Ein einfacher Rautenraum, das direkt zu einer Gruppe, die von einer Radhöfe getragen wird ...

... dem Hang folgend gestaffelt ...

... und versetzt ...

... über ein ungeachtet Tragfeder verbunden.
Outline

What is sustainable design?
Environmental issues
Architectural considerations
Human response
Ecological concepts
What is Sustainable Design?

Responsible energy ethics

- “After a while the natural environment became polluted & unsafe to live in because of the side effects of this new kind of work. The seemingly inexhaustible supply of fuel became more limited…. & then the end was in sight. More effort had to be expended to acquire less & less fuel. Suddenly, it was too expensive to drive cars, light cigarettes, take showers, & indulge in the energy orgy.”

What is Sustainable Design?

In 2006, sustainable design extends well beyond the energy issues of the 60’s, 70’s & 80’s.

According to the AIA & IUA, “sustainable design integrates considerations of resource & energy efficiency, healthy buildings & materials, ecologically & socially sensitive land use, & an aesthetic sensitivity that inspires, affirms, & ennobles …”

Maxman & Majekodunmi, quoted in Mary Guzowski, Daylighting for sustainable design, New York: McGraw-Hill, 2000, p. XXV.
What is Sustainable Design?

Daylighting issues
- Energy & environment
- Formal & aesthetic implications
- Human implications

Daylighting is one small part of larger picture.
Environmental Issues

Bioregional approach

- How a specific region influences daylighting
  - Sun path
  - Sky conditions
  - Nature of site
  - Climate
Environmental Issues

Sun movement
- Time of day
- Seasons
- Geographic location
- Spatial location within building

Daylight can maintain our biologic rhythms & connections to rhythms in nature.

Jacob II Residence, Madison, WI: Cold
Environmental Issues

Experience of time through light
- Physical response
- Emotional sensation

Cannot be quantified or measured

“Light tells a different story about time than does a clock or a calendar.”

Environmental Issues

Seasons

- Impact of summer & winter solstices; fall & spring equinoxes
- Solstice
  - Longest day of year
  - Shortest day of year
- Equinox (equal night)
  - Two times of year when length of day & night approximately equal
- Northern & southern hemisphere
Environmental Issues

Geographic location

- Hot-arid climates
  - Minimize heat gain
  - Control glare
  - Relief & protection from intense sunlight
- Hot-humid
  - Maximum ventilation
  - Maximum control of heat
  - Maximum control of direct sunlight

Will Bruder, Theuer House in Phoenix: Hot-Arid
Environmental Issues

Geographic location

- **Temperate**
  - Greater flexibility
  - Modest temperatures
  - Modest seasonal changes
  - Greater connections inside to outside

- **Cold**
  - Tremendous seasonal changes: temperature, precipitation, & sky conditions

Olson Sundberg Architects, Jaech Residence, Kirkland, WA: Temperate
Environmental Issues

Spatial location in building

- Interaction of light & form
  According to Kahn: “Light is mood.”
- Color characteristics
  Overcast day
  Clear day

Steven Koll, Chapel of St. Ignatious, Seattle University, Washington
Architectural Considerations

Factors that affect flow of light:
- Building massing
- Plan
- Section
- Window design

Determine:
- How much daylight admitted
- How distributed
- Coordination with electric lighting
- Heat gain & loss
- Appropriate ventilation
Architectural Considerations

Building massing

- Linear forms
- Central forms
- Clustered forms

Palmetto Residence, Southern Florida: Hot-Humid
Architectural Considerations

Plan & Section

- Room depth & height
- Room surfaces & characteristics
- Ceiling characteristics

Palmetto Residence, Southern Florida: Hot-Humid
Architectural Considerations

Windows

- Size
- Location
- Position on wall
- Orientation
- Detailing

Mt. Airy Library, North Carolina
Human Response

Biological needs for light

- Seasonal affective disorder (SAD)
- Rickets – deficiency of vitamin D
- 15 minutes of sunlight sufficient
- Use of phototherapy
- Time-related cycles
- Color for therapeutic benefit
Human Response

Visual comfort
Sick building syndrome
Building-related illnesses
Computer vision syndrome
  - Eye & vision problems related to near work during computer use
Quality of life
# Ecological Concepts

## Table 8.6  Comparison of Ecological Concepts and Principles

<table>
<thead>
<tr>
<th>Malcolm Wells: a wilderness-based checklist</th>
<th>John Todd and Nancy Jack Todd: nine precepts for ecology as the basis for design</th>
<th>William McDonough: The Hannover Principles</th>
<th>John Tillman Lyle: design strategies for regenerative design</th>
<th>Sim Van der Ryn and Stuart Cowan: second-generation ecological design</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Creates pure air</td>
<td>1. The living world is a matrix for all design</td>
<td>1. Insist on rights of humanity and nature to coexist in a healthy, supportive, diverse, and sustainable condition</td>
<td>1. Letting nature do the work</td>
<td>1. Solutions grow from place</td>
</tr>
<tr>
<td>2. Creates pure water</td>
<td>2. Design should follow, not oppose, the laws of life</td>
<td>2. Recognize interdependence . . .</td>
<td>2. Considering nature as both model and context</td>
<td>2. Accounting informs design</td>
</tr>
<tr>
<td>4. Produces its own food</td>
<td>4. Design must reflect bioregionality</td>
<td>4. Accept responsibility for the consequences of design decisions . . .</td>
<td>4. Seeking optimum levels for multiple functions, not the maximum or minimum for any one</td>
<td>4. Everyone is a designer</td>
</tr>
<tr>
<td>5. Creates rich soil</td>
<td>5. Projects should be based on renewable energy sources</td>
<td>5. Create safe objects of long-term value . . .</td>
<td>5. Matching technology to need</td>
<td>5. Make nature visible</td>
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<tr>
<td>6. Uses solar energy</td>
<td>6. Design should be sustainable through the integration of living systems</td>
<td>6. Eliminate the concept of waste . . .</td>
<td>6. Using information to replace power</td>
<td>6. Solutions grow from place</td>
</tr>
<tr>
<td>7. Stores solar energy</td>
<td>7. Design should be coevolutionary with the natural world</td>
<td>7. Rely on natural energy flows . . .</td>
<td>7. Providing multiple pathways</td>
<td>7. Accounting informs design</td>
</tr>
<tr>
<td>9. Consumes its own wastes</td>
<td>9. Design should follow a sacred ecology</td>
<td>9. Seek constant improvement by the sharing of knowledge . . .</td>
<td>9. Managing storage as a key to sustainability</td>
<td>9. Everyone is a designer</td>
</tr>
<tr>
<td>11. Matches nature’s pace</td>
<td></td>
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<td>11. Shaping form to manifest process</td>
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<tr>
<td>12. Provides wildlife habitat</td>
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<td>12. Prioritizing for sustainability</td>
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<td>13. Provides human habitat</td>
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<td>14. Moderates climate and weather</td>
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<tr>
<td>15. . . and is beautiful</td>
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</tbody>
</table>