



Teacher's Guides for the Permaculture Era (Vol. 3)

Forests, Climate Change and Permaculture

Wetlands, Climate Change and Permaculture

Regenerative Agriculture, Climate Change and Permaculture

ReWilding, Climate Change and Permaculture

Solar Power, Climate Change and Permaculture

Bioregions, Climate Change and Permaculture

Biodiversity, Climate Change and Permaculture

The Food Forest, Climate Change and Permaculture

The Permaculture Convergence and Climate Change

Compost, Climate Change and Permaculture

By William Paul

<https://www.planetshifter.com/>

Forests, Climate Change and Permaculture

A Teacher's Guide

Definitions -

'To solve our climate crisis, forests are crucial. Our top priority should be to protect old growth forests. They are the largest, most resilient, and the most carbon-rich life forms on earth. Allowing them to sequester carbon is a primary way to reverse climate change. Another climate change strategy is to practice reforesting land that was clear-cut.

There is great potential for reversing climate change by restoring degraded forests.

Reforesting forests begins with restoring human rights. Racial expulsion of Indigenous people continues to this day. The more than five hundred Indigenous nations represent some of the most knowledgeable and motivated people of the world when it comes to repairing, restoring, and regenerating their land.'

[Regeneration – Ending the Climate Crisis in One Generation. Paul Hawken. pp. 34-7]

Permaculture is a set of ethics and design principles centered on whole systems thinking, simulating, or directly utilizing the patterns and resilient features (the capacity of an ecosystem to recover from change) observed in Nature. Permaculture systems - including 12 principles* and 5 impact zones - are now integrated into a growing number of fields from regenerative agriculture, rewilding, and community resilience. 'The Three Ethics of Permaculture are: 1. Care of the Earth, 2. Care of People, and 3. Returning surplus to the system.' [Mollison]

*The Twelve Principles of Permaculture -

Observe and Interact

Catch and Store Energy

Obtain a Yield

Apply Self-Regulation and Feedback

Use and Value Renewables

Produce No Waste

Design from Patterns to Details

Integrate Don't Segregate

Use Small and Slow Solutions

Use and Value Diversity

Use Edges and Value the Marginal

Creatively Use and Respond to Change

Questions –

Which of the 12 Permaculture Principles can address climate change?

Is a lumber yard returning "surplus" to the system?

Do you know what proforestation means?

Do the ethics of permaculture include the rights of Indigenous people?

What groups do you know that could potentially team-up with permaculturalists to plant trees?

How do you place a value on a living tree?

How do forests contribute to carbon sequestration?

What do you know about bioenergy and climate change?

How does a forest contribute to community well-being and resilience?
Do you contribute to biodiversity where you live?
How do some trees recover naturally from human devastation?

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Wetlands, Climate Change and Permaculture

A Teacher's Guide

Definitions –

'Wetlands remain the most diverse and productive habitat on the planet, repositories of carbon, diversity and life. Wetland variations are endless, depending on soil, climate, depth, and ecosystem. They can be seasonal or permanent, freshwater or saline, and come in a myriad of shapes, forms, and places. Wetlands include bogs, mangroves, mudflats, and swamps.

Where local rains are prolific and exceed outflows, wetlands perform a function that rivers and lakes cannot. The waters move slowly, seep into the soil, and/or remain standing for days or longer. They perform unseen services of filtration and cleansing. Pollutants from upstream farms are taken up by plants.

Wetland restoration is less expensive and more effective than constructing concrete infrastructure.

Once we stop burning, cutting and poisoning wetlands, we will see life and regeneration flourish.'

[Regeneration – Ending the Climate Crisis in One Generation. Paul Hawken. pp. 84-5]

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Questions –

Which of the 12 Permaculture Principles can help wetlands address climate change?

What types of wetlands do you live next to?

How do wetlands respond to climate change?

Do wetlands return surplus to the system? How?

How are wetlands an example of sustainability?

Are wetlands self-regulating?

What types of human waste do wetlands typically capture and transform?

How would you measure yield in a wetland?

Do wetlands produce any significant waste?

