

## **Lesson Six**

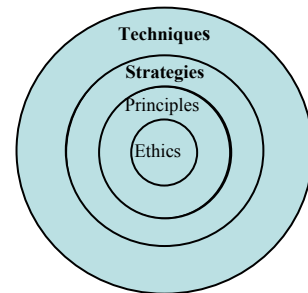
### **What are some useful strategies and techniques for creating and implementing a site design?**

In this lesson you will learn:

- What a strategy and a technique are and how they can help you in site design
- Nine areas to look at when creating and implementing a site design
- Strategies and techniques for each of the nine areas

Strategies can be thought of as goals that you can use to prioritize and focus your efforts in creating and implementing your design. Techniques are concrete ways of accomplishing those goals.

We will look at strategies and techniques you can use to incorporate permaculture practices in nine different areas: natural systems, food, water, waste management, energy, shelter, social and economic systems, interpersonal relationships, and personal empowerment.



### **1. Natural systems**

Natural systems, such as forests, wetlands, and streams, perform vital functions for us, and preserving them gives us multiple yields.

#### **Strategies:**

- Repair and protect natural ecosystems.
- Protect and enhance biodiversity.
- Meet human needs using as little land as possible.

*Repair and protect natural ecosystems.* When forests are cut down there is less rainfall, more soil loss, lower productivity, more flooding and runoff, greater nutrient loss and higher sedimentation in the rivers. In areas where forests have been kept you actually have more rainfall because you have more evaporation and transpiration coming off the leaves, you have less erosion and runoff, less flooding, and better habitat. Wetlands are another natural system we want to preserve. They play a vital role in filtering our water. Finally, streams should be protected because they provide habitat for wildlife and a source of fresh water.

*Protect and enhance biodiversity* because all species deserve a good quality of life. Permaculture believes that every living thing has value and contributes to the system even though it may not have a commercial value.

*Meet human needs using as little land as possible* in order to preserve as much land as possible for natural systems. This is one of the key points of permaculture. Some people criticize permaculture by saying it focuses too much on humans and human needs, but the reason for that is that if we humans can learn to meet our own needs in sustainable ways - by using less resources and less land - then that means more for the natural systems. And the natural systems can take care of themselves - they don't need us. We need to learn to take care of ourselves in a responsible way.

### **Techniques:**

*Riparian buffers* –One technique for protecting our streams is to plant riparian buffers. Riparian buffers are vegetative areas along streams. Ideally there should be at least 50 feet of vegetation on either side of a stream. That vegetation plays an important role - it helps to stabilize the bank, filters runoff, protects against floods, and can provide shade over the water, which is important for creating the right habitat for the aquatic life forms.



Riparian buffer on Codorus Creek in Glen Rock, PA.

## **2. Food production**

Being able to meet our needs for food is an important part of a sustainable system and a focus of permaculture.

### **Strategies:**

- Produce food onsite or locally.
- Use organic methods, polycultures, and perennials and limit fossil fuels.
- Treat animals humanely.
- Build up the biological resources of your site.

*Produce food onsite or locally.* Growing your own food can produce multiple yields, such as fresher produce, exercise, connection with the land, and community. Buying food grown locally creates a more vital local economy. Limiting the distance that food is transported conserves fossil fuels.

*Use organic methods, polycultures, and perennials and limit fossil fuels.* Growing food organically means not using chemical fertilizers, pesticides, or herbicides. Polycultures, having many different kinds of plants in our system, rather than monocultures, support the principle of diversity. Right now our agricultural system focuses on annuals, crops that are planted and harvested every year. But in a sustainable system we would rely more on perennials (plants that persist for several years) to meet our food needs. And

eventually we would like to eliminate the use of fossil fuels used to operate farm machinery and to produce chemical fertilizers.

*Treat animals humanely.* Make sure the animals in your system are treated humanely and have a good quality of life. Animals are an important part of our food production system even if we don't eat them. Some permaculturists are vegetarian and some are not. Even if you are vegetarian you always have animals, such as birds, worms, insects, and humans, that do useful work in your food production system.

