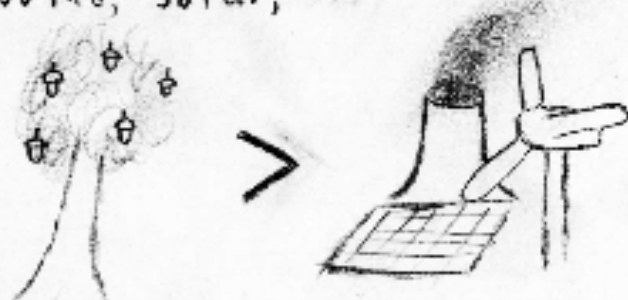


# Reversing CLIMATE CHANGE

without  
Wind, Solar, or Nuclear



The Southside Permaculture Park  
The Burbage Institute of Art + Design

# Disclaimer

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Blah blah blah climate change is the biggest threat to humanity blah blah  
blah loss of biodiversity blah blah blah extreme weather and infrastructure  
damage blab blah blah unimaginable human suffering.

This is not a zine about why climate change is bad or why we have to stop it. That's been said a million times by a million different people and if you opened this zine then you already know that climate change is bad and that the four biggest contributors are electricity/heat production, agriculture, transportation, and industry. It's hard to say exactly what proportion each contributes because they are so intertwined (for example, peppers grown in Chile with industrially manufactured pesticides are flown overnight to the US where they sit in a refrigerated warehouse for three days before being trucked to a refrigerated grocery store where you buy them wrapped in plastic), but depending on the sources you read and where you draw the lines, it's safe to say that each contributes about  $\frac{1}{4}$  of all emissions, give or take.

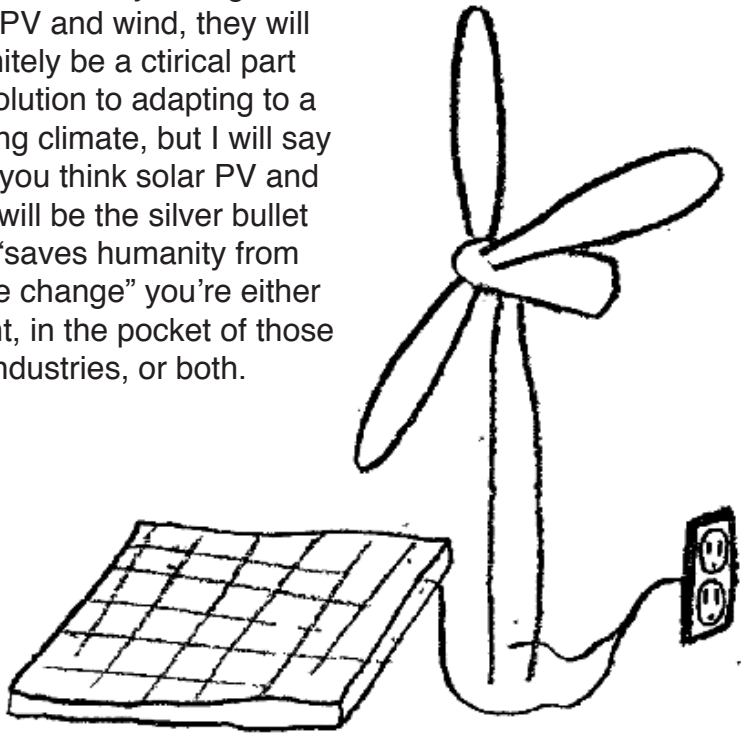
If you are not familiar with climate change and its causes, or if you just want to know more, check out the "Further Reading" section in the back before continuing.



With that said, this is not a zine about what causes climate change or why we have to act;  
**this is a zine about solutions.**

Most of the time when you hear about climate change solutions, you hear about million-acre solar and wind farms. And that's about it. Maybe they bring up how you should recycle more.

Now, I won't say I'm against solar PV and wind, they will definitely be a critical part of a solution to adapting to a changing climate, but I will say that if you think solar PV and wind will be the silver bullet that "saves humanity from climate change" you're either ignorant, in the pocket of those industries, or both.



If you're ignorant, you get a pass as long as you are willing to learn; continue reading and check out the resources in the back for that. Otherwise, there is no excuse.

