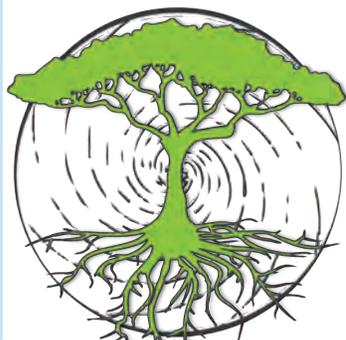


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Design

Regenerating Life Together



Ecological Restoration

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A Cure for the Desolation of the Suburbs

John Wages

CLEARCUTTING HAS BEEN WITH US a long time. The reforested hills around San Francisco Bay area were completely cut over to supply lumber to build San Francisco and the Bay Area cities. It's hard to imagine. Parks like Purissima Creek Redwoods in the coastal hills preserve second- and third-growth redwoods, and hikers walk on trails that, in many cases, are old logging roads. Signs warn visitors to look out for mountain lions. Ecosystems are reassembling themselves here, just a few miles from the densely populated Bay Area. Clearcutting, acid rain, pollution in general, and even climate change were topics explored by the *Weekly Reader*, a weekly magazine for students back in the 60s and 70s. *Limits to Growth* was published back in 1972. We've known about ecosystems degradation for a long time, and our best scientists have warned us of the inevitable. Why do we still allow the destruction of our home?

For anyone growing up close to nature and spending a lot of time outdoors, as I did, it was a strange experience to go to school in town. The first school I attended, for kindergarten and first grade, had a near-impenetrable thicket with a few big trees on the west edge of the playground. Some of us kids used to venture into that jumble of roots and vines to explore and play. We loved it. Nowadays, such a "dangerous place" would be fenced to prevent us from hurting ourselves. Indeed, the powers that be decided a better solution would be to obliterate the jungle completely. It was my first experience of loss. Every time I heard Joni Mitchell sing "Big Yellow Taxi," I remembered the parking lot that replaced the place I loved. My next school was a shiny new one in the middle of a newly planted suburb called Lee Acres. Drive through there, even today, and likely as not, you won't see any kids playing outside. They're all inside watching TV or playing video games. A whole generation grew up with virtual reality. It always seemed creepy to me. Riding my bike through the countryside, there were always kids occupied with something outdoors. In contrast, Lee Acres seemed void of life.

On the positive side, there are more birds and small mammals (like squirrels) in that part of the South than there were when I was a kid. The reason may simply be that there are fewer people in the countryside to wreck havoc. One indicator species is the Eastern bluebird (*Sialia sialis*). Once rare in my area, they're now common. Along with the phase-out of the worst pesticides like DDT, part of the reason for their local comeback was the Florence Carr Bluebird Trail. When his wife Florence died, Gale Carr memorialized her and her love of birds by spending the rest of his life building bluebird houses and giving away thousands of them. People all over the area put up bluebird houses, which substituted for the now-scarce nesting holes in hollow trees. His work helped restore a small part of the local ecosystem. Perhaps more importantly, he inspired many people to look outside their windows at the increasingly com-

mon flashes of blue flitting around outside. A footnote in local history, Tupelo's bluebird comeback was catalyzed by one man most people in my hometown today have never heard of—small steps are key. How many people do nothing because they can't envision themselves making a big impact? How many people are paralyzed by the enormity of the problems we face?

Nature isn't just a place to ride your mountain bike. Humanity's destiny is wrapped up in the fate of redwoods and bluebirds. The dichotomy of Humans and Nature is an artificial construct, enabled by language and abstract thinking and justified by greed.

Our earliest experiences shape our understanding and appreciation of wild nature. Sure, we may read about ecosystems degradation and the loss of biodiversity, and we may see the plight of the big apes on TV, but unless we have experienced loss first-hand, these concepts remain abstractions. My losses are small, but they are mine and impact how I live my life today.

Ecosystems have been pushed to the limits. So what do we do? We can start by talking ("Just Talk," Daniel Quinn; www.ishmael.org/Education/Writings/just_talk.cfm). Next, we can start making small changes in our own lives. If we own property, we can diversify our zones and practice observant, sound ecosystems restoration. We can support other efforts. We can explain to others how holistic views and systems thinking can put all the pieces together and tell us what to do about the devastation outside our walls. What do we do in the face of mounting losses? We do what we can and not less.

Thanks to all the writers in this issue. Thanks especially to Chris Warburton-Brown for collecting and editing transcripts of several talks from the International Permaculture Conference in London this past September (IPC-12).

Our next issue will examine permaculture's approach to drought and flood. Here in northern California, El Niño has brought the rain, but the long-term drought is still with us. Climate change will bring longer, deeper droughts to the Southwest, as well as areas not so accustomed to long dry periods. How can we prepare? Flooding is also an increasingly common experience, with tremendous amounts of rain falling recently in Texas, Florida, and south India. How can we build resilience into our designs to best handle these extremes of drought and flood? Tell us your stories, and please share your successful designs in the pages of Permaculture Design. Δ

Ecological Restoration from a Permaculture Perspective

The Upward Spiral

Jono Neiger

MANY, IF NOT MOST, of the worlds' ecosystems are in tatters. Systems verge on collapse or a fundamental shift in state, leading to very altered conditions. Soil loss and degradation, hydrology changes, water table contamination, loss of freshwater resources, climate chaos, and air pollution—the list could go on, but suffice it to say that we are in need of restoring ecosystems everywhere and quickly.

But...not all restoration is equal. I worked in habitat restoration for The Nature Conservancy in the 90s. Much of what we did was amazing—replanting forests in flood-prone agricultural land along the Sacramento River in the Central Valley of California. We planted thousands of trees and shrubs. We had staff, hundreds of volunteers, and an education program about restoring ecosystems. But we also used techniques that continued to disturb the system even as we tried to repair it. We sprayed Roundup® with tractor boom sprayers across many acres. We used heavy equipment, bush hogs, and tractors, and tilled the soil, increasing soil disturbance.

