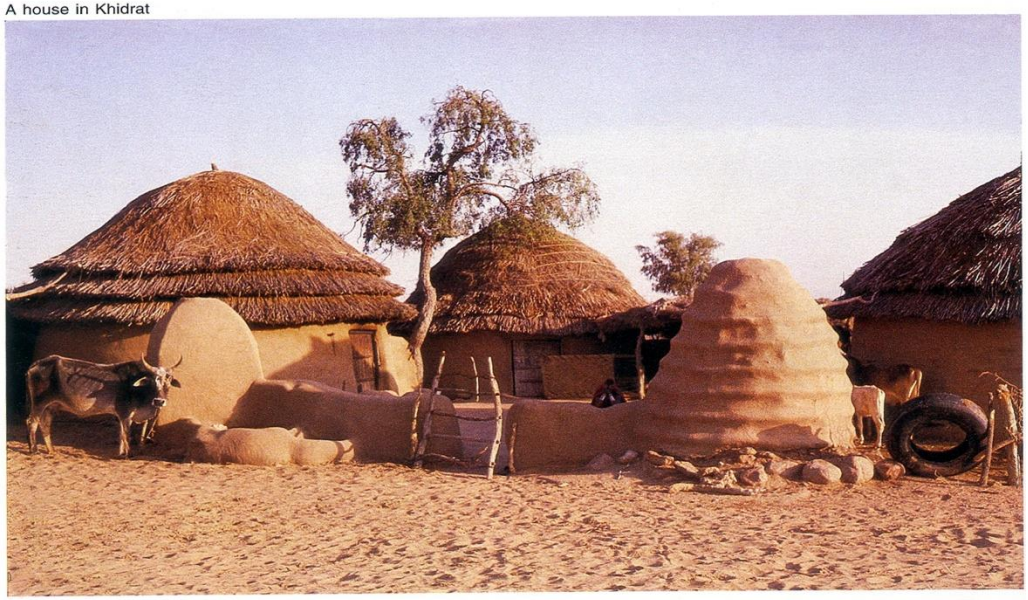




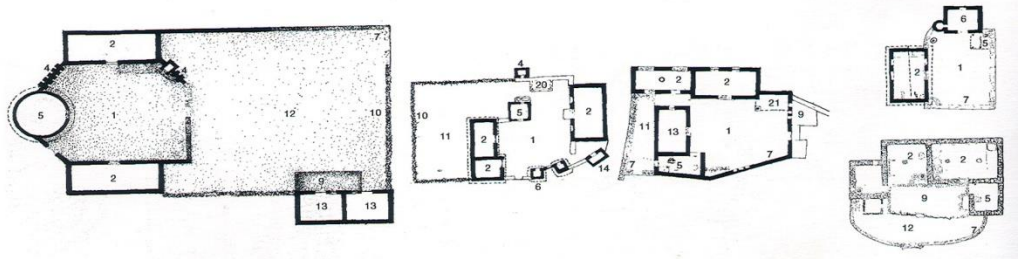


BHUNGA-KUTCH.