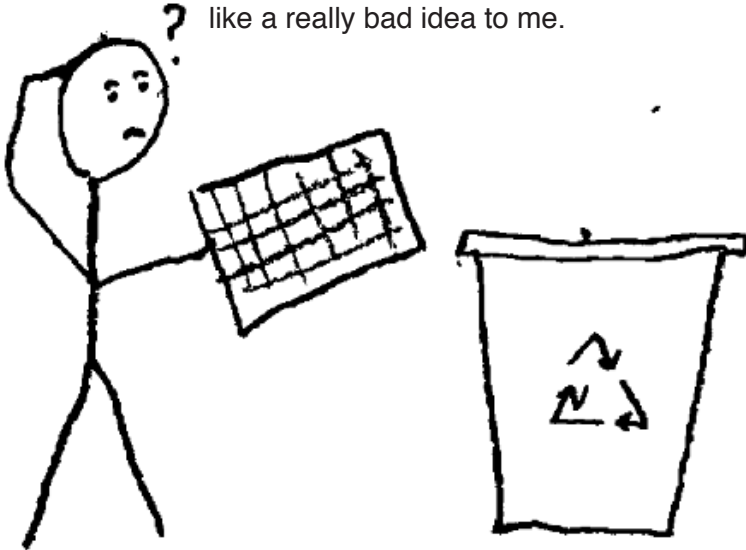
There are a few problems with wind and solar PV.

The first is that they take up a lot of space. Unless these solar farms are in equatorial desert regions, they require a pretty absurd amount of space to meet current electricity demands [1]. I will always advocate for reducing demand, but either way it's a lot of space.

The problem with concentrating generation in areas where sun or wind energy is abundant is that it creates perfect conditions for hegemonic control over the energy supply and therefore manipulation of society at large. This is what happened with the fossil fuel industry. We should aim not to repeat that mistake.

Besides that, solar PV and wind turbines have a pretty nasty supply chain, with materials made from toxic and rare-earth elements mined by what is essentially slave labor [2]. Once these materials are out of the ground, there is really no good way to put them back. We have yet to create a safe and effective way to recycle solar panels and wind turbines. Building a million acres of them now and banking on the possibility that we will in the future know what to do with them seems

? like a really bad idea to me.

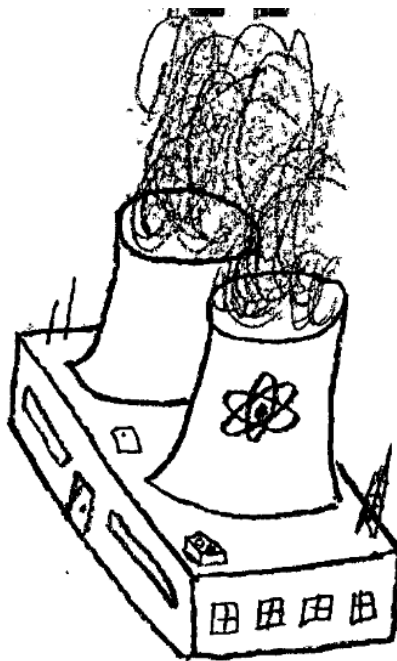


But even if none of the aforementioned problems with solar PV and wind existed, it still wouldn't bring us carbon negative, it wouldn't stop or reverse climate change, and it would do very little to actually safeguard us from the effects of climate change.

Nuclear is often proposed as a solution. Modern thorium liquid salt reactors have the potential for incredible energy density and can be modular and run by and for communities. They have virtually no risk for dangerous meltdown and their byproducts are much safer and shorter lived than uranium. More research and development is necessary, but the potential is there and the technology is not far off.

I think nuclear power - fusion and fission – could be an important part of the solution, and I'm glad there are lots of smart people working on it, but the truth is that it will never bring us carbon negative.

There is also a very high barrier to entry to even work on such technology, making it off limits to most people.



Surly there must be a way that everyone can get involved in actively making a difference to build a harmonious society that is resilient to even the worst effects of climate change.

Fortunately, there is.

All we  
have to do  
is...

**PUT  
CARBON  
BACK  
IN  
THE  
SOIL!!!**



If we increased the average carbon content in all the worlds soils by just four parts per thousand per year, we could offset all of our annual carbon emissions [3].

