

Role of Soft Landscape Elements Influencing the Microclimate of a Building

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Abstract—A slight difference of atmospheric conditions changes the microclimate of any surrounding areas. It is a local set that differ from place to place, often with a slight difference but sometimes with a substantial one. It can be for the small areas and also for big ones. It exists, near water bodies which may cool the local atmosphere, or in areas where brick, concrete, etc., absorbs the sun's energy, heat up, and re-radiate that heat to the atmosphere and further results in the urban heat island.

After considering the atmospheric conditions for microclimate, we cannot forget the contributing factors of microclimate like the hills and aspect of an area.

Micro-climate is the variations in localized climate around any building whereas Macro-climate the climate of a larger area such as a region or a country.

The micro and macro climate plays a very important role on both the energy performance and environmental performance of the buildings and its surroundings, in different seasons.

The site and design of a building can have a deep effect upon the interaction between a building and its environment.

This article is an attempt to point out the importance of plants for environmentally responsive design through discussing the concept of microclimate and its effect on buildings. A case study has been done to study the role of Soft Landscape in controlling several aspects of the microclimate.

Keywords: Micro-Climate, Energy Performance, Environmental Performance, Environmentally Responsive, Soft Landscape.

1. INTRODUCTION

Microclimate is the set of metrological parameters that characterize a localized area. Micro climate is the condition of the solar, wind, air temperature, humidity in a small outdoor space.

2. OBJECTIVE

Objective is to study the role of Soft Landscape in controlling several aspects of the microclimate.

- i. Air Temperature Control
- ii. Control of Air Velocity and Wind Direction
- iii. Control of Surface Reflectance of Heat and Pollution Control

3. METHODOLOGY

- a) Study of Climate of that particular Area
- b) Factors that are affecting the Microclimate
- c) Soft Landscape elements and their influences
- d) Suggesting measures to provide comfortable Microclimate.

4. CASE STUDY

IIC, INDIA INTERNATIONAL CENTER, LODI ROAD, NEW DELHI

Architect & Planner: Ar. Joseph Allen Stein



Figure 1: Location of site



Figure 2: Ariel view of site

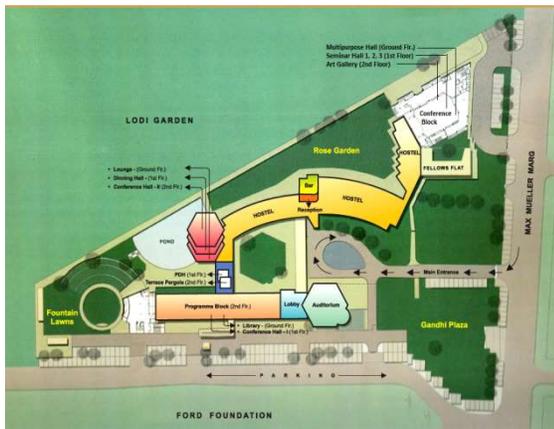


Figure 3 Site Plan

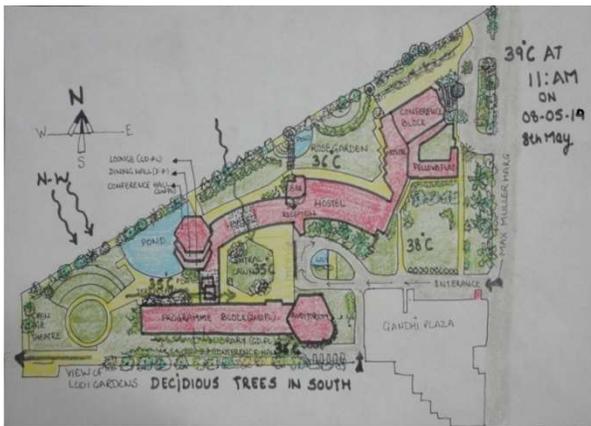


Figure 4: Site plan with suggested landscape

South East direction

- i. Row of trees, shrubs and ground covers on the Eastern side for shading entrance.
- ii. Reducing the heat of sun during day time
- iii. It covers the passage making it shady and comfortable for users.



Figure 5: Row of trees on Eastern side

North West direction

- i. Keeping in mind the prevailing wind direction N-W, trees are planted on that side which gives an airy hostel rooms and serve as a wind channel.
- ii. As trees shade is going in opposite direction and building shade is confined to pathway
- iii. Placing water bodies at regular intervals, with the prevailing north western wind improves the microclimate
- iv. Placement of a water body also helps in cooling the microclimate during the summer season of New Delhi.
- v. Buildings placed as close as possible to a water body, which improves the thermal comfort and energy efficiency of a building.



Figure 6: Showing shady trees



Figure 7: Water body to improve thermal comfort

Interior landscaped courtyards with Shady Trees and mounds containing shrubs and groundcovers make the inner courtyard airy and shady.



Figure 8: Open Air Theatre with trees channelizing N-W breeze



Figure 9: N-W view

South Direction

Climbers are used to reduce cooling load within the building on South side. Deciduous trees are planted in the south direction to provide relief in summers and provide sun in winters.



Figure 10: Deciduous trees as shading device



Figure 11: Climbers on southern wall

5. ANALYSIS

Temperature difference created in the Courtyards with the help of soft landscape elements when outside temperature was measured as 39°C at Max Muller Marg.

Direction	Location	Temperature at 11:00 a.m.
East	Entrance	38°C
North-Western	Rose Garden	36°C
North-Western	Near Pond	35°C
-	Central Courtyard	35°C
South Face	Parking Area	36°C

6. RECOMMENDATIONS

- i. **Key point** of microclimatic landscape design is **wind and radiation**
- ii. Impact of **trees to reduce the impact of radiation**
- iii. Select **trees that cater both summer need of shade and winter need of penetration of sun i.e. choose Deciduous Trees**
- iv. **Wind modification** can improve the energy efficiency of buildings.
- v. Properly **sited water bodies** in design can reduce the heat loading of a building.