LANDSCAPE MICROCLIMATE DESIGN
HORTICULTURE 401

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I. Climate and Microclimate
II. Why Microclimates
III. Microclimate Analysis
IV. Design Strategies
V. Design Exercise

Arbutis flowering on February 2nd - hilltop, Western Massachusetts
I. Definitions

*Climate* = Weather patterns over time

*Microclimate* = Discrete area within a larger area of differing climate. “Intentional climates”
II. The Problem

Energy Use
Comfort
Productivity

Define the optimal climate for a site

Optimized microclimates can result in the following:
• Lower energy needs for buildings
• Longer growing seasons
• Higher yields from plants and animals
• More enjoyable, healthier human habitats.
III. Analysis
Main climate forces
Sun - Wind - Moisture

Component of space Influence on space
- Heat access/solar aspect*
capture
- Color/reflectivity
capture
- Cover/radiative loss prevention
retention
- Mass
retention
- Form
capture
- Relative position to air currents capture & retention

*Exception = active source of heat such as a hot air vent or geothermal source
Observation starting points:
Dawn/dusk/midday observations
Seasonal (especially swing seasons) observations
Snow and frost patterns
Photographing across day and season
Marks/flagging on the ground for sun/shadow lines
IR thermometer
Time and experience

Examples of intentional microclimates
Termite mounds
Beehives

Microclimate creating landscape features
courtyards – inner corners
IV. Design Strategies

1. SITING – THE FIRST STEP
   Primary factors: aspect, slope, relative elevation, groundwater, bedrock, etc.

2. SITE DESIGN – THE SECOND STEP
   Secondary factors: thermal mass, vegetation, color, forms, etc.

Design of warm microclimates checklist:
1. Site outside of cold hollows
2. Face-southerly
   a. South – southwest = warmest
   b. Consider orographic affects
3. Slope
   a. The further poleward the steeper the slope
   b. Vertical surface vs. horizontal planes
4. Forms
a. Bowl – solar arc/sun trap
b. Concentrate sun’s wave energy

5. Minimize radiative losses – cover
   a. Nighttime most critical

6. Wind-shelter
   a. Buffer and deflect, create eddies
   b. Still = key for human comfort in cold climate

7. High-mass
   a. Stone and water = primary materials

8. High absorption (low albedo)
   a. Color

9. When is your microclimate?
   a. Design for a particular time of day and year
   b. Offer a range of periods