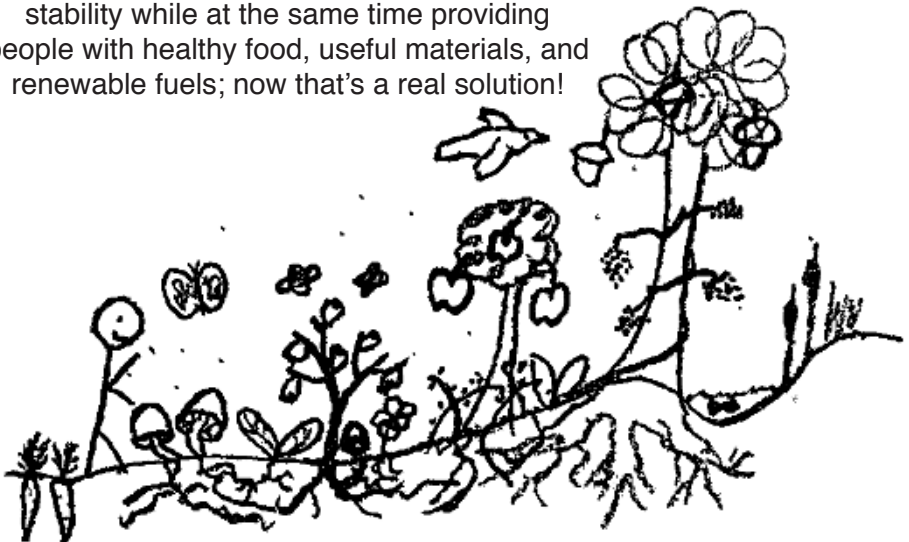
That's only a 0.4% increase in soil carbon!

Agricultural systems can help us do that. Converting tilled monoculture annual row crops to intensively managed pasture, a technique that uses high densities of grazing animals and rotates them frequently, results in a 75% increase in soil carbon over 6 years [4]. That's just over 30x the rate we need! Granted, not all of Earth's land is covered in row crops (though a lot is), but it has been estimated that if all of US conventional row crop and pasture were converted to this style of managed rotational grazing it would sequester 1/3 of all US emissions [5].

Agroforestry, the practice of integrating tree crops into agricultural systems, has the potential to sequester much more carbon and to do so for much longer periods of time.

By some estimates, agroforestry could increase carbon sequestration by an order of magnitude [6]. That would mean drawing down three times the carbon that we emit!

Not only would we be drawing down carbon and reversing climate change, but we would be increasing biodiversity and ecosystem stability while at the same time providing people with healthy food, useful materials, and renewable fuels; now that's a real solution!



It is true that, according to these studies, at a certain point soil carbon accumulation plateaus. This happens after about 6-8 years for pasture and a couple decades up to a century for agroforestry systems.

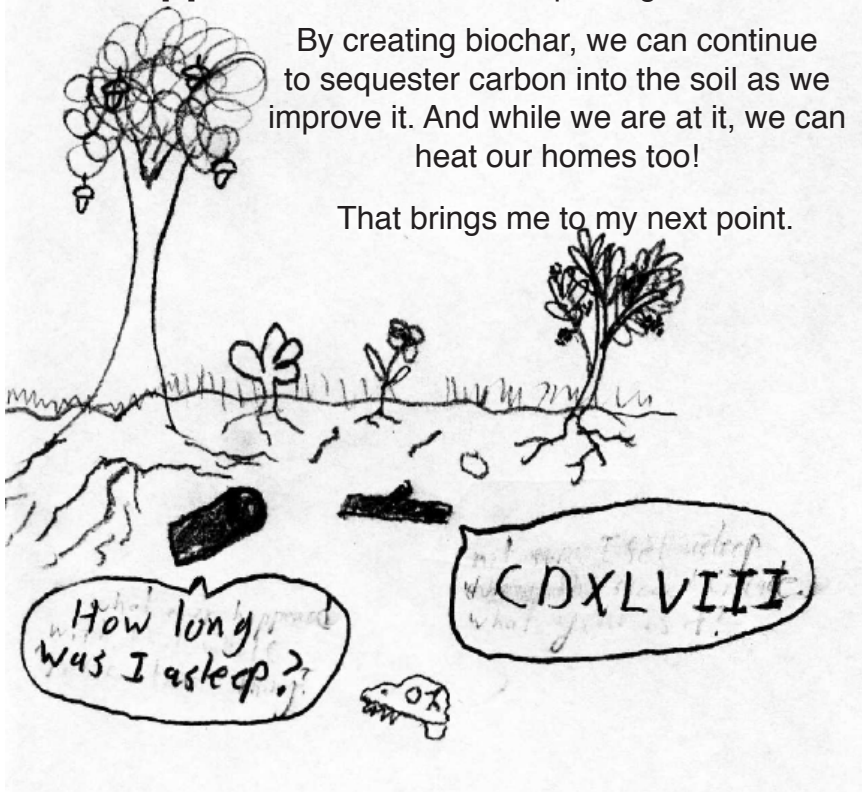
The question then becomes: how do we continue to sequester carbon after the soil reaches equilibrium?