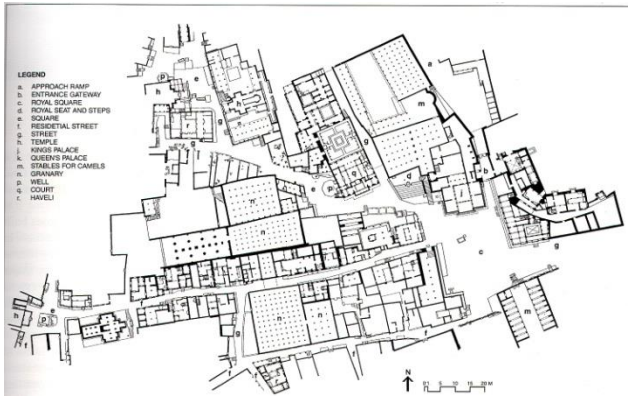
A house in Khidrat

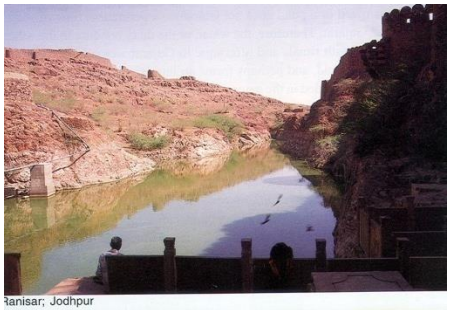


Comparative plans of houses of the various settlements included in the study

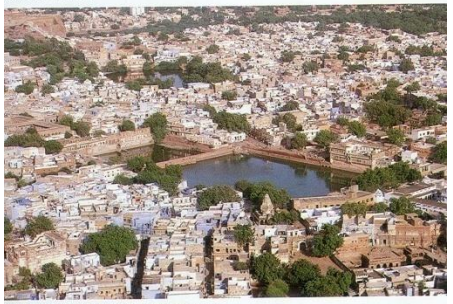


•SELECTION OF SITE- URBAN FABRIC

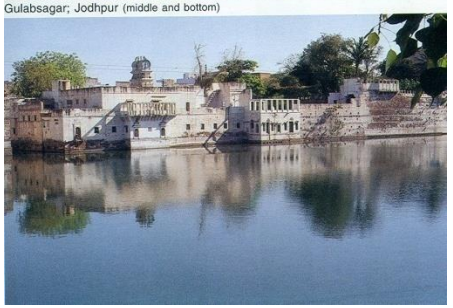




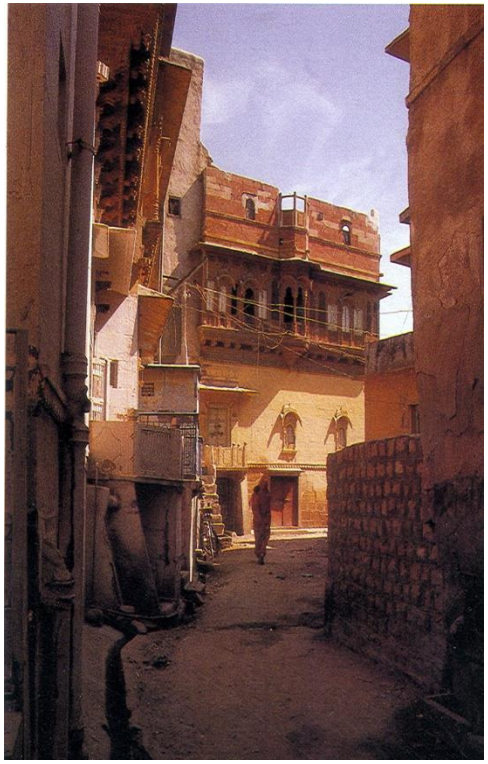
anisar; Jodhpur

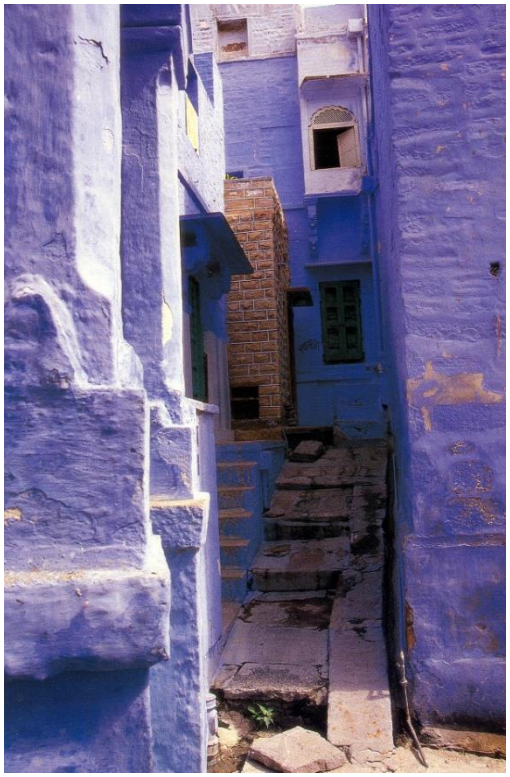


Gulabsagar; Jodhpur (middle and bottom)