I've come to believe the process of restoration is as important as the result. The ends don't justify the means. I look at techniques being used in current restoration work through that lens. In the work I do on residential properties, community land, farms, campuses, and in urban areas, I look to heal the land AND to reconnect people to the land and their homes. We cannot expect people to reconnect to the land if they see nature as dangerous and filled with aliens. Ultimately, we need people to fall in love with the land and become stewards of it.

Restoration is in its infancy.... Humility and keen observation are required.

Do no more harm

A primary directive akin to the medical directive of “Do no harm” might be “Do no more harm.” The work of restoring ecosystems should not cause more harm...in process or result. Restoration is in its infancy, as is our understanding of ecosystems and how ecosystems heal from alterations and disturbance. Humility and keen observation are required.

An example of the importance of “Do no more harm” is the attempt to restore salmon populations in the Pacific Northwest



The author in an oak forest restoration he planted 20 years ago. Photo by Kemper Carlsen.

in the 60s and 70s. As biologists tracked the decline of salmon across the region, they surmised that the cause was the ubiquitous debris jams: brush and logs blocking river flows (and, they thought, blocking salmon movement upriver). The solution, the experts decided, was removal of the in-stream materials. Without the logs and debris slowing down water in the rivers, there was torrential flow, massive bank loss, scouring down to bedrock, and loss of more salmon cover and spawning habitat. “It was a good lesson in humility,” said Aldaron Laird, an environmental planner in Arcata, CA, in a 1999 interview (“Wood pulled from rivers now being replaced,” *Chicago Tribune*, February 15, 1999). Biologists and restorationists at the time didn't fully realize the importance of these ‘messy’ elements in the river system in slowing flow, dropping important spawning sediments, creating deep pools, and creating cover for young fish. Since that time, millions of dollars have been spent to put logs and debris back into the rivers. Salmon are still threatened for many reasons, but this damage to the river habitat has been

part of the problem.

Two facets of current restoration cause more harm than the supposed benefits—one physical, the other social. Use of herbicides and pesticides to restore habitats and ecosystems merely continues to disturb ecosystems and gives us the false idea that by removal of a plant or animal in a location, we are changing the underlying ecosystem dynamic. It plays into the hands of chemical companies like Monsanto, a backer of the invasive species paradigm. Another problem in restoration is labeling newly arrived and naturalized species as invasive or alien, and insisting that these species are the problem. It's an easy cop-out (and projection—to shift the blame away) that belies the problem of habitat loss, loss of ecosystem function, and continuing human ecosystem destruction. It also leads to what Tao Orion, in her book *Beyond the War on Invasive Species*, calls “eradication-based restoration,” where the focus is on killing off the species deemed undesirable or bad. In this approach, landscape restoration can look a lot like horticulture or gardening, where endless planting and weeding are required.

Focus on function

A central question of every restoration is “What are we restoring to?” Some restoration projects focus on restoring the species composition. When restoration biologists look solely to the species composition, they are looking at superficial dynamics, not the underlying functional relationships, which are more critical. The provenance, or origin of a species, is not of central concern to restoring function.

The idea that only native species indicate health or healing of ecosystems (usually meaning species that were there in 1491—before Columbus) is ecologically indefensible. The world is changed, and we need the tools we have at hand. There is embedded knowledge in ecosystems, and we can learn from how they are responding and adapting to the changes we have wrought.

All these are critical to life on the planet and not solely for human benefit.

An example of this is the zebra mussel (*Dreissena polymorpha*), which arrived in North America in the late 80s in shipping ballast. The zebra mussel is a suspension feeder that filters indiscriminately; in the presence of available nutrients and suspended particles, its numbers expanded rapidly. A primary complaint against them is blocking industrial waste pipes directed into the lakes. Another more reasonable complaint (but without supporting data) was that zebra mussels outcompete other mussel species already present. These freshwater mussels had been on the decline for some time, primarily due to declining water quality.

The zebra mussels remove large amounts of suspended matter, and have the capacity to increase transparency and alter plankton abundance, thereby changing the ecosystem and the aquatic food web. Zoom ahead 20 years, and research is showing the zebra mussels have significantly cleaned the water in some areas of the Great Lakes, St. Lawrence River, and the Hudson River through water filtration, and concentration and settling of suspended solids. The results of the cleaner water: better light penetration, food chains recovering, and many fisheries rebounding. Within only two decades, this new species has become part of the food chain. A study along the St Lawrence found three duck species had a ten-fold increase in ‘duck feeding days’ and a decrease in zebra mussel biomass by 83% over a ten-year period. Over a short time, the zebra mussels have become embedded in ecosystem processes as a food source (an available niche) and an important water filtration source.

These critical supportive functions, sometimes called ecosys-



*The author with acorns collected for a restoration project.
Photo by Kemper Carlsen.*

tem services, are the ways that an ecosystem provides clean water, soil, air, food, shelter, support for wildlife, climate stabilization, pollinators support, and waste decomposition. All these are critical to life on the planet and not solely for human benefit. But in our monetized society, quantifying the multitude of ‘services’ provided by the ecosystem is a way to reach decision-makers and direct funding toward the important work of restoring these systems.

Restoring to native

Considering where species are from is often a central element of a restoration project. When teaching students about plants, a first question I am often asked is “Is it native?” What does this even mean? Are they wondering “was it here before Columbus?” or maybe “Is it a good species?” or “Does it belong?” Our idea of whether a species is native, and thus whether it can be part of restoring an ecosystem, is fraught with problems. I find the nostalgia for the past troubling, while the need to repair functioning ecosystems is so great. This longing for what once was is hampering restoration. Species move widely and rapidly over short periods of time, even without human assistance.