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Regenerative Agriculture, Climate Change and Permaculture

A Teacher's Guide

Definitions –

'Regenerative agriculture is not a specific practice itself. Rather, proponents of regenerative agriculture use a variety of sustainable agriculture techniques in combination. Practices include recycling as much farm waste as possible and adding composted material from sources outside the farm. Regenerative agriculture on small farms and gardens is often based on philosophies like permaculture, agroecology, agroforestry, restoration ecology, keyline design, and holistic management. Large farms tend to be less philosophy driven and often use "no-till" and/or "reduced till" practices.

The group Terra Genesis International based in Thailand, and VF Corporation's partner in their regenerative agriculture initiative, created a set of 4 principles, which include:

- "Progressively improve whole agroecosystems (soil, water and biodiversity)"
- "Create context-specific designs and make holistic decisions that express the essence of each farm"
- "Ensure and develop just and reciprocal relationships amongst all stakeholders"
- "Continually grow and evolve individuals, farms, and communities to express their innate potential"

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Most plans to mitigate climate change focus on "reducing greenhouse gas emissions." Regenerative agriculture, (i.e., the capture of atmospheric carbon dioxide by growing plants that move that carbon dioxide into the soil) is pretty nearly the only currently-functioning technology available for drawing down greenhouse gases that are already in the atmosphere, mostly through the cultivation and nurturing of forests and permanent perennial pastures and grasslands.' [WIKI]

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Questions –

Why is regenerative agriculture called a technology?
Is permaculture a technology?
Could a “no till” soil strategy be considered a technology?
What permaculture principles apply to regenerative agriculture? This there overlap?
How does regenerative agriculture aid in the fight to prevent climate change?
When is sustainable agriculture regenerative agriculture?
Can biodiversity help to reduce climate change? How?
What permaculture and regenerative agriculture practices could reduce the burning of fossil fuels?
Have you walked on a permanent perennial pasture or grassland? What can grow there?

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ReWilding, Climate Change and Permaculture

A Teacher's Guide

Definitions –

“Rewilding is a form of environmental conservation and ecological restoration that has significant potential to increase biodiversity, create self-sustainable environments and mitigate climate change. Rewilding aims to do this by reintroducing lost animal species to natural environments. It is an exciting and promising conservation strategy aimed at restoring natural processes and wilderness areas, providing connectivity between such areas (corridors), and reintroducing large herbivores, predators and/or keystone species.

While reintroduction is an approach that many conservationists take to restore and reinforce endangered species populations, rewilding's focus on animals high up on the food chain like apex predators and large herbivores make it unique. The reason these particular species are targeted by rewilding is that by being high up on the food chain, they influence many species below them by restoring ecological functioning.

Most rewilding approaches fit the concept of trophic rewilding, defined as: “an ecological restoration strategy that uses species introductions to restore top-down trophic interactions and associated trophic cascades to promote self-regulating biodiverse ecosystems. Types of rewilding include:

- (a.) Pleistocene rewilding entails reintroducing species or descendants of megafauna species from the Pleistocene era, more commonly known as the Ice Age.
- (b.) Passive rewilding takes quite a different approach, aiming to reduce human intervention in ecosystems, giving human cultivated land back to nature and restoring nature, with the goal of letting nature develop and flourish on its own. It entails passive management of ecological succession with the goal of restoring natural ecosystem processes and reducing human influence on landscapes.
- (c.) Translocation rewilding is a more active approach, also involving the reintroduction of species, but the species it focuses on reintroducing are of more recent origin. It seeks to restore missing or dysfunctional processes and ecosystem functions by reintroducing current descendants of lost species.” <https://truenaturefoundation.org/what-is-rewilding/>

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Questions –

How does rewilding promote biodiversity and mitigate climate change?

Can you name some keystone species in your bioregion?

Is rewilding a form of self-regulation?

Does permaculture's "creatively use and respond to change" relate to rewilding's restoring ecological functioning?

Does rewilding adhere to permaculture's mandate to "design with Nature?"