One answer is to stop producing it. We'll get to that in a minute.

Another solution is biochar. Biochar is a form of inorganic carbon formed by controlled burning of woody plant material. It is like charcoal, and has been shown to be stable in the ground for up to a thousand years, if not longer, and is an amazing habitat for all kinds of beneficial microorganisms that support healthy plant life. It is also an excellent storage of water in the soil [7], and can be used in composting toilets too!

By creating biochar, we can continue to sequester carbon into the soil as we improve it. And while we are at it, we can heat our homes too!

That brings me to my next point.



About 1/3 of the energy we use goes to heating and cooling our homes and buildings.

This is largely because they are very poorly designed.

By utilizing concepts of thermal mass, geothermal, convection cycles, and others, we can passively heat and cool our homes and buildings without the need for natural gas or electricity.

Additional heat and fuel for cooking could be achieved as a byproduct of producing biochar, thereby making our homes and kitchens net carbon negative.

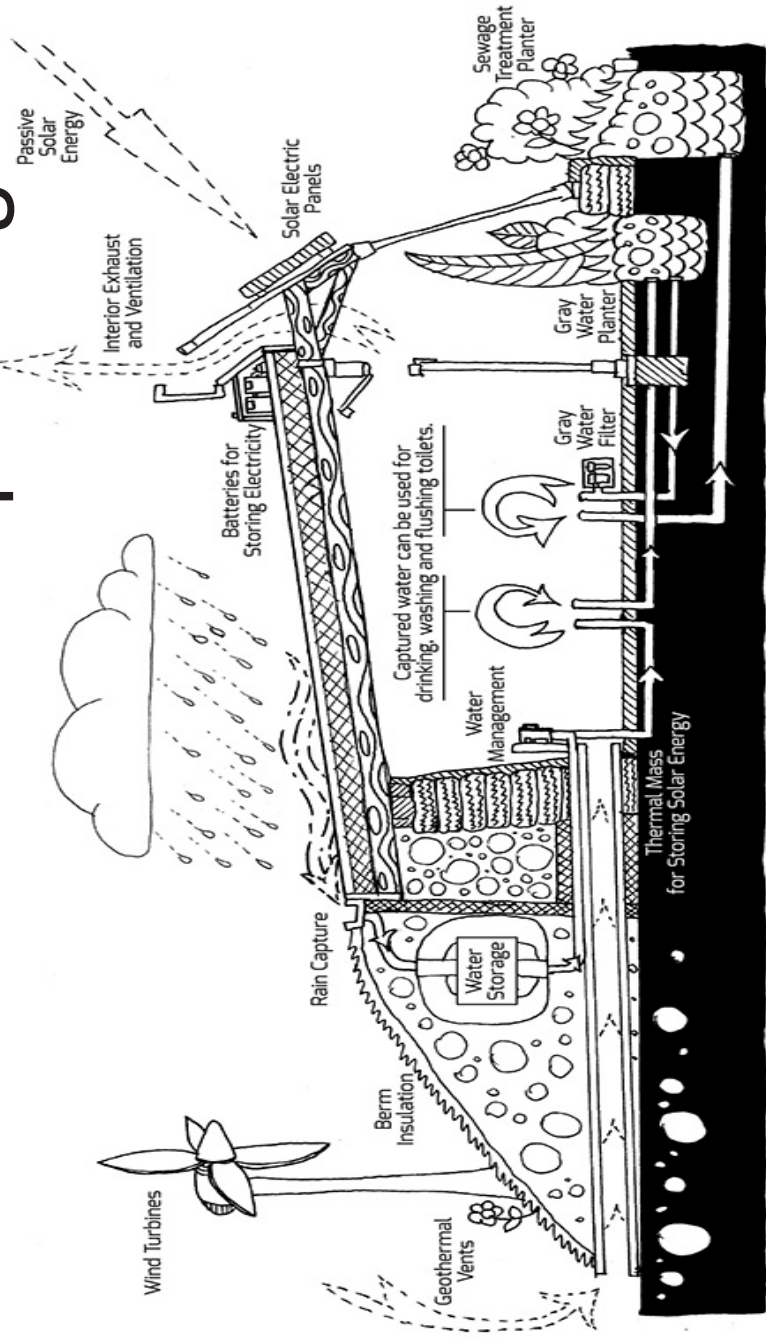
The Earthship building design is a fascinating and proven method for passive buildings.