A range map is a snapshot in time and useful in understanding where species have been and how they have moved, but not something to overly fixate on. Disjunct ranges, where species have pockets of populations, indicate separation; over time, this separation could lead to speciation. Pollen residues record species dispersal back into northern ranges after the last ice age. Species combinations don’t move as units, and ecosystems are fleeting associations of species that change over time. Osage orange (*Maclura pomifera*) range maps show it confined to small parts of Texas and Oklahoma in separate pockets. This contracted and divided range was an artifact of losing its megafauna dispersers when they were wiped out only 15,000 years ago (probably by humans). Our subsequent dispersal of this species back across the continent saved the osage orange from certain extinction.

Provenance: place of origin

It might be more useful to refer to provenance and to understand where species came from in a geological sense versus where are they from in an immigration and valuation sense. Should we judge newly arrived species the way we have judged immigrants coming to the US from Ireland, Italy, or Syria? Ecologists use historical or paleogeological evidence to tell where a species originated. There’s no other way to tell whether a species is “native.”

Are ecosystems full and unable to accept new species? Studies of island ecologies show that these “containers” can regularly accept new species, while only occasionally losing species. Despite the vociferous claims, the linkage between the arrival of new species and extinction of natives is tenuous. Research has shown only anecdotal evidence of connection. The overwhelming cause of species loss (local extinction) or full extinction is habitat loss. That points the finger at us: humans and human-caused habitat loss.

Incorporating change—don’t stop the flow

Ecological restoration needs to work with ecological processes. In aikido, incoming energy is transformed and redirected, not blocked. Restoration must be earth aikido. Working against the ecosystem requires extra effort and extra energy, and

there is a temptation to begin fighting the species that arrive with chemical herbicides or pesticides and causing further disturbance and disruption.

Work with the system—alter the disturbance regime, nutrient flows, hydrology, and soils to reach a desired condition. This can mean changing vegetation, altering grades and topography, and changing the management regime.

What missing functions are desired? Here are some to consider:

- water infiltration
- floodwater storage/capacity
- density and diversity of vegetation
- wildlife habitat: food, nesting, cover, and water
- soil and slope stability—repair erosion, compaction, and contamination

Understand the context

A critical need in any restoration project is to deeply investigate the history of the land. Past disturbances may include fire or storm events, successional changes, species arrival, changes to hydrology, terrain, and air flows. Human changes are often intertwined with the ecological trajectory, particularly the disturbance history. What kind of changes have humans made, and how has the land been managed, altered, or disrupted?

In New England, where I live, human disturbance has been ongoing for centuries. Layers of land clearing, acid rain, fire suppression, forestry, grazing, farming, and more recently development and urbanization have left an utterly changed ecosystem. The restorationist must tease apart the past for each place and identify critical functions that have been disrupted, ongoing disturbances, and the opportunities to intervene and move the system into health. On a landscape scale, the activities that have left systems degraded can sometimes be used to reverse the damage. For instance, over-grazed land might be restored by grazing with intensive, mob grazing. Thinning, managing brush, and planting can reverse poor forest management such as high grading or clear-cutting.

Regeneration with people as part of place

People are part of the landscape. Restoration that seeks to exclude people misses the opportunity to engage communities and also create land stewards into the future. Humans can be a disruptive force on the land, of course. But we can also be a force for regeneration and healing, meeting human needs while also creating ecosystem health and vitality. Kat Anderson’s seminal book, *Tending the Wild*, documented California native Americans’ use of this approach.

Urban environments—altered and potential

Urbanized environments have special conditions to consider. These environments have long histories of change with altered hydrology, soils, and air. Nothing is like it was in the past, and the idea of bringing it back to some past condition is a nostalgic notion and unrealistic. A vacant lot in downtown or

east Philadelphia will not become the floodplain forest that it once was several hundred years ago before the Delaware River was channelized and urbanized. What is the best use of urban Philadelphia floodplain? What are the ecological functions it can serve where it is, now? How might it serve the residents of the neighborhoods and reduce their demands for food, water, or other goods from far away? Put the permaculture lens on, and a whole world of possibility opens up.

The first option—do nothing

The first step after understanding the place where you are working is to assess whether an intervention is really needed or what is the best option. Does the desired work really need to be done? Often we race in and take action when it's not appropriate or helpful to the system (like the salmon recovery example above). Or the repair is well underway, and we need to stay out of the way. Ecosystems have internal repair mechanisms that we barely understand. In our hurry-hurry culture, the idea that decades or longer might be needed for an ecosystem to repair doesn't fly.

Think of restoring ecosystems as mimicking the processes that the system already has in motion.

As an example, a nearby residence had a backyard slope give way and slide into the wetland below. The developer had pushed material onto the slope, and this loose material, in combination with groundwater coming out of the slope, destabilized and slid down the slope. The homeowners contacted my business, Regenerative Design Group, about implementing the stabilization plan they inherited when they bought the home. In the ten years since the slide occurred, much of the slope stabilized and revegetated with willow, locust trees, and herbaceous perennials. We looked at the proposed plan, a highly engineered restoration with thousands of yards of fill, that would be super expensive to implement and would cause more damage to the wetland below. In this plan, all the vegetative regrowth and rebuilding soils would be removed, fill added, and then plants plopped on top of imported soil. In this case, it would be five steps back to get a step forward.

Our plan is to leave the regrowth (use the willow for live stakes) and further stabilize the slope as it came to rest, with broadcast seeds and rooted plugs. Some grading at the top of the slope will create terraces and improve the homeowners' access, with maybe some berries and fruit trees to draw the family into the area. A series of light interventions with bioengineering ma-

terials such as fiber logs and erosion control matting, and some stone and swales, will carry on and push forward the site repair work already well underway.

It's not always the best option to wait or do nothing. Some places may warrant immediate action to stabilize, decompact, replant, or bring into a more functional condition. Restoration work is very site-specific.



Slope stabilization as part of a restoration project.

Restoration as ecosystem mimicry

Think of restoring ecosystems as mimicking the processes that the system already has in motion. Use the embedded knowledge and strategies already working or recently displaced.