Does rewilding support the cultivation and nurturing of forests and permanent perennial pastures and grasslands?

Are "small and slow solutions" a part of passive rewilding? How?

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Solar Power, Climate Change and Permaculture

A Teacher's Guide

Definitions –

Solar power is the conversion of renewable energy from sunlight into electricity, either directly using photovoltaics (PV), indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and solar tracking systems to focus a large area of sunlight into a small beam. Photovoltaic cells convert light into an electric current using the photovoltaic effect.

Photovoltaics were initially solely used as a source of electricity for small and medium-sized applications, from the calculator powered by a single solar cell to remote homes powered by an off-grid rooftop PV system. Commercial concentrated solar power plants were first developed in the 1980s. Since then, as the cost of solar electricity has fallen, grid-connected solar PV systems have grown more or less exponentially. Millions of installations and gigawatt-scale photovoltaic power stations have been and are being built. Solar PV has rapidly become an inexpensive, low-carbon technology. (https://en.wikipedia.org/wiki/Solar_power)

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Questions –

Is solar power an example of a “Small and Slow Solution?”
How does solar power “Obtain a Yield?”

What potential wastes are produced from solar power?
Does solar power “Return Surplus to the System?” What / who is the system?
Does solar power reduce greenhouse gas emissions?
Who owns the power that is typically generated from solar power? Is this benefit an example of Care of People? How?
What resiliencies come with solar power?
What types of electrical grids can solar power support?
Is solar power found in Nature?
Can solar power work in tandem with regenerative agriculture? How?
Is solar power a “diverse” source of energy? What are its weaknesses?
Does solar power impact existing CO2 levels in the atmosphere? How?
Can a solar array be an example of Zone 0?

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Food Security, Climate Change and Permaculture

A Teacher's Guide

Definitions –

Food security is the measure of the availability of food and individuals' ability to access it. According to the United Nations' Committee on World Food Security, food security is all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life. The availability of food irrespective of class, gender or region is another one. At the 1974 World Food Conference, the term "food security" was defined with an emphasis on supply; food security is defined as the "availability at all times of adequate, nourishing, diverse, balanced and moderate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices".

The Food and Agriculture Organization of the United Nations, or FAO, identified the four pillars of food security as availability, access, utilization, and stability. The United Nations (UN) recognized the Right to Food in the Declaration of Human Rights in 1948 and has since said that it is vital for the enjoyment of all other rights. Later definitions added demand and access issues to the definition. The first World Food Summit, held in 1996, stated that food security "exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. [https://en.wikipedia.org/wiki/Food_security]

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Questions –

How do the 12 principles and ethics of Permaculture support the Right to Food?

Please discuss the four pillars of food security as availability, access, utilization, and stability through Permaculture and Regenerative Agriculture frames?

Can everyone participate in providing food?

What are “basic foodstuffs”?

Is food security susceptible to the volatility of the stock market? The shipping networks?

Does food security address the Permaculture Principle “Produce No Waste” or Ethic #1, “Care of the Earth?”

Is food security “returning surplus to the system?” How?

How can we protect food sources from negative encroachment?

Can food security strategies “draw down greenhouse gases”? How?

Does COVID-19 impact food security?

Does soil security promote the “cultivation and nurturing of forests and permanent perennial pastures and grasslands”?

Are there patterns in food security?

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Bioregions, Climate Change and Permaculture

A Teacher's Guide

Definitions –

'The concept of a bioregion was popularized by environmental activists and scientists in the 1970's to describe geographical areas that are defined by their unique landscapes and ecosystems – as opposed to political boundaries. Although the geography of a bioregion is delineated by both physical and biological factors, the preservation of culture, customs, and traditions is as crucial as saving native trees, plants, and animals.

Bioregions have three main goals:

1. To identify and inform inhabitants where they live
2. To teach and learn
3. Explore reinhabitation

Creating a bioregion requires understanding of the region as a whole, which means working as a community and making the commons home.'