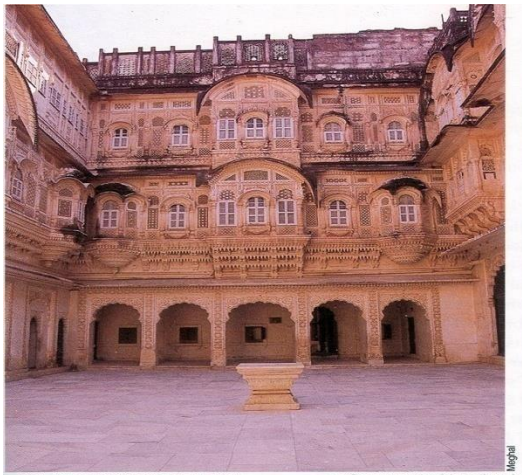


STREETS-MUTUAL SHADING-WIND

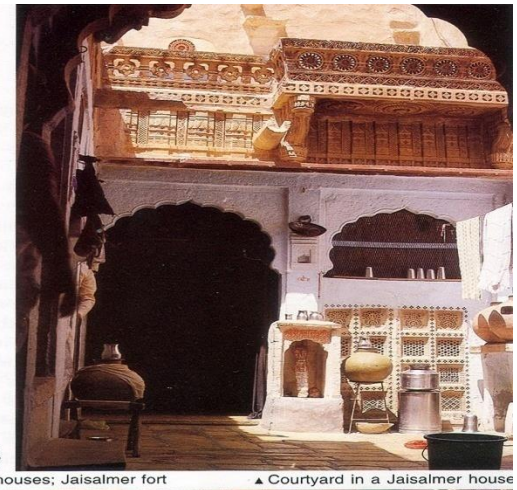




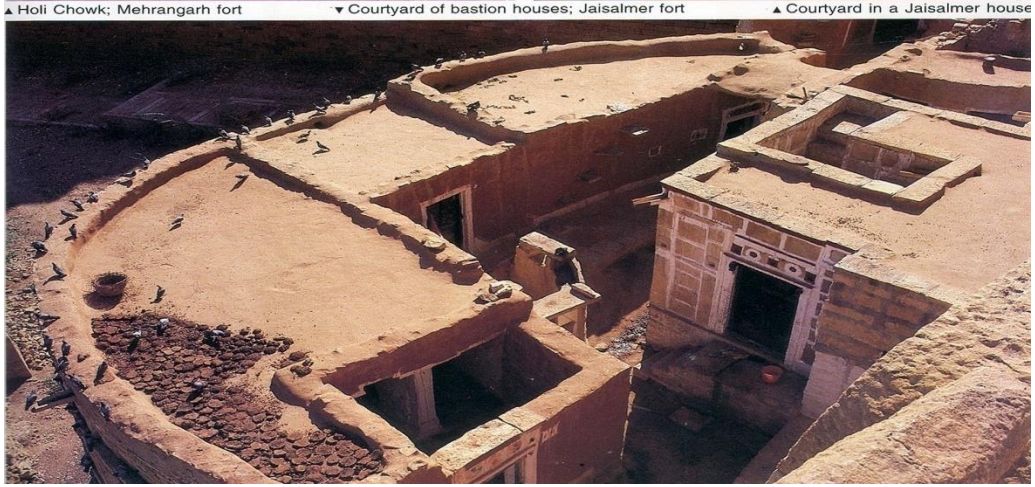
- COURTYARD IN HOT-DRY CLIMATE



▲ Holi Chowk; Mehrangarh fort