Some examples of restoration mimicking ecosystem processes:

- *Slope stabilization*—Mimic a tree falling across a slope or debris building up from vegetative growth. Use branches or debris to block water and soil movement. Use logs, fascines, or wattle bundles across the slope to intercept water and create swales and micro-dams.
- *River stabilization*—Logs across rivers or a root ball or debris at the edge of a river holds the flow, catches more debris, gravel collects above, and a plunge pool forms below. Deep pools form under a root ball.
- *Meadow and grasslands*—Use of deep-rooting perenni-

als mimic prairie and grassland species that root into subsoil layers and deepen soil. Use of grazing animals at high density for short periods mimics the herds moving across grasslands doing pulsed grazing and soil disturbance.

...interventions should be multifunctional, creating livelihood, nurturing other species, and growing food, fiber, or fodder.

There are many strategies specific to each area of ecosystem restoration. All of these use the same fundamental design process of permaculture: goals articulation; site analysis and assessment; concept, schematic, then detail design. Ecosystem mimicry, regenerative practices, people/community involvement, and observation are fundamental. Some strategies for healing ecosystems and ecosystem function:

- *Stop erosion*—intercept water, disperse the flow, move it across slope, and infiltrate it. The methods common in permaculture circles are swales and terraces. A variety of bioengineering techniques such as erosion-control matting, geotextiles, live stakes, and seeding are available to intercept rainfall, slow water coming off slopes, and speed revegetation. Broad-scale strategies for erosion control include contour strips, windbreaks, and perennial and cover crops.
- *Build soil*—add organic matter and/or compost, inoculate with microorganisms, and use other strategies to support the soil food web, with grazing management (if done well), stacking brush and debris, and cover crops. In particular, managing vegetation with coppice, scything, and use of deep rooting plants and so-called dynamic accumulators.
- *Remediate soil (reduce contamination)*—Remediation with plants, mycorrhizal fungi, bacteria, and other microorganisms can either break apart compounds like hydrocarbons or bind compounds (chelation). Bind lead and metals with organic matter. Remove contaminated soil in small areas, and remediate nearby if more time is needed and space is available. Build soil above contaminated layers. Testing to determine exact location and depths of contamination is essential.
- *Filter water with plants*—Ironically, many aggressive aquatic plants are specialists at nutrient removal, and some are indicators of high nitrogen—just what we need in waterways surrounded by leaking septic systems and lawn fertilizers. Plant filter buffers around nutrient sources and around rivers and wetlands. In shallow water along edges, plant and encourage aquatic plants. John Todd's 'Restorer' technology is accessible for small scale projects: floating islands that pump

water through the plants and back into the water cleaner than before.

- *Support 'novel' ecosystems*—New combinations of species are coming together in response to ecosystems changes. Long-standing species are behaving differently with new conditions. These unique species assemblages are being called "novel ecosystems." Explore them. Celebrate the new connections. Look for ways to support the work these new ecologies are doing. This 'Brave New Ecology' as Peter Del Tredici calls it, is likely to become the norm.

Restoration: the upward spiral

Simple interventions done at the right place and at the right time, can move ecosystems into balance or at least back toward resilience. These interventions should be multifunctional, creating livelihood, nurturing other species, and growing food, fiber, or fodder.

Paul Krafel in his quirky movie, *The Upward Spiral*, about systems and flows, observes moving high in the system to make very small changes (finding the leverage point) to produce large results. How we alter those flows can be regenerative or degenerative. The second law of thermodynamics establishes that energy flows down—entropy will increase. However, life builds life. Life is regenerative, supporting more life, creating stability, diversity, and thus the upward spiral. As Krafel says, "The work builds on itself." △

Jono Neiger has 25 years experience in conservation, restoration, land stewardship, permaculture, and landscape design and planning. Jono was the Land Steward at Lost Valley Educational Center in Oregon, Restoration Ecologist with the Nature Conservancy of California, and Lost Creek Watershed Council Founder and Coordinator. He is on the faculty of the Conway School of Landscape Design, and is a founding board president of the Permaculture Institute of the Northeast, and a founding partner of the Regenerative Design Group in Greenfield, Massachusetts.

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Tree-crop Survivors Defy Development Standing Tall Amongst the Sprawl

Ben Richmond

J. RUSSELL SMITH'S CLASSIC TEXT, *Tree Crops: A Permanent Agriculture* (1), needs no introduction among permaculturists. Eighty-six years after its original publication, it remains a truly uncommon book, one that combines a global vision for a sustainable future with realistic, regionally specific solutions for achieving that vision. Despite the gravity of the subject matter (encompassed in the saying "after man, the desert"), Smith writes with a kind of waggishly anti-establishment good humor that immediately sets his book apart from so many other urgent calls for sustainability where a tone of overzealous didacticism can result, for me at least, in a sluggish, difficult read. In a nutshell (pun emphatically intended), Smith's work lit a fire under me when I first read it, which shows no sign of abating any time soon.

And so, on a clear Pennsylvania autumn day last year, I left my home outside Philadelphia and headed due west on historic Lancaster Avenue toward the borough of Downingtown, a little over 30 miles away, on a quest to locate the former site of John W. Hershey's nursery and tree-crop farm.



A pair of burr oaks (Quercus macrocarpa), originally planted by John W. Hershey, frame the historic Quaker meeting house in Downingtown. Hershey's connection with the Downingtown Society of Friends is detailed at downingtowntownfriendsmeeting.org/buroak.htm.

Hershey, who served briefly as the chief of the Tennessee Valley Authority's tree-crops section during the Depression (apparently due to Smith's recommendation), is repeatedly mentioned in *Tree Crops* as one of many private experimenters whose breeding and selection work with fruit and nut trees is a vital element in Smith's overall vision. In typically irreverent fashion, Smith describes Hershey as someone "who has not had the disadvantage of an agricultural college course, or the disadvantage of being a botanist, or a forester, or an experiment-station staff member, so that without these limitations he has been able to use his mind in a practical way." In addition to detailing the results of some of Hershey's breeding work with such trees as honeylocust, hickories, and edible acorns, the book even includes a map of Hershey's nursery in Downingtown, complete with a key of what is planted where.

