

Principles of Environmentally Sustainable Design

Fall Course - Class 2

Permaculture

Closed Loops, Policies, Specifications,
Arcologies

Design Methodology

- US Green Building Council – LEED - Leadership Energy and Environmental Design
 - Triple Bottom Line Strategy
- Sustainable Building Industry Council – SBIC - Whole Building Design
 - Low Impact Strategy
- Energy Star – US EPA Standard for Energy Efficient Management

Permaculture

- **Permaculture** is an approach to designing human settlements and perennial [agricultural](#) systems that mimic the relationships found in natural [ecologies](#).
- Permanent agriculture is understood as agriculture that can be sustained indefinitely.
- Permaculture principles draw heavily on the practical application of ecological theory to analyze the characteristics and potential relationships between design elements. Each element of a design is carefully analyzed in terms of its needs, outputs, and properties.

Permaculture

- **Earthcare** – recognising that [Earth](#) is the source of all life (and is possibly itself a living entity — see [Gaia theory](#)), that Earth is our valuable home, and that we are a part of Earth, not apart from it.
- **Peoplecare** – supporting and helping each other to change to ways of living that do not harm ourselves or the planet, and to develop healthy societies.
- **Fairshare** (or placing limits on consumption) - ensuring that Earth's limited [resources](#) are used in ways that are [equitable](#) and [wise](#).

Permaculture Design

- **O'BREDIM design methodology**
- **Patterns**
- **Zones**
- **Links and Connections**
- **Layers / Stacking**
- **Polyculture**
- **Guilds**
- **Energy**

Understanding “Whole System” Design

CLOSED LOOPS

Definition

- Closed ecological system where the system doesn't rely on matter exchange with outside of the system. The opposite being an open loop where outside material to support life is needed

Examples

- Hot Water Heating Systems
- Composting Management Systems
- Blackwater / Greywater Systems
- Engineered Wetlands
- Biosphere
- Eden Project
- Bottle Gardens

Importance

- Resource Management
- Monitoring & Tracking
- Sustainable Food
- Health
- Energy
- Safer Environments

Leading the Design direction

POLICIES

Definition

- a deliberate plan of action to guide decisions and achieve rational outcome(s).
- the process of making important organizational decisions, including the identification of different alternatives such as programs or spending priorities, and choosing among them on the basis of the impact they will have.

Examples

Statement on Affirmative Action:

- The Center for Green Leadership is committed to providing equal employment opportunity without regard to race, color, religion, sex, sexual orientation, national origin, age, disability, or any other protected status with respect to recruitment, hiring, upgrades, training, promotion, and other terms and conditions of employment. Further, The Center for Green Leadership takes affirmative action in support of this policy to employ and advance in employment individuals over 40 years of age, minorities, women, the handicapped, and Vietnam era veterans.
- The Center for Green Leadership does not condone or tolerate the harassment of any employee, including those placed through affirmative action efforts. It is a violation of The Center for Green Leadership policy for any employee to engage in any activity that could be deemed as sexual harassment or as any other form of harassment. The Center for Green Leadership intends that all matters related to recruitment, hiring, training, compensation, benefits, promotions, upgrades, transfers, and separations, as well as CGL-sponsored social and recreational programs be free of unlawful discriminatory practices.

Examples

Statement on Environmental Responsibility:

- The Center for Green Leadership is committed to protecting the environment through functional planning and execution of low impact operations throughout the organization. Further, The Center for Green Leadership takes Environmental Responsibility to be the leading principle in its training of accountability.

The Center for Green Leadership does not condone loose trash or poor sanitation standards. Furthermore, failure to follow recycling and sanitation policies will result in penalty.

Examples

Statement on Building Operation:

- The management of this building is committed to reducing the carbon emissions of this building through efficient operation and prevention of unnecessary use of utilities and resources. Further, management takes this policy to be followed and applied by all residents and visitors of the building.

Importance

- Identify Parameters of Operation
- Create Limitations to outside influence
- Establish stronger safety and security
- Fiscal Responsibility
- Force unique creativity

Identifying the variables and constraints

SPECIFICATIONS

Definition

- A specification is a type of a [standard](#) which is often referenced by a [contract](#) or procurement document. It provides the necessary details about the specific requirements.
- Specifications can be another "performance-based", whereby the specifier restricts the text to stating the performance that must be achieved in each Section of work, or "prescriptive", whereby the specifier indicates specific products, vendors and even contractors that are acceptable for each workscope.

Purpose

- Building Performance
- Systems operations
- Directing Traffic
- Image and Impact
- Brand Impression

Importance

- Defines Performance
- Further restricts what policies direct
- Highlights unique features / operations
- Creates Standards
- Protects Sustainable Methodology
- Determines functional behavior

Creating the Future

ARCOLOGIES

Definition

- a set of architectural design principles aimed toward the design of enormous habitats (hyperstructures) of extremely high human population density
- They are often portrayed as self-contained or economically self-sufficient.

Example

- Arcosanti is designed according to the concept of [arcology](#) (architecture + ecology), developed by Italian architect [Paolo Soleri](#).
- In this complex, creative environment, apartments, businesses, production, technology, open space, studios, and educational and cultural events are all accessible, while privacy is paramount in the overall design. [Greenhouses](#) provide gardening space for public and private use, and act as solar collectors for winter heat.

Reason

- By 2030 it is estimated that 60% of the global population will live in a metropolitan setting.^[1]
- Interactions between non-living factors, such as sunlight and water, and biological factors, such as plants and microbes, take place in all environments including cities. Concentrating humans and the resources they consume in metropolitan areas alters such things as soil drainage, water flow, and light availability. For example, sidewalks and rooftops can change an area's [hydrology](#) by increasing storm water runoff and can contribute to higher urban temperatures by storing heat energy and acting as an artificial [heat sink](#).