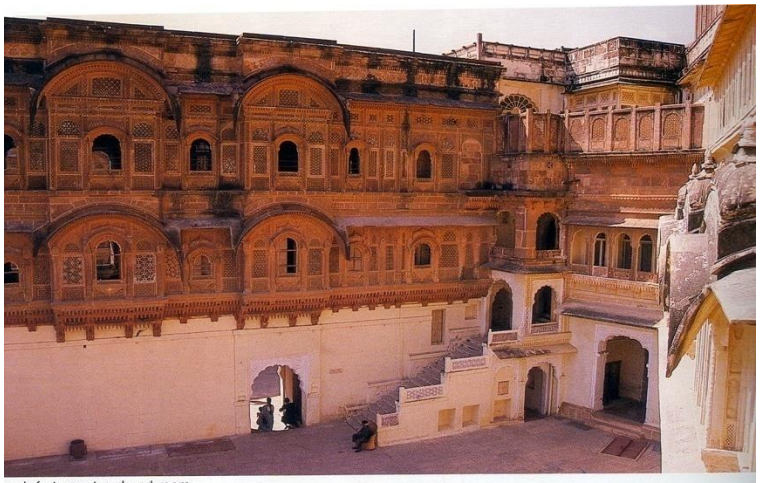


▼ Courtyard of bastion houses; Jaisalmer fort

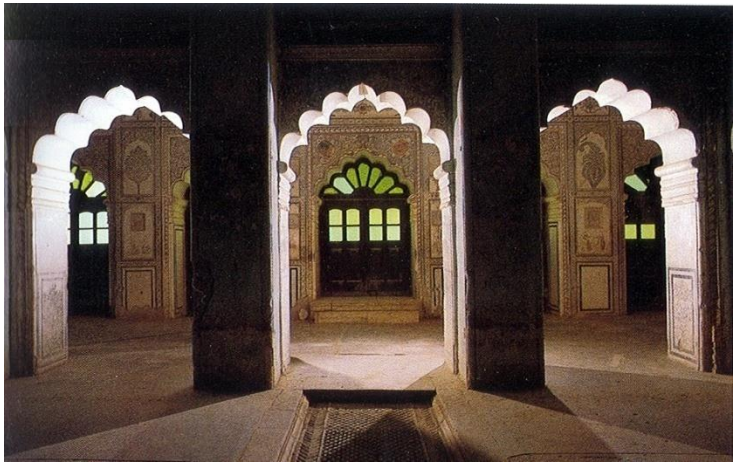


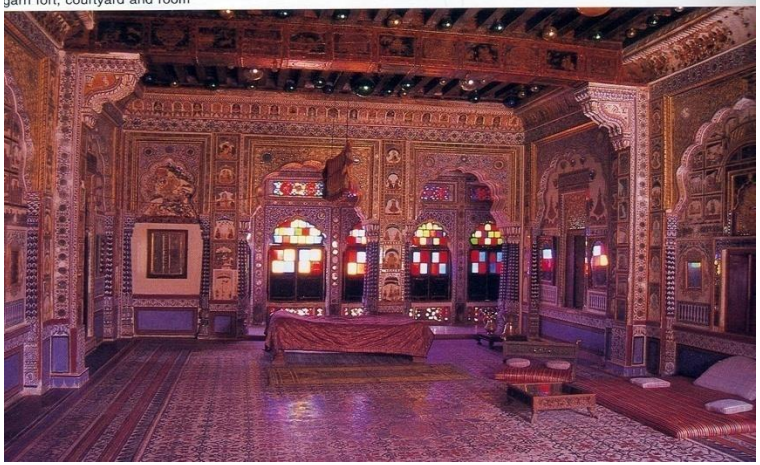
▲ Courtyard in a Jaisalmer house

LAYERING OF SPACE(BUFFER SPACE)