It isn't always necessary to start from scratch.

Smith explains: "Hershey's tree-crops section in the TVA offered prizes for the best acorns, the best honeylocust pods, the best persimmons, the best blueberries, and other wild fruits." At least three high-sugar honeylocust introductions attributed to Hershey (Hershey, Calhoun, and Millwood) are still available and highly sought after. At one time, some of the most exceptional temperate climate food-producing trees were grown at Hershey's nursery in Downingtown. Much of the nursery consisted of rare, superior selections of vastly under-utilized native species. Might there be survivors worthy of propagation? I had to find out.

It's easy to speculate that Hershey had visibility in mind when he established his business along what was then a section of the Lincoln Highway, the first transcontinental, automobile-navigable road in the US, stretching from New York City to San Francisco (in fact, well before it was The Lincoln Highway, it was the first stage of The Great Wagon Road which carried countless recent immigrants from the Port of Philadelphia westward in the mid-18th century). It would have seemed an ideal location from which to disseminate his improved, superior varieties of fruit and nut trees across North America.

These days, however, the road heading into Downingtown is more commonly (and much less poetically) known as US Highway 30 Business and is typical of the periphery of thousands

of towns across the US and Canada. As I drove, printed nursery map in hand, past the big-box stores, car dealerships, and airfield-sized parking lots lining the highway, my hope of finding survivors from Hershey's nursery began to dwindle.

Fortunately (as you may have realized from the title of this article), that wasn't the whole story. As I sat at a stoplight just beyond the realm of big-box stores and before entering the town proper, I found reason to get excited. A modestly sized overgrown lot, the first undeveloped land I'd come across along this part of the highway, was dominated by black walnuts. This was not in itself unusual in this region. What was curious, however, was that among the many smaller, randomly distributed seedling walnuts were distinct, big trees loaded with nuts, big trees that appeared to be evenly spaced and planted in rows. Bingo!

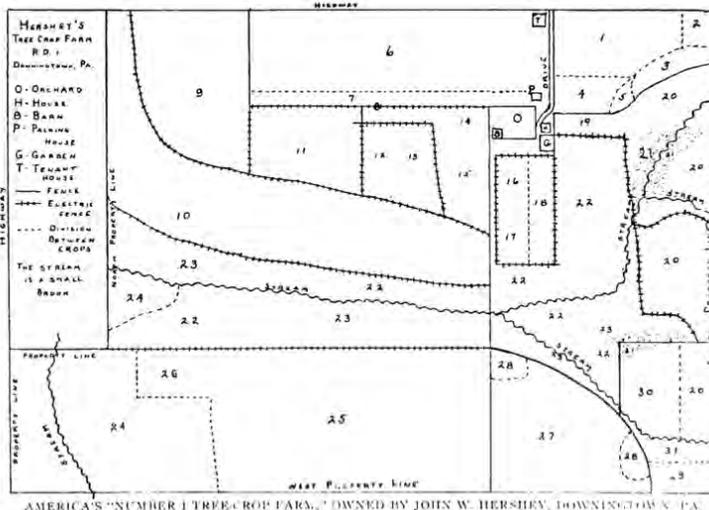
The undeveloped lot was bounded by the highway, a high school, and a Society of Friends (Quaker) Meeting House. At the next stoplight, I pulled into the meeting house, a stone relic from another age that has held its ground in the face of rapid development and, like the walnuts, is a relatively common sight in southeastern Pennsylvania. Yet this meeting house stood in the shade of two large burr oaks with some of the largest acorns I had ever seen—as good as a banner reading “Welcome To Hershey's Nursery!”

Further exploration of the area turned up enough food-producing trees to make a permaculturist (or a squirrel, for that matter) giddy. In the margins of parking lots and the slivers of land where trees had been left between the nursing home, health care center, apartment complex, and housing development across the street were large grafted honeylocusts, American persimmons with ample, delicious, fruit, Northern pecans, hiccans, shagbark hickories, several kinds of walnut, a large hybrid chestnut, and more. While some of these trees were obviously later volunteers, many were planted in rows and of the right size to be from the original nursery.

Yet any excitement I had of finding these rare, valuable trees, was tinged with the knowledge that the vast majority of them had been carelessly felled and that this repository of trees with enormous value to society, trees that had been carefully selected from across the continent and propagated as a labor of love, had been destroyed in the name of development by people who didn't know or didn't care.

Smith concludes *Tree Crops* on this note: “Wherever possible, I urge private experimenters to make some provision, while still alive, for the preservation of your trees for as long as possible after your passing.” He mentions several extensive collections which, after the death of the owner, “were scattered, neglected, and mostly lost—and their lands were owned by persons to whom a tree was just a tree.”

1. Nursery
2. Acre of test fiberts
3. Swampy, drained, in blueberries
4. One acre each of Asparagus and Raspberries
5. Holly
6. 5 acre farm field
7. Nursery
8. Wild life fence row many species
9. 5 acres nuts mostly English, some thin shelled black, 60 x 8 for 11, chestnuts set at 40 ft. on row. Hay
10. 4 acre farm field
11. Bull pasture. Will be planted when 12, 13 trees large enough to pasture
12. Assorted, peaches, cherries, pears
13. Jujubes 3 varieties, 82 trees
14. Sugar maples for syrup
15. Chinquapin and late oak for hog feed
16. Mulberry for hog and chicken feed
17. Wild plum for hogs, wildlife, ornamental
18. Persimmons
19. Select grafted oak of 5 varieties—set in a vista for effect from home (11)
20. Honey Locust, pasture
21. Swamp
22. Meadow
23. Brush land to be cleared
24. Woods
25. 5 acres chestnuts 40 x 40 ft. Four rows of fiberts as fillers. Here chestnuts are 50 ft. between rows. Fanned between trees.
26. 24 oak on ground too low for chestnuts
27. 7 acres planted some as (9) planted to orchard grass, below for
28. Sharp rocky knoll
29. Honey Locust, sowed to orchard grass, mixture of holly, hickory, hickory, hickory
30. 13 rows, one row each of hickory, pecan and hickory varieties. Will be fanned all trees large enough to pasture
31. Sprout land of nearly solid stone



Map of John W. Hershey's tree-crop nursery in Downingtown, PA, from *Tree Crops: A Permanent Agriculture*.