A chicken is often used as an example to illustrate the many outputs and functions of animals. They produce eggs, meat, feathers, manure, methane, etc. Scratching, fighting, flying, and foraging are some of the things they do. Again, we would also want to make sure that when we have chickens in our system that we meet all their needs - shelter, grit, dust, water, air, space, etc. - and other chickens so they can have a happy social life. This is in contrast to factory farming methods in which chickens are only viewed as a food product and are denied a good quality of life.

*Build up the biological resources of your site.* Build up soil fertility as well as the number of useful plants on your site. Use native plants, and carefully select any exotics to ensure that they are not invasive. Think of it as a form of investment. Instead of investing all your money in the bank or stock market, buy some trees or other useful perennials and plant them on your site. This will increase the value and productivity of your site and you will be able to meet more of your needs on that site long-term.

**Techniques:**

Here are some techniques for building up the soil, increasing soil fertility, and increasing the diversity of plants:

*Don't mix the top layers of soil.* There are different layers of soil. The top two layers, the O-horizon and the A-horizon, are the layers we pay the most attention to. The O horizon is just organic matter, the A-horizon is a mix of rock materials and organic matter. In traditional agriculture you plow and rototill to mix those layers, but in permaculture you don't. Nature builds soil by depositing organic matter on top, so we want to do what nature does. This also maintains the proper soil structure. Within soils there are soil aggregates - clumps of soil that cluster together - and also little pores and channels where air and water can get through. We don't want to destroy that structure.

<b>Soil Structure</b>	
<b>O-horizon:</b>	leaf litter, organic matter
<b>A-horizon:</b>	plough zone, rich in organic matter
<b>B-horizon:</b>	zone of accumulation
<b>C-horizon:</b>	weathering soil; little organic matter or life
<b>R-horizon:</b>	unweathered parent material

*Sheet mulch to create new garden beds.* Sheet mulching can be used to create new garden beds in areas that have vegetation that you do not want. Here are the steps:

1. Cut the vegetation down and lay it on the ground.
2. Cover it with a layer of compost or manure and other organic matter to attract the worms.
3. Put down a layer of cardboard and/or newspaper on top of your organic layer to form a barrier that prevents the plants from growing up again.
4. On top of the layer of paper put another layer of compost or manure to attract more worms.
5. Top it off with some mulch such as straw or leaves or grass clippings - basically anything organic. And there you have your sheet mulch garden bed!



Step 3 – putting a layer of cardboard on top of the compost and vegetation.



Step 5 – putting a layer of straw on top.

You can place plants directly into the sheet mulch garden bed at that time by cutting a hole in the sheet mulch, adding some compost, and putting in your plant. Or, you can let the mulched garden bed sit for perhaps six months before planting to allow nature to prepare the bed. The worms will be attracted to the compost and come up. They will work the soil for you, making it soft while maintaining proper soil structure. The cardboard will gradually decompose. In six months you could simply push the straw aside and plant seeds.

*Plant in guilds.* Planting in guilds means placing plants so they can work together. This creates a mini ecosystem. A typical guild might have:

1. A central overstory fruit tree such as an Asian pear.
2. A leguminous ground cover such as Dutch White Clover. The leguminous ground cover will fix nitrogen, which helps to fertilize the soil.
3. Deep-rooted dynamic accumulators such as comfrey and rhubarb. These plants bring nutrients from deep within the soil nearer to the surface so that other plants can use them.
4. Plants, such as yarrow and fennel, that attract beneficial insects.

*Create food forests.* A food forest or forest garden is a perennial agricultural system that is modeled on a natural forest. It is more productive than an annual garden because you can grow food and fiber in seven different layers:

1. large fruit and nut trees
2. lower trees
3. layer of shrubs
4. layer of herbs
5. root layer
6. ground cover layer
7. vertical layer - climbing vines



First edible forest garden in an urban area, Asheville, NC.

The man who came up with the idea of the forest garden was Robert Hart. He lived in Britain and was well-known for his forest gardening ideas. Mollison incorporated Hart's ideas into permaculture.