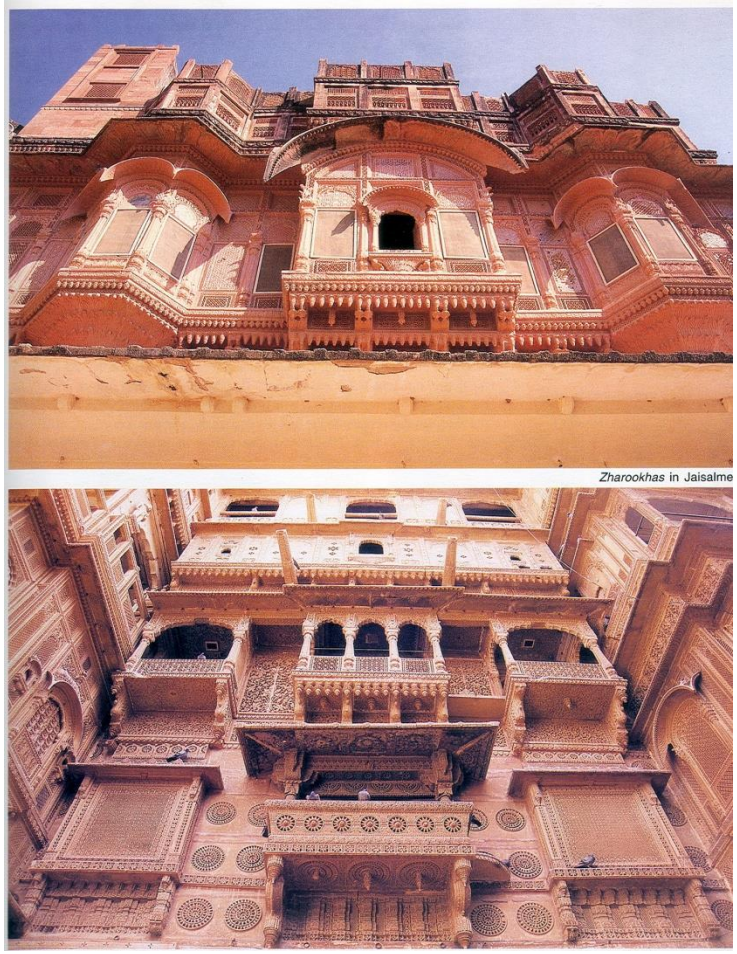


garh fort, courtyard and room

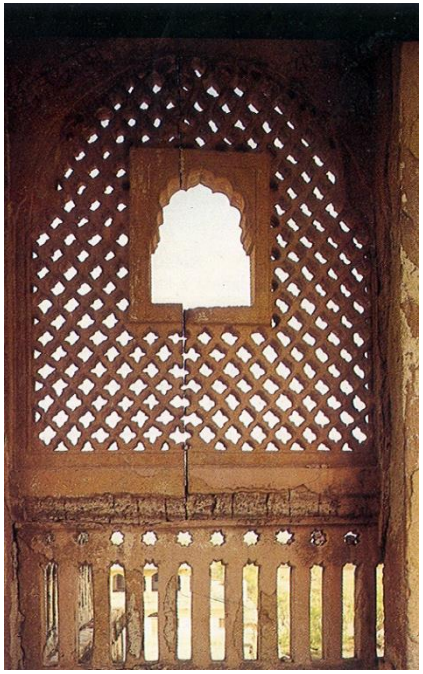




•OPENINGS



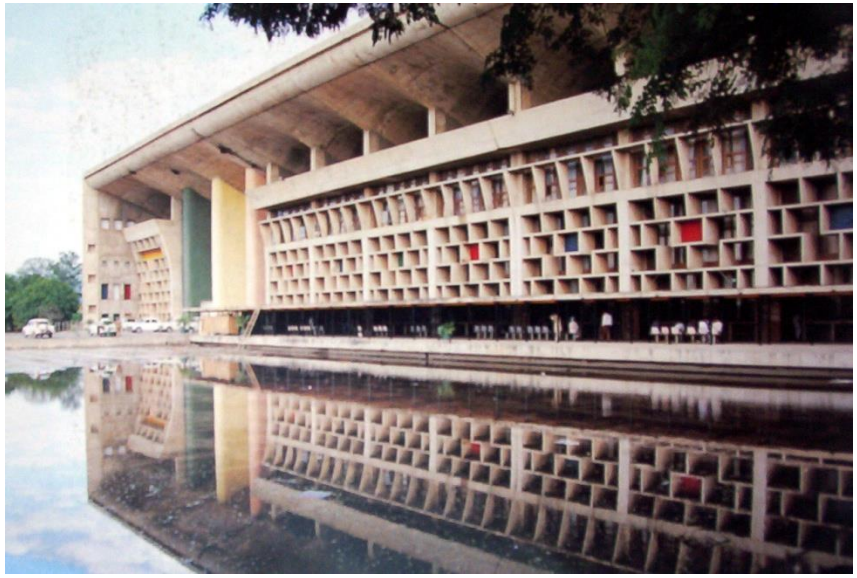