The story of Hershey's nursery is not an anomaly. How many other remnants of the collections of forward-thinking, conscientious tree-crop growers sit waiting to be rediscovered and propagated? This is hardly pie in the sky musing. Consider, for example, Neal Peterson, the notable pawpaw breeder, who began his work breeding superior pawpaws by doing exactly what I'm advocating here: locating historic collections that had been long forgotten (2). Smith mentions quite a few other private experimenters and the towns where they resided. Perhaps someone in your neighborhood, maybe even the person who owned your home a hundred years ago, was, like Hershey and Smith, a member of The Northern Nut Growers Association (a still extant organization founded in 1910 with many members in the US and Canada). There's always a chance that those nut or fruit trees in your backyard, outside your apartment, or in the ditch next to that shopping center, aren't wild seedlings and weren't planted as ornamentals—maybe, just maybe, they were painstakingly selected for good eating by some thoughtful predecessor.

It isn't always necessary to start from scratch. Generations before us have done a great deal of the legwork in developing a sustainable, perennial food production system already (more often than not anonymously, after their day job, and as a labor of love). Let's not let their work go to waste! Δ

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Notes

1. Smith, J. Russell. *Tree Crops: A Permanent Agriculture*. New York: The Devin-Adair Company, 1953.
2. Peterson, Neal. “A story about a man and his pawpaws.” www.petersonpawpaws.com/About.php (accessed December 1, 2015).

Restoring Communities and the Landscape

Agroforestry in Ecuador

Nick Slobodian

I REMEMBER VIVIDLY when I arrived for the first time in the community of Camarones on the coast of Ecuador. I was taken back by the diverse landscape. Lush patches of tropical forest converged with coastal plains brushing up against the Pacific Ocean's crystal blue waters as far as the eye could see. I was arriving to begin my work with the Third Millennium Alliance (TMA), an international conservation organization, based in a rural agricultural community at the foot of a small stand of existing tropical forest. This region is located within the world's most endangered biodiversity hotspot, the Tumbes-Choco-Magdalena Hotspot. The Tumbes-Choco-Magdalena Hotspot reaches from southern Panama through Colombia to the coast of Ecuador and Peru. The Third Millennium Alliance (TMA) has been managing a conservation effort in the region for a little under a decade. The organization has striven to protect the last remaining forests by purchasing large tracts of land and putting them under conservation within the Jama Coaque Ecological Reserve. TMA has extended its efforts in forest conservation by purchasing tracts of degraded pasture land and establishing reforestation practices. As time has passed we have experienced the difficulties that are inherent in restoring degraded ecosystems. Equally, we often wonder what will happen to the remaining forest if the reserve would ever disappear. Through my work with TMA, I reflect upon past experiences, in permaculture and ecological restoration, to envision how we might improve upon the classical paradigm of conservation to make an everlasting impact.

...it is essential to design ecological restoration with the intent of managing the effects of climate change.

Ecological restoration plays an integral role in permaculture design, and is an ongoing necessity in global land management. Over the years, I have seen numerous large- and small-scale restoration projects implemented—some with notable success, but the majority with marginal returns. By observing these results, we can look to permacultural principles to design a way to create more success on the landscape. Agroforestry, in its



Restoration in process using plantain and coffee.

broadest definition, is a dynamic landscape restoration tool that has shown to be effective at solving many of these challenges. Agroforestry practices are not new, but creative assemblages of agroforestry systems have shown their dynamic ability to restore broad-scale landscapes. Agroforestry practices create agriculturally productive systems while mimicking the biological structures of forest ecologies. These practices provide an approach to ecological restoration with economic incentives that display lasting results. By identifying how the design principles apply to the implementation of agroforestry as a restoration technique, we can design holistic systems that restore ecosystems and the communities that steward them.

Identifying the mechanisms of ecological restoration is a crucial first step in evaluating the effectiveness of our design. Agroforestry systems create stability in degraded landscapes in a number of ways, most of which are deemed essential for ecosystems to repair themselves. Enhancing ecosystem services plays an integral part in ecological restoration. These services include the creation of wildlife habitat and food sources, mitigating soil erosion, and maintaining moisture within the landscape. By establishing tree-based land management systems our work has been able to achieve all of these results in a short period of time. Similarly, agroforestry has the ability to mitigate other areas of importance to ecological restoration and climate change. Maintaining soil ecology and fertility is a major component in regenerating degraded landscapes. Agroforestry systems manage soil resources through canopy cover and leaf drop, especially through the integration of nitrogen-fixing trees, to allow for nutrient cycling to occur, building soils, and regulating mois-

ture and temperature for soil micro-life. Many nitrogen-fixing trees that excel in our region also produce food. These include tamarind (*Tamarindus indica*), carob (*Ceratonia siliqua*), pigeon pea (*Cajanus cajan*), and ice cream bean (*Inga edulis*). With soil resources becoming more scarce and fertilizer use increasing at an astonishing rate, integrating nitrogen-fixing trees into agroforestry provides a durable alternative. Lastly, it is essential to design ecological restoration with the intent of managing the effects of climate change. Regulating surface temperatures and maintaining microclimates through the absorption and reflection of radiation with trees will be a vital part of stabilizing our atmosphere.