Earthships use waste materials like used tires and old bottles to create totally off-grid, passive homes and buildings that catch all the water they use, process all the sewage they create into food and other useful products, and can retain comfortable living temperatures throughout the year and in any climate. They do all this without being connected to city power grids or sewers.

There are companies that will build them for you, but I recommend just buying the instructional/informational material and learning how to do it yourself.

You can check that out in the Further Readings section in the back.

# Generic Earthship Design



Up to this point, I have been using the term “agroforestry” because I think it is a more accessible term, and it is the term used in many of the scholarly articles that assess the topic of carbon sequestration, but

**what I am really talking about in this zine is the philosophy of Permaculture.**

Both management intensive rotational grazing and agroforestry are practices that could be said to fall under the umbrella of permaculture.

Permaculture is a holistic design philosophy for creating functional, adaptable, integrated systems.

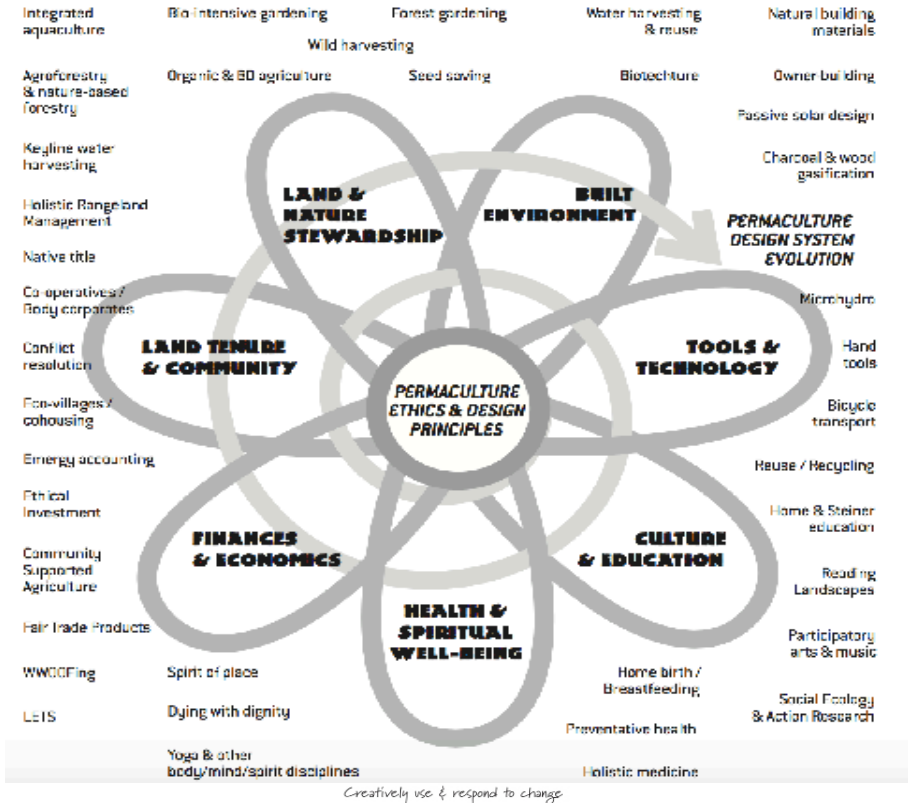
In permaculture we focus on the relationship between elements, rather than the elements themselves in isolation. Every element serves multiple functions, and every function is supported by multiple elements. Nothing is wasted; the output of any element is the input of another. Stability is built through diversity. Design is nonlinear, iterative, fractal.

Permaculture extends beyond agriculture into the realms of interpersonal relations and social structures, economic frameworks and political paradigms, spirituality and philosophy.