Zharookhas in Jaisalme



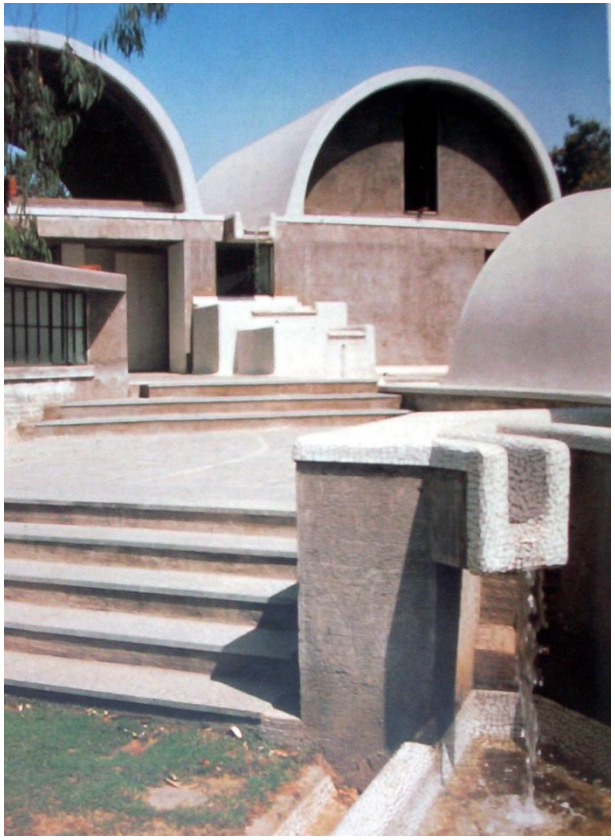
- **EVAPORATIVE COOLING**

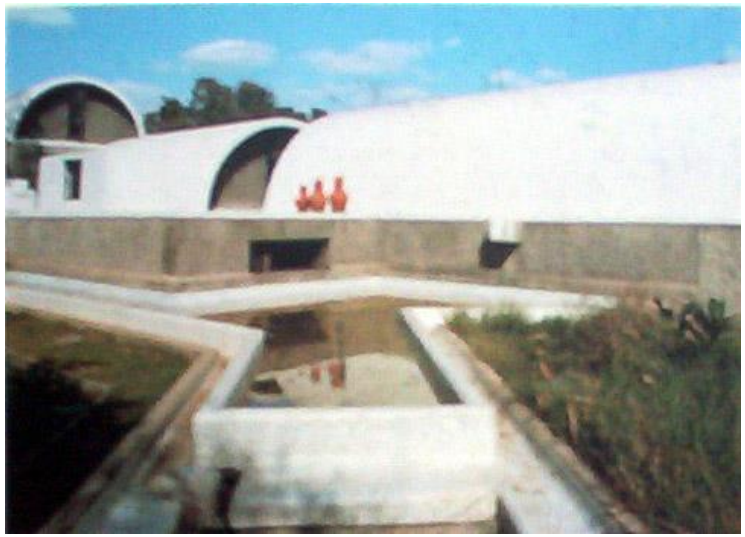
.....WATER....