In the community of Camarones and the surrounding region where I work, land management is predominantly based on slash-and-burn agriculture and grazing cattle, thus slowly turning the landscape from a tropical forest to a mosaic of degraded grasslands. From my experience, the damaging effects of agriculture, forestry, and industry are similar between tropical and temperate zones. Likewise, the hurdles that affect the success of ecological restoration projects share a similar reality. Through-

...we are maintaining our heritage of agri-CULTURE, or the culture around creating and harvesting food, while also restoring these landscapes.

out various projects, I have observed some of the most important missing links in ecological restoration and why there is so much resistance to the restoration approaches that we design. To understand this, we must remind ourselves what permaculture stands for: “permanent agriculture” and most importantly “permanent culture.” No matter on what side of the world you reside, the concepts of permaculture are directly related to our ability to effectively restore ecosystems. Agroforestry applies the ideas of both permanent agriculture and culture for a regenerative approach to ecological restoration.

The foundation of agroforestry is the establishment of agriculturally productive systems based on perennial plants, which is the essence of permaculture itself. By integrating productive systems within intact forested landscapes, we provide ourselves incentives to manage these ecosystems effectively and in a healthy manner. There are many successful agroforestry projects around the world that have been able to provide real life examples of how we can restore our ecosystems through permanent agriculture. In contrast, “permanent culture” is the conundrum that we continue to struggle with, and I might argue is our biggest hurdle in ecological restoration. Designing ecological resto-

ration without considering community incentives to develop and maintain these projects limits our ability to make a broad-scale, lasting impact. Agroforestry produces many ecosystem services, but equally important are the community and economic incentives that develop a culture of stewardship.

At the Jama Coaque Ecological Reserve, we are on the frontline of the stereotypical reality of rainforest conservation versus environmental degradation. Our communities consist of subsistence farmers that implement extractive agricultural practices and illegal logging to sustain a meager existence. These approaches to land management are a direct contradiction to the work that my organization conducts in the region. This reality seems to be a major contributor to the disappearance of tropical rain forests across the globe, but I remind myself that the problem is the solution. I have come to the realization that no matter how many trees we plant, and no matter how much land we purchase to put into conservation, none of our work will last if the inhabitants around us cannot develop community incentives for ecological restoration. Agroforestry practices provide communities a reason to steward their land. Agroforestry creates a system of economic incentives that produce high quality restoration work and a culture around sustainable land stewardship.

By producing an agricultural crop within a forested landscape, whether it is shade-grown coffee in a tropical rainforest or ginseng and goldenseal underneath a temperate forest in North America, agroforestry systems allow people to make a livelihood through ecological restoration. Some of our most degraded landscapes are agricultural, and by transitioning these sites to agroforestry production systems, we are maintaining our heritage of agri-CULTURE, or the culture around creating and harvesting food, while also restoring these landscapes. Agri-CULTURE encourages communities to invest in dynamic food production systems, to participate in the management and learning of landscape restoration, while enjoying the culture of food production and the economic sustenance that comes from these practices.

The permaculture principles of establishing interfunctional relationships and relative location, which are inherent in agroforestry practices, provide a recipe for success within



A view of restored and preserved forest from the Jama Coaque Reserve.

restoration work. Ecological restoration is a challenging practice because weeds, drought, disease, pests, and most importantly maintenance, can all affect the success of restoration projects. By establishing economic incentives to care for a specific crop and maintain the landscape around it, by default the surrounding landscape is receiving as much care as the agricultural crop. As time goes on, agroforestry systems reach a point of self-regulation, perpetuating the crop and the environment around it, with minimal inputs. Over the past few years, TMA has spent excessive resources battling the invasive grasses that proliferate in the pastures that we are reforesting. These grasses choke out trees and need to be cut multiple times a year, making our restoration efforts increasingly expensive every year. Our efforts are not an exception to the realities of restoration—we have experienced that reforesting pastures with native hardwood trees is an uphill battle. Many native hardwood species are adapted to the moist shady understory of the forest, and the sunny pastures do not provide the conditions they prefer. They need this microclimate to grow in the first few years. By manipulating and using succession, I feel that we have developed a technique that shows exceptional results. By integrating agricultural crops such as yucca and corn that grow in dense blocks within our reforestation areas, we are having success at keeping invasive grasses from swallowing our work. Similarly, by integrating tall plants that grow quickly, such as banana and plantain, within our reforestation zones we are able to create the shady microclimate that our native hardwoods need. The shade that these crops cast also assists in mitigating the invasive grasses. We are currently implementing these techniques on a 100-acre (40 ha) parcel of land that has been recently clear-cut by the previous owner. We are utilizing these techniques to assist in the natural regeneration of the forest by establishing agricultural crop successions.

The Jama Coaque Ecological Reserve, spanning over 1,000 acres (400 ha), lies at the headwaters of the Camarones River Watershed in the coastal mountain range above the community of Camarones. The landscape is a stark gradient, moving from the rich biodiverse forests of the reserve to the sparse, dry



Shade-grown coffee under existing forest in the Jama Coaque Reserve.

forested foothills, arriving at the degraded and deforested landscapes surrounding the community. We see that this landscape provides us an opportunity to extend our reforestation efforts into the privately owned farms that follow the extent of the watershed. We are currently implementing a Community Agroforestry Program within Camarones to share our experiences and support community members in transitioning their landscape. Our vision is to assist current producers and to create new ones. We are striving to develop producers that are passionate about agroforestry and the restoration ethic that it propagates.

Ecological restoration work should not be left to large tracts of land never to be touched again, nor should it be left to ecologists.