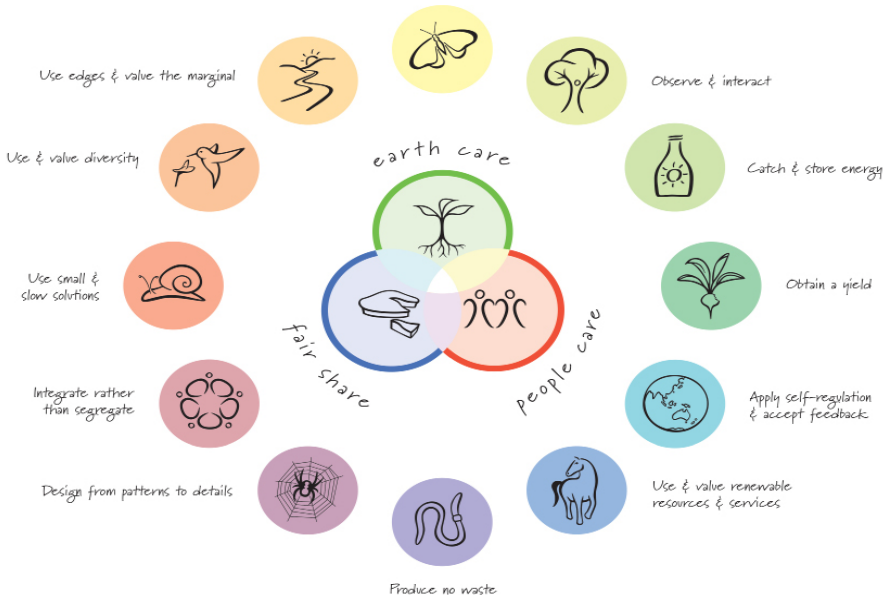
This is not a zine about what permaculture is, but rather one about how it can be used to think about and solve the biggest problems we face today.

For more information on permaculture theory and practice, check out the Further Reading section in the back.

# The Permaculture Flower



Creatively use & respond to change



## Ethics and Principles

What makes permaculture so unique and so powerful is that it can be implemented anywhere, at any time and at any scale, with as little or as many resources as are available. Permaculture can be done on a rural homestead over six generations or in an urban center apartment over a six month lease. It can be done on 10,000 acres with \$10 million or on a quarter of a city block with materials scoured for free from the dump. It can be done on rocky hillsides, swampy lowlands, concrete jungles, or even in the middle of the desert.

If we are going to mitigate climate change and adapt to its inevitable effects, we are going to need to really learn to belong to where we live. We need to learn to cultivate and live in conjunction with productive, functional, and regenerative ecosystems rather than the destructive, dysfunctional, and degenerative ecosystems we currently create.

Whether you acknowledge it or not, the cities, highways, and mines we build are features of the ecosystems we live in just as much as any forest or river. The difference is that one actively regenerates the conditions it needs to thrive, and one systematically destroys them.

Permaculture lets us change that. It gives us the tools for theory and practice to create these regenerative, functional ecosystems.

Humans can engineer highly productive, highly diverse ecosystems even in the harshest, most arid regions of the world. Humans are fucking cool like that, and we can use our intelligence and power for good. If anyone ever tells you that the best way to protect “nature” is for humans to not be involved, you can tell them they are full of shit, and then proceed to educate them on how we can reverse climate change, safeguard biodiversity, and create highly functional ecosystems that support human society.

The abundance that existed in ecosystems where indigenous cultures thrived was not an accident or a result of passive existence in the landscape; it was the result of millennia of active participation in shaping the ecology of the region to suit the needs of all beings present. We can combine our knowledge with the knowledge of indigenous cultures to forge a path forward where we work with the forces that drive succession rather than against them so we can all truly belong to where we live.

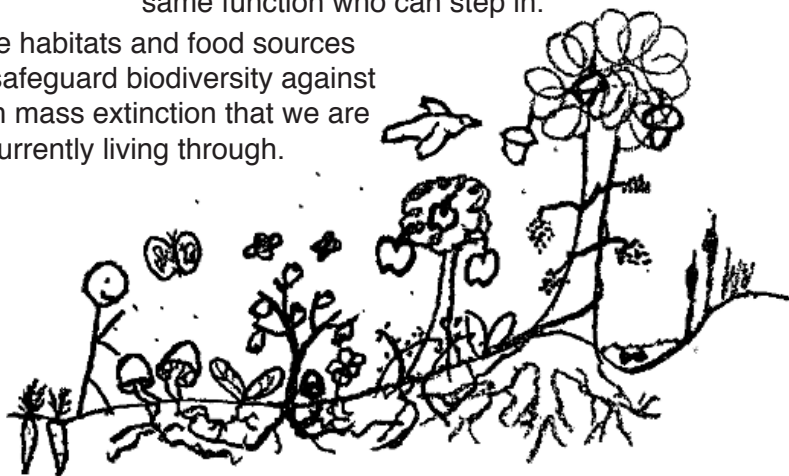


By redesigning spaces like farms, lawns, highway medians, and parks into forest gardens with permaculture principles, we can flip our society from carbon positive to carbon negative without altering our energy production or transportation sectors at all. Of course, this will reduce emissions too. Fresh, local food means significant reductions in transportation and refrigeration. It means no toxic pesticides or synthetic fertilizers manufactured in distant factories from even more distant mines. Local production means people can find meaningful work in their neighborhoods and don't have to commute long distances for soul-sucking corporate jobs.