*Use greenhouses and cold frames to extend the growing season.* Greenhouses and cold frames trap the sun's energy, creating higher temperatures, which enables us to grow plants in cold weather. These structures can be built very inexpensively using straw bales and recycled materials. A cold frame is essentially a mini greenhouse and can be located inside or outside a greenhouse.



The greenhouse pictured to the right was made out of straw bales, a wood frame, metal poles and plastic. Even in the depths of winter, this greenhouse generated temperatures up to 100 degrees.

Inside the greenhouse at Riverpearl Farm is a cold frame. It was just a border of straw bales topped off by an old glass door. By being in the greenhouse, the cold frame produced even hotter temperatures.

*Grow food in containers.* This technique is particularly applicable to urban areas. You might not have a lot of open space where you can grow things, so you can use containers in areas without soil, such as sidewalks and rooftops. Because the soil in cities may be of poor quality and even contaminated, you may want to use containers instead of planting directly in the soil. You may need to bring in organic matter and top soil for your containers.

*Rent a publicly owned garden plot.* Lots of cities have garden plots that you can rent to grow food in the city.

City Farm urban gardens at Patterson Park in Baltimore, MD is pictured to the right.



### **3. Water**

#### **Strategies:**

- Capture and store the water on site.
- Use water as many times as possible in the system.
- Conserve water as much as possible.
- Release water from the system clean.

*Capture and store the water on site.* This way we can most efficiently utilize the water that comes to our site naturally.

*Use water as many times as possible in the system.* If we capture it high on the landscape we can make it do as much work as possible on the way down.

*Conserve water as much as possible.* This supports the principle of conservation.

*Release it from the system clean.* We need to be responsible users of our resources.

#### **Techniques:**

*Use a front loading washing machine.* Front loading washing machines use about one third the water that top loading models use.

*Swales.* Swales (a shallow ditch that's on a contour) help to trap the water rather than having it run off.

*Create a rooftop water catchment system.* You can capture the water that falls on your roof and use it in your system.

At Heathcote, pictured at right, they set up a simple system using a plastic 55 gallon drum that fills up with water from a roof. They then use it to water their garden.



*Capture and use greywater.* Blackwater has human excrement; greywater is from laundry, the kitchen, showers and similar uses. There are many different types of greywater systems. An example of a low tech system is catching your shower water in a bucket and using it to water your plants. A more complex system might involve running the water through beds of wetland plants to filter it.

#### **4. Waste management**

##### **Strategies:**

- Produce no "waste" or pollution.
- Refuse to use substances that cannot be recycled.
- Reduce what you use.
- Reuse materials.
- Recycle materials.

*Produce no "waste" or pollution.* Instead of producing waste we want everything to be recycled within the system.

*Refuse to use substances that cannot be recycled.* In particular, refuse to use toxic substances.

*Reduce what you use.* By reducing the amount of materials that we use, we will have less to recycle. This also supports the principle of conservation.

*Reuse materials.* Reuse materials to get as much out of them as possible.

*Recycle materials.* Use all materials as inputs for other elements in the system.

##### **Techniques:**

Here are some waste management techniques:

*Compost.* There are many types of composting systems. You can purchase them or build one. Worm composting systems are particularly good for urban areas where you don't have much space to work with. You put the worms in trays and put your kitchen scraps in with them along with some layers of newspapers. As the worms process the kitchen scraps they produce a liquid - worm poop mixed with water - which is very fertile and can be used to water plants.



Worm composting system

*Composting Toilets.* Human excrement can be recycled to use as a fertilizer. Instead of mixing it with drinking water the way we do with flush toilets, the excrements can be collected, mixed with sawdust or other carbon-rich materials, and composted. Composted “humanure” can be applied to perennial and ornamental plants as a fertilizer.

## 5. Energy

### Strategies:

- Use renewable energy sources.
- Maximize efficiency and minimize emissions.
- Use fossil fuels only to establish systems that create more energy than they consume.