- **MODERN ARCHITECTURE**

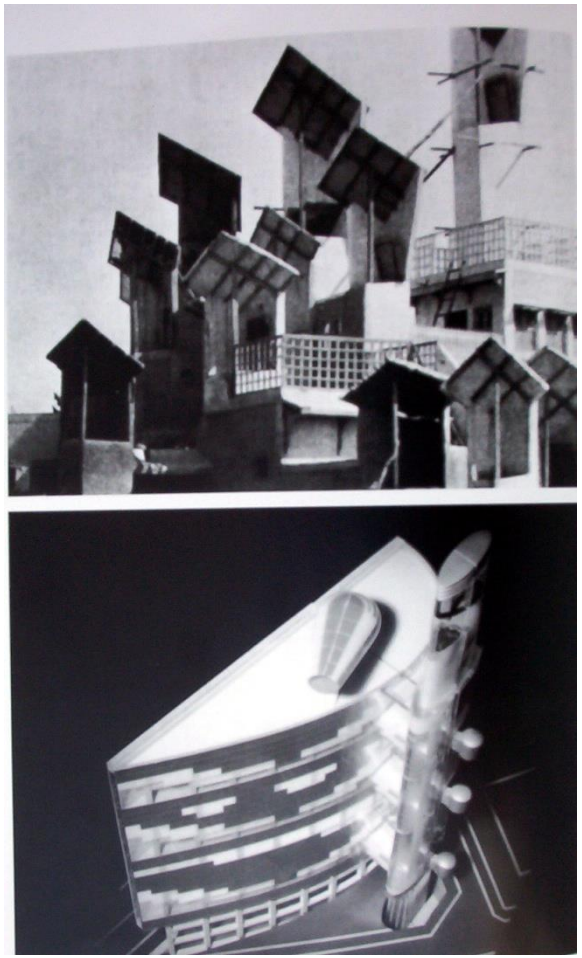


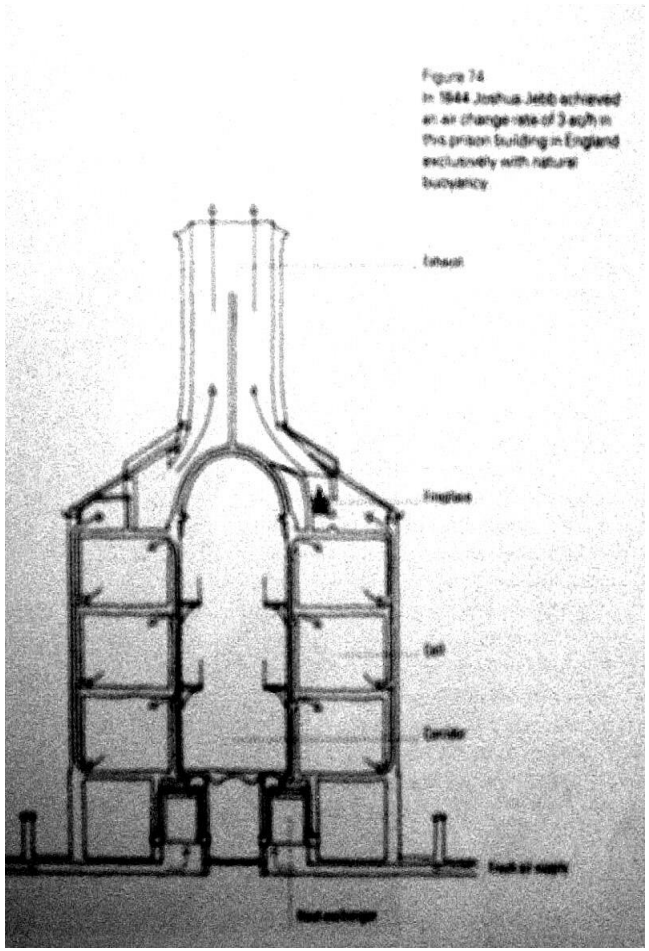
EARTH SHELTERING, VAULT, WATER



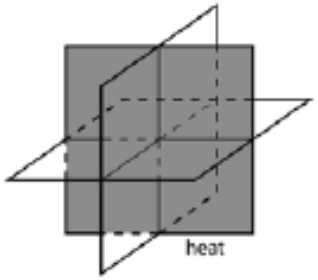


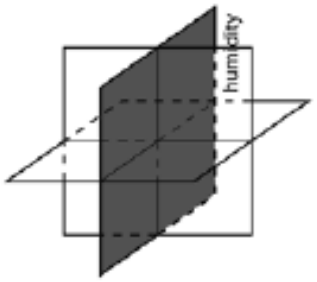
•WIND TOWERS

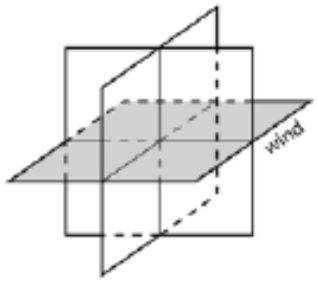




- **MODERN ARCHITECTURE**

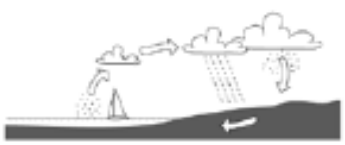




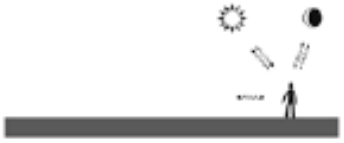


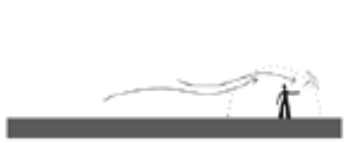
HEAT **HUMIDITY** **WIND** **LIGHT**

CLIMATE



COMFORT





SCREEN

CONTROL