We can create local solidarity and autonomy within geographic communities, severing the bond of dependency on the corporate overlords and granting people the freedom to express and explore themselves. We will create a sense of belonging, to a group of people, to a place, to a culture, and to an ecosystem, that will bring great inner peace and satisfaction to the stress-filled, isolating society of today.

When we put carbon back into the soil, we increase the capacity for the land to hold onto water in times of drought and let it go in times of flood. Change is constant, and diversity and redundancy means stability. A late spring frost or dry summer might cripple one element, but if we work with diverse types of elements, then there will be plenty that thrive in those conditions, and whatever function that crippled element served, there are other elements that serve that same function who can step in.

Diverse habitats and food sources help to safeguard biodiversity against the sixth mass extinction that we are currently living through.





Creating integrated spaces like the forest gardens of permaculture allows us to directly combat the relationship of dominance and exploitation that are so rampant in our society today.

If one looks at a conventional farm, what they see is a million identical drones that are at the complete mercy of one individual. Everything they need is provided by the one farmer, and their only purpose is to produce for humans. Humans are the clear and undisputed despots in this. When our whole society is based upon this fundamentally abusive relationship with our food, it is only natural that those relationships would propagate out into all aspects of society; social relations, economic bondage, political violence, state and corporate control over the masses.

When one walks among a permaculture forest garden, however, one senses a very different type of relationship.

Each element in the system provides multiple functions that support the other elements in the system. Decentralized mutual aid is the rule here. No one is on top, no one is in control. Humans in this space are not the undisputed despots. If they were to leave, many of the critical ecosystem functions would still be maintained, and the overall system would go on being productive and resilient. Here, we are stewards of the land. We serve important roles in promoting and maintaining biodiversity, but we are no more important than the trees that build soil or the insects that pollinate the flowers.

When we build the foundation of our society on these principles of mutual aid and integration of diversity, it is only natural that these relationships will ripple out into society at large in the same way.

We can sequester enough carbon to begin to reverse climate change, and in doing so we can also dramatically reduce our emissions in the first place. By implementing permaculture and agroforestry systems, we are also building healthy, fertile soil and diverse ecosystems that are much better suited to handle extreme weather events like droughts, floods, and fires that will only become more common as the climate changes. Even if we can't mobilize all the people to adopt such practices and we don't manage to go carbon negative, even if climate change does spiral out beyond any hope of going back, these systems will be at least 100 times more likely to survive than conventional agriculture, and so our hopes of continuing as a species rest with them.

You may not own a thousand-acre farm, or even any land at all, but you can still organize in your community to plant nut trees in a local park or abandoned field. You can start collecting compost to build new soils and then guerrilla garden along the highway or in forgotten corporate fields. You can share what you have learned with everyone you meet, and with enough of us pushing others and demonstrating these practices in our own small communities, we can make the big changes.

If you are less direct-action oriented and more connected politically, then talk to your city council, state congress people, or other elected officials about the benefits of permaculture and agroforestry. If we are going to have a "Green New Deal" anyway, then it damn well better include funding for transitioning to agroforestry systems. If you are more market oriented, then make an effort to purchase forest-based products like chestnut flour or venison.

I'm not against wind, solar, or nuclear. I think they may play a very important role in our future as a society. But what I am saying is that if we are serious about climate change and safeguarding human society, then we need to think beyond them. Way beyond them. We need to put carbon back in the soil. Permaculture gives us the tools to do just that.

## Further Readings on Climate Change:

- <https://www.ipcc.ch/>
- The Oil We Eat by Richard Manning

## Further Readings on Permaculture:

- Gaia's Garden by Toby Hemenway
- The Essence of Permaculture by David Holmgren (<https://permacultureprinciples.com/resources/free-downloads/>)
- Edible Acres (<https://www.youtube.com/user/EdibleAcres/videos>)
- Trees of Power by Akiva Silver
- Southside Permaculture Park (<http://southsidepermaculturepark.org/>)
- Farming the Woods by Ken Mudge & Steve Gabriel
- Greening the Desert (<https://www.youtube.com/watch?v=keQUqRg2qZ0>)
- Tree Crops: A Permanent Agriculture by J. Russel Smith
- Beyond the War on Invasive Species: A Permaculture Approach to Ecosystem Restoration by Tao Orion