[Regeneration – Ending the Climate Crisis in One Generation. Paul Hawken. pp. 88-89]

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Questions –

Which principles from Permaculture involve climate change?
Can a bioregion be defined by the three ethics of Permaculture?
Which bioregion do you live in? What makes it unique?
What customs do Permaculturists share?
Is Permaculture addressing CO2 pollution through their PDC?
Is the Permaculture zone compatible with defining a bioregion?
Is Permaculture involved in the process of reinhabitation?

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Biodiversity, Climate Change and Permaculture

A Teacher's Guide

Definitions –

'Biodiversity is the biological variety and variability of life on Earth. Biodiversity is a measure of variation at the genetic, species, and ecosystem level. Terrestrial biodiversity is usually greater near the equator, which is the result of the warm climate and high primary productivity. Biodiversity is not distributed evenly on Earth, and is richer in the tropics. These tropical forest ecosystems cover less than ten percent of earth's surface, and contain about ninety percent of the world's species. Marine biodiversity is usually higher along coasts in the Western Pacific, where sea surface temperature is highest, and in the mid-latitudinal band in all oceans. Biodiversity generally tends to cluster in hotspots, and has been increasing through time, but will be likely to slow in the future as a primary result of deforestation. It encompasses the evolutionary, ecological, and cultural processes that sustain life.

Among other factors, the diversity of all living things (biota) depends on temperature, precipitation, altitude, soils, geography and the presence of other species. The study of the spatial distribution of organisms, species and ecosystems, is the science of biogeography.

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Questions –

How does climate change impact biodiversity?

Which of the Permaculture principles could promote biodiversity? What about using Small and Slow Solutions?

Is a biodiversity hotspot an example of Design from Patterns to Details?

What technologies are important in helping to reduce climate change?

How can the gardens and farms of Permaculture impact climate change?

What are the pros and cons when applying Self-Regulation and Feedback to biodiversity and climate change?

Is Returning Surplus to the System part of increasing biodiversity?

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The Food Forest, Climate Change and Permaculture

A Teacher's Guide

A food forest, also called a forest garden, is a diverse planting of edible plants that attempts to mimic the ecosystems and patterns found in nature. Food forests are three dimensional designs, with life extending in all directions – up, down, and out. Generally, we recognize seven layers of a forest garden – the overstory, the understory, the shrub layer, the herbaceous layer, the root layer, the ground cover layer, and the vine layer. Some also like to recognize the mycelial layer, layer eight (mushrooms). Using these layers, we can fit more plants in an area without causing failure due to competition.

A food forest does not have to be re-planted year after year. Once it is established, it is generally very resilient. Deer and rabbits might come and munch some of the herbaceous edibles in some areas, for example, but other species will not be palatable to them or will be out of their reach. Or perhaps some children will come running through the area in wild play, running off path and possibly causing some damage to the ground cover and herbaceous layers. Not only will they usually grow right back, since many will be perennials and have healthy underground systems, but the trees, shrubs, and vines should be undamaged.

An ideal food forest is as organic as possible. But it goes farther than that. Forest gardens depend heavily on a healthy ecosystem and cannot be sprayed with herbicides or pesticides or have non-organic fertilizers applied. A healthy ecosystem will take several years to establish itself, especially in a city or open farm area. We have to be patient and let nature take care of itself (while providing the necessary food, water, and habitat for all the components of the ecosystem, otherwise they won't come). <https://projectfoodforest.org/what-is-a-food-forest/>

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Forest carbon sequestration is the process of increasing the carbon content of the forest through processes that remove carbon dioxide from the atmosphere (i.e., photosynthesis). Once sequestered the carbon is stored in the forest within living biomass, soil and litter and contributes to the forest carbon stock.

<https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2018/uk-forests-and-climate-change/carbon-sequestration/>

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Questions –

Which Permaculture Principles support the reduction of CO₂?
Do you agree with the seemingly singular role of Regenerative Agriculture in 'drawing down greenhouse gases that are already in the atmosphere?'
Why use "layers" when describing the components of a food forest?
What can humans do to grow a food forest?
How do the first two ethics of Permaculture relate to the role of food forests?
Is catch and store energy the same as forest carbon sequestration?
Do food forests have edges?