*Use renewable energy sources.* Use renewable sources such as solar, wind, hydro, human, animal, geothermal, etc. as much as possible.

*Maximize efficiency and minimize emissions.* Use technologies that are as efficient as possible. Minimize the release of greenhouse gases, particulates, and toxic emissions from the combustion of fuels.

*Use fossil fuels only to establish systems that create more energy than they consume.* Systems that depend on fossil fuels are not sustainable, because fossil fuels may not always be available and the combustion of fossil fuels produces greenhouse gases that can cause climate change. However, at this time in history, fossil fuels and the machines and infrastructure that are dependent upon fossil fuels are readily available and can be used to construct and establish systems that are sustainable. For example, earth moving equipment powered by fossil fuels can be used to create a pond that will create more energy, in the form of biomass, than was consumed to create the pond.

### Techniques:

Here are some techniques for more sustainable energy use:

*Use a drying rack or clothesline to dry your clothes.* This will enable you to utilize solar energy instead of fossil fuels to dry your clothes.

*Utilize natural methods of heating and cooling.* Design buildings to use passive solar heating by including south facing windows and a heat sink to absorb and store the sun's energy. Cool your buildings naturally with proper ventilation, awnings over south facing windows, and shade trees.



The Bryn Mawr School in Baltimore, MD, utilizes passive solar heating.

*Build an outdoor solar shower* for use during the summer in rural areas.

*Use a micro hydro electric generator.* This is a small electric generator that can generate power from a small stream without disturbing the flow or aquatic life of the stream.

## **6. Shelter**

### **Strategies:**

- Locate buildings to minimize environmental impact and transportation requirements.
- Renovate older buildings.
- Use natural and recyclable materials.
- Design buildings to incorporate sustainable energy, water, food production, and waste management systems.

*Locate buildings to minimize environmental impact and transportation requirements.* Put buildings in areas that are already developed or in areas that are close to where we might be working or going to school or close to public transportation so we have minimum driving time.

*Renovate older buildings.* That way we don't have to build new ones using new materials.

*Use natural and recyclable materials.* Worldwide building construction is estimated to consume 3 billion tons of raw materials annually. The materials used in building construction affect the health of a building's occupants. Every building will eventually deteriorate and be demolished, creating solid waste that must be disposed of. For these reasons, proper selection of building materials is important. Many conventional building materials, such as pressure-treated wood, are toxic and should be avoided. Natural materials, such as untreated wood, stone, brick, straw, and earth, are better for the health

of occupants and the earth. These materials can also be recycled when the building is demolished.

*Design buildings to incorporate sustainable energy, water, food production, and waste management systems.* Buildings are a great place to integrate all of the elements in a sustainable system.

### **Techniques:**

Here are some examples of natural building techniques:

*Cobb.* Cobb is a building material made from mud and clay mixed together with straw.

*Straw bale.* Straw bale is a great building material because it's often a waste product and in some areas they actually burn it, creating air pollution. But it can be baled together and made into a very sturdy building material and has very good insulating properties.



Cobb hut at Earthaven Ecovillage , NC.



Building with straw bales.

## **7. Social and economic systems**

These are an important part of any sustainable system. We need to redesign our social and economic systems to support sustainable living.

### **Strategies:**

- Practice domestic self-reliance.
- Build cooperative communities.
- Create local, alternative economic systems.

*Practice domestic self-reliance.* Try to meet as many of your own needs as possible.

*Build cooperative communities.* It's impossible to meet all your own needs by yourself. Therefore, we want to build cooperative communities so people can work together to meet their needs. Permaculture supports cooperation rather than competition.

*Create local, alternative economic systems.* Capitalism creates large disparities between the wealthy and the poor. Private ownership of land puts money into private pockets when community land values increase. Large corporations take money out of communities to enrich shareholders and corporate executives who live far away. In contrast, permaculture seeks to recycle wealth within local communities and ensure that resources are equitably distributed by creating alternative economic institutions such as cooperatives and land trusts.

### **Techniques:**

*Practice voluntary simplicity.* Make a conscious choice to limit your consumption of material goods.

