ECOLOGICAL LANDSCAPE

ENHACING THE ECOLOGY IN DESIGN

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Environmental problems
Environmental crisis as a design crisis

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Conclusion
The most critical changes in the world over the last century have been derived from the variety of environmental problems.

Three Major Themes:
• Rapid growth of the human population
• The depletion of non-renewable and renewable resources
• Extensive and intensive damage
The environmental crisis is a design crisis.

The relationship between ecology, sustainability and design.
### Nature, Aesthetics & Landscape Design?

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<td><strong>Alexander Baumgarten (1714-1762)</strong></td>
<td><strong>Uvedale Price (1747–1829)</strong>&lt;br&gt;‘Picturesque’ landscape as a third aesthetic sitting midway between that of the sublime and the beautiful</td>
<td>The perceived aesthetic value of nature and the landscape diminished</td>
<td>Thayer&lt;br&gt;The core problem: ‘today’s complex, multivalent mental image of the natural world has thus far outstripped the semiotic limits of typical landscape architecture to describe it’</td>
<td>New approaches to understanding environmental aesthetics:&lt;br&gt;› Sociobiological approaches of Appleton and Bourassa&lt;br&gt;› Environmental psychological approaches of Kaplan and Kaplan&lt;br&gt;› Aesthetic appreciation of nature will range from the trivial to the serious (Carlson)</td>
<td>Phillips&lt;br&gt;‘Does sustainability have a visual validity that can be expressed as an aesthetic?’&lt;br&gt;Susan Feagin&lt;br&gt;Aesthetics as the ‘branch of philosophy that examines the nature of art and the character of our experience of art and of the natural environment.’</td>
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The Language of Nature

Benoit Mandelbrot and Fractal Geometry

Natural forms, as inspiration for design, are evident in art, architecture and landscape throughout history. However, until recently, it was not understood that many natural forms and processes possess a common ordering characteristic – a characteristic described by the mathematics of fractal geometry. (Gisiger, 2001; Mandelbrot, 1977)

Natural fractals exhibit scale invariance over a limited range of scales. They are classified as having statistical self-similarity, which means that the patterns will not be geometrically identical, but statistically similar like the pattern identified in the four photographs of the Eucalyptus tessellaris bark. (Figure 1)
Fractal patterning is embedded within the dry landscape garden of the Ryōan-ji Temple in Japan. Using a technique known as medial-axis transformation, the overall structure of this dry garden is based on a spatial form similar to that of a branching tree. By changing either the placement or number of rocks within the garden, they found that the self-similar tree form and convergence on the main viewing area was removed from the corresponding medial axis.
What is a patch

- Area of land that has defined edges and is separated from the landscape.

- Each patch in itself is homogenous, and is separated from the surrounding heterogeneous landscape.

- The study of ecology and patches are important as it will affect your design.

- Cause: Construction and zoning and/or deforestation

(Edge serves as a corridor for invasive species and transition from patch to areas outside the patch).

Continuous construction and disturbance to patches narrows the patch to an edge (no interior core).
Patch size and Biodiversity

**Size**

- 1 Small patch vs 1 big patch

![Diagram showing 1 small patch facing a big patch](image)

1 habitat type < several habitats

(usually bigger patches support more populations, therefore more biodiversity and hence less chances of extinction)

**Connectivity**

- Many small patches vs 1 big patch

![Diagram showing many small patches facing a big patch](image)

more habitats than 1 large > several habitats

(wind direction affects diversity of the patch. A patch in the direction of the wind allows for flow pollen to the path)
We want to increase the connection to allow for migration of species and hence preservation of species. (3 main ways to increase connectivity)
Increasing Connectivity

1. Create a **corridor** to reducing the distance between patches...eventually forming a network

2. Improve matrix quality by creating corridors of high quality habitat or **stepping stones** (smaller patches of less quality) between patches

3. Increasing the **sizes** of the patches in order to increase population size and reduce the edge effect.

   - Hence migration and survival

   - (therefore when designing, take these factors in to consideration to enhance biodiversity)
Case Study Patches in Damour

Large masses of patches are separated into smaller, less connected patches due to zoning—dividing the land. This is referred to as habitat fragmentation.

Disconnections:

1. Disconnection by highway

2. Disconnection due to deforestation/landslides

Solution:
Create a well designed underpass corridor to connect the patches.
Analytical vs Synthetic Method: Example of Highway Construction

“...surely it is the highway commissioners and engineers who most passionately embrace insensitivity and philistinism as a way of life and profession.” – Design with Nature

Institutionalised: cost benefit formula; traffic, volume, design speed, pavement, structures...

Improved method: incorporate resource values, social values, aesthetic values along with the normal criteria of physiographic, traffic, and engineering considerations.

“The best route is the one that provides the maximum social benefit at the least social cost.”
Case Study: Bronx River Parkway

- First example of a modern highway
- Rehabilitate the foul river and its raddled landscape to create new public values.
- Intervene with the least possible damage
- Exploit and reveal the visual qualities of the landscape while meeting traffic requirements.
References

*Landscape Design and the Language of Nature* by Stephen Perry, Rob Reeves and Jeannie Sim

*Design with Nature* by McHarg, Ian