## Further Readings on Passive Building Design:

- <https://pangeabuilders.com/earthships/>
- <https://www.earthshipglobal.com/design-principles>

## References:

[1] <https://www.youtube.com/watch?v=N-yALPEpV4w>

[2] <https://www.theguardian.com/global-development/2018/oct/12/phone-misery-children-congo-cobalt-mines-drc>

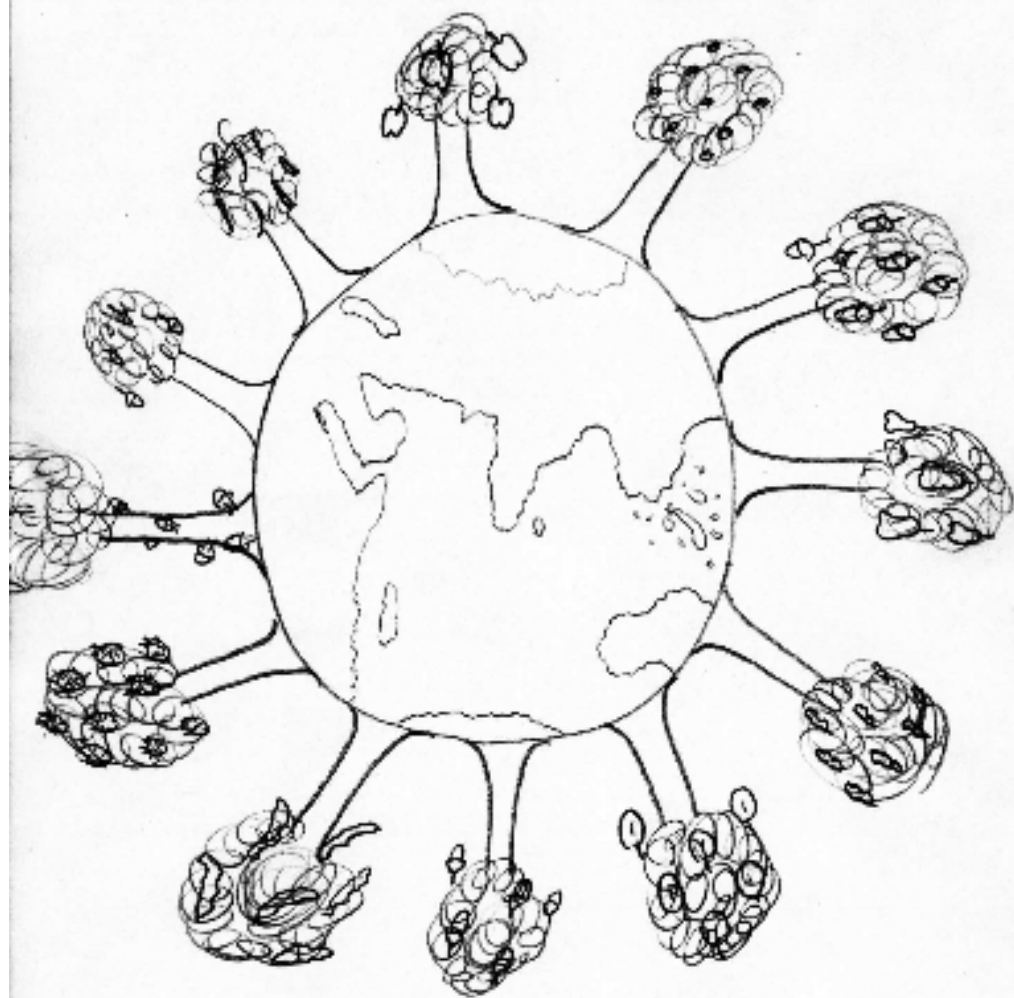
[3] <https://www.4p1000.org/>

[4] Machmuller, Megan B., et al. "Emerging land use practices rapidly increase soil organic matter." *Nature Communications* 6 (2015): 6995.

[5] Lal, Rattan. "Soil carbon sequestration to mitigate climate change." *Geoderma* 123.1-2 (2004): 1-22.

[6] Nair, PK Ramachandran, et al. "Carbon sequestration in agroforestry systems." *Advances in agronomy*. Vol. 108. Academic Press, 2010. 237-307.

[7] Downie, Adriana, Alan Crosky, and Paul Munroe. "Physical properties of biochar." *Biochar for environmental management: Science and technology* (2009): 13-32.



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