*Establish or live in an intentional community.* An intentional community is a small, localized, often rural community of persons or families pursuing common interests or concentrating on certain basic values. (from [www.dictionary.com](http://www.dictionary.com)) For more information about intentional communities go to <http://www.ic.org/>.

*Barter.* In a barter system, individuals trade goods or services instead of using money to purchase them.

*Create a cooperative or join existing cooperatives.* Cooperatives are organizations or entities that are jointly owned by its members. Users of cooperatives usually buy shares in the cooperative and may participate in its management. There are cooperative businesses, schools, and apartment buildings. Credit unions are cooperative financial institutions.

*Land trusts.* In a land trust the land is held in common, usually by a non-profit organization, rather than being held privately so the profits that come from the land go to benefit the greater community rather than going into private pockets.

## **8. Interpersonal relationships**

Interpersonal relationships are another important part of creating a sustainable culture. We can consciously design our relationships to be more loving and fulfilling.

### **Strategies:**

*Create cooperative, caring relationships.* In our mainstream cultures we are often not taught the skills necessary to create cooperative, caring relationships. Some of the things we want to focus on are: attuning to our own authentic feelings to learn what we are actually feeling, listening well to others, communicating clearly, resolving conflicts nonviolently, and making decisions together using consensus.

### **Techniques:**

*Nonviolent conflict resolution.* Learn how to resolve conflicts nonviolently. There are a variety of approaches that you can study. For example, the Quakers offer workshops called “Help Increase the Peace.” Nonviolent communication is another approach that was developed by Marshall Rosenberg and is practiced in 25 countries worldwide. It is a set of principles, ideas, and tools designed to help people become aware of their own and others’ feelings, foster compassion, communicate clearly, and resolve conflicts.

*Consensus decision-making.* Right now the model that is used most widely in our culture is the model of voting. In voting everyone gets a say but there are winners and losers, and the losers basically don't get any say. But with the consensus model everyone needs to agree so everyone will at least have a decision that they can live with.

## **9. Personal empowerment**

Permaculturists refer to the mental and emotional state of the self as “Zone Zero.” We can redesign our own “internal ecosystem” so that we are more empowered and better able to create a sustainable culture. Spirituality can be integrated into permaculture as a tool for personal empowerment.

### **Strategies:**

- Love and nurture yourself.
- Engage in inner healing work.
- Cultivate inner peace.

*Love and nurture yourself.* Recognize and appreciate your worth. The philosophy of permaculture believes that every element in a system has value. Take care of yourself so you can enjoy life and contribute to our world. Care of the people is one of the ethics of permaculture.

*Engage in inner healing work.* If we don't heal ourselves we won't be able to do any of the things that we've just been talking about. Within our culture many people have been harmed by various kinds of abuses, addictions, and oppressions. We need to heal ourselves from those so that we no longer play the roles of victim or oppressor and can act from a place of empowerment.

*Cultivate inner peace.* Environmentally destructive behaviors, such as over-consumption, result from our futile attempts to fill a spiritual void. When we learn how to fill ourselves from within, we stop seeking gratification from outside of ourselves and are able to live in harmony with our environment.

### **Techniques:**

*Provide yourself with proper nutrition, exercise, rest, and relaxation.* This may seem simple but it is actually very challenging in our high-stress culture. Remember, burnout is not sustainable! Commit to making time to care for yourself. A sustainable lifestyle begins with sustaining our own physical and emotional well-being.

*Engage in healing practices.* If you have been harmed by abuse, addiction, or oppression, engage in practices that will help you to heal. These may include therapy, co-counseling, breath work, empowerment workshops, etc.

*Engage in spiritual practices.* We can train our minds to be happy and peaceful by engaging in spiritual practices. These may include prayer, meditation, ritual, and selfless service. These techniques have universal value and can be effective regardless of one's religion or spiritual beliefs.

### **Activities**

1. Identify some permaculture techniques that you are already practicing.
2. Identify some permaculture techniques that you can easily incorporate into your daily life.