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'A permaculture convergence (<https://www.northwestpermaculture.org/convergence.html>) is an opportunity to connect with other permaculture designers, folks living the permaculture lifestyle and people new to permaculture.

It's a platform to seek answers in a safe supportive environment. A convergence creates an opportunity for the whole family to spend the weekend being inspired and gearing down from our crazy hectic everyday lives. If you have made a beneficial discovery yourself, a convergence allows you to bring it to the group for support and feedback. Mostly, a convergence is an opportunity to step back and take a look at your own life and choices you would like to bring to fruition.

The permaculture convergence can utilize the power of the group collectively sharing skills, knowledge, dialogue and support.

Topics at a permaculture convergence often include: composting toilets, rocket mass heater showers, cob oven, permaculture garden to feed the attendees, and a roundwood timber frame structure with a reciprocating roof.' <https://www.permaculturenews.org/2012/07/30/what-is-a-permaculture-convergence/> Most plans to mitigate climate change focus on "reducing greenhouse gas emissions."

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Questions –

Can the Permaculture Convergence itself facilitate the reduction of CO2? If so, how?

What would you include in a course on climate change at a Permaculture Convergence?

Is “creatively use and respond to change” in play here?

Is a Permaculture Convergence designed to practice the second ethic: Care for People?

What principle talks about unifying people and ideas?

What role does CO2 play at a Permaculture Convergence?

Could “valuing diversity” play a role in sequestering CO2? How could this topic be facilitated at a Permaculture Convergence?

How is a Permaculture Convergence like a Food Forest?

Is Climate Change, or a Permaculture Convergence, a spiritual challenge?

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A Teacher's Guide

Definitions –

‘Compost is a mixture of ingredients used to fertilize and improve the soil. It is commonly prepared by decomposing plant and food waste and recycling organic materials. The resulting mixture is rich in plant nutrients and beneficial organisms, such as worms and fungal mycelium. Compost improves soil fertility in gardens, landscaping, horticulture, urban agriculture, and organic farming. The benefits of compost include providing nutrients to crops as fertilizer, acting as a soil conditioner, increasing the humus or humic acid contents of the soil, and introducing beneficial colonies of microbes that help to suppress pathogens in the soil. It also reduces expenses on commercial chemical fertilizers for recreational gardeners and commercial farmers alike. Compost can also be used for land and stream reclamation, wetland construction, and landfill cover.

Most plans to mitigate climate change focus on "reducing greenhouse gas emissions." Regenerative agriculture, (i.e., the capture of atmospheric carbon dioxide by growing plants that move that carbon dioxide into the soil) is pretty nearly the only currently-functioning technology available for drawing down greenhouse gases that are already in the atmosphere, mostly through the cultivation and nurturing of forests and permanent perennial pastures and grasslands.’ [WIKI]

Permaculture is a set of ethics and design principles centered on whole systems thinking, simulating, or directly utilizing the patterns and resilient features (the capacity of an ecosystem to recover from change) observed in Nature. Permaculture systems - including 12 principles* and 5 impact zones - are now integrated into a growing number of fields from regenerative agriculture, rewilding, and community resilience. ‘The Three Ethics of Permaculture are: 1. Care of the Earth, 2. Care of People, and 3. Returning surplus to the system.’ [Mollison]

*The Twelve Principles of Permaculture –

Observe and Interact
Catch and Store Energy
Obtain a Yield
Apply Self-Regulation and Feedback
Use and Value Renewables
Produce No Waste
Design from Patterns to Details
Integrate Don't Segregate
Use Small and Slow Solutions
Use and Value Diversity
Use Edges and Value the Marginal
Creatively Use and Respond to Change

Questions –

Is compost a metaphor for Permaculture?
Is compost soil?
Is compost waste?
By itself, can compost sequester CO₂?

What are “beneficial colonies of microbes?”

What Permaculture Zone would you expect to find a pile of compost?

Which ethics of Permaculture does compost connect with? Please explain.

Is compost found in Nature?

Are there patterns in composting?

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