Agroforestry systems, such as the ones we are implementing within our nature reserve and the nearby community, are developing into a mosaic of multi-use landscapes. Throughout our work, my organization has been able to effectively restore degraded cow pastures to diverse production systems, which increase tree cover, provide food for our programs, and create a diversified income that supports our conservation and restoration efforts. Establishing tree-based agriculture is essential in our communities, as many producers deal with the challenges of degraded tropical soils and drought. These practices allow producers to create microclimates, increase soil fertility, and conserve water. Our program provides a multi-faceted approach to incentivize agroforestry. We are working with producers who own large properties to design and implement agroforestry within their pastures and forested land to provide them an economic return. Shade-grown coffee, cacao, banana, plantain, papaya, and other products help transition their growing practices to a more perennial infrastructure that requires lower inputs and a higher return. These approaches provide an incentive to producers to maintain forested cover, as the highest quality coffee and cacao are grown in shady forested zones. We also provide incentives for community members to install small coffee plantations around their rural homes and plant native and food-producing trees as an over-story to provide shade for their coffee. These home production systems will contribute to food security and provide supplemental income as the community continues to develop an agricultural cooperative. The coffee “gardens” will dramatically change the landscape around the village, which is currently dry and degraded due to grazing and deforestation. These gardens will provide an income source for many of the single mothers and unemployed community members who

spend much of their time around their homes. Demonstrating to the community that they can restore previously degraded areas to productive systems and gain an economic return is integral to success. Projects like these are gaining traction amongst the community, to cultivate and restore the land around their homes, and we are sure that this sentiment will resonate through the region.

Similarly, we are implementing silvopastoral systems, or planting native trees for wood production within pastures, providing producers the opportunity to maintain these spaces as grazing pastures for cows, but in return provide tree cover and wildlife habitat while they grow. Integrating nitrogen-fixing tree species, such as *Leucaena*, can provide multiple functions in these systems. *Leucaena* provides valuable timber, nitrogen fixation, and livestock fodder for cows in times of drought. These practices will ultimately provide a harvest of timber to the producer to use domestically or for sale, lessening the pressure from illegal logging in the surrounding forest. As we continue this work, we are seeing that providing an accessible land management approach with incentives for the community is paramount to create a new culture around ecological restoration and to broaden the organization's goals of reforestation.

Temperate climates have the capacity to adopt agroforestry practices just as much as the tropics. Temperate zones are home to numerous fruit and nut trees. Nitrogen-fixing trees like honey locust (*Gleditsia triacanthos*) and black locust (*Robinia pseudo-acacia*) produce quality wood and can be used to feed livestock. These are fantastic options in temperate applications. By creating incentives for large-scale agricultural producers to establish more diversified tree-based farming systems, we will be able to make an impact on a large scale. The community and city levels also present numerous opportunities to rebuild the urban forest with green belts, community orchards, and backyard food forests to provide the much needed renewal within the urban setting. These applications will not only localize sources of food, but also potentially offer alternatives for local economies. These approaches within the temperate zones allow us to rebuild corridors for wildlife and develop intact forested zones in a very fragmented and degraded landscape. Examples of successful temperate agroforestry are arising every day through the work of the Association for Temperate Agroforestry and producers such as Mark Shepard of New Forest Farm, Don Tipping of Seven Seeds Farm, and many other forest farmers who are leading the way in developing a new agri-CULTURE within the temperate zones.

Agroforestry practices provide us an opportunity to restore our ecosystems at every level. Ecological restoration work should not be left to large tracts of land never to be touched again, nor should it be left to ecologists. Ecological restoration should be made accessible to all. Restoration work should permeate into every crevice of our built environment, both urban and rural. Agroforestry as a tool for ecological restoration creates cascading effects that are difficult to see at first glance. Providing habitat, sequestering carbon, regulating climate change, and creating more fresh air and water are the perks of designing beautiful and productive tree-based systems.

Ultimately, agroforestry practices allow us to produce a



Jama Coaque Park Ranger, Ediberto Marquez, holds native tree seedlings during a community restoration day.

yield. This is an essential concept in creating a culture around ecological restoration. Many restoration projects spend unbelievable amounts of resources, with the sole return being intrinsic ecosystem services. Restoration projects, like other endeavors, need to provide a return for the effort invested. Agroforestry provides us an alternative perspective to the traditional restoration paradigm. Agroforestry practices develop stable and resilient landscapes, while providing us the food, fuel, and fiber that we need. In return, these practices limit our need to extract virgin resources and degrade more landscapes in the process. In the past, human civilization managed the resources of the forest for their subsistence, and in return were able to maintain healthy fruitful landscapes for generations. It is as if agroforestry allows us to “re-wild” the landscape while also “re-wilding” the way that we provide for our sustenance. For much of history, we have depended on forests for survival. Forests have served as our hardware stores, pharmacies, and grocery stores since the dawn of civilization. Forests have provided us the firewood and biofuels necessary to maintain the advancement of our society. By establishing agroforestry production systems, we are building into the landscape the mechanisms that will allow us to restore our ecosystems for generations to come. Now we must use the patterns of the past to advance our society into a future of ecological restoration. △

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Ecology and Economy

The End of Restoration

Tao Orion

“RESTORATION”—the term conjures sentiments of healing, repair, giving back, and doing better. The Society for Ecological Restoration defines restoration as “the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.” Important work to be sure—degraded, damaged, and destroyed ecosystems abound throughout the world today. Restoration in practice often idealizes a return to a previous state, and all too often focuses on the removal of invasive species as a priority, based on the assumption that these organisms are causing observed ecological degradation or damage. However, the underlying processes facilitating and enhancing the success of invasive species are much more critical, but perhaps more difficult, to acknowledge because they are intertwined with the ways that we shape ecosystems through our political, economic, and ecological design decisions.

In North America (and elsewhere), displacement of indigenous land management practices in concert with modern forestry, ranching, agriculture, urban development, water impoundment, and mining practices changed ecosystems in uncountable, intersecting, and cascading ways. That these land management strategies mostly continue unabated should give us pause when considering the value of typical ecological restoration in practice today, as restoration often takes place outside of the context of

We need to phase out production models that degrade ecosystems....

production systems. Patchwork mosaics of ‘restored’ prairie, woodland, and riparian corridors pepper a landscape largely dedicated to singular crops and limited (and artificially inflated) economic outcomes. These production systems convert what was once biologically diverse habitat into monocultures, which also yield significant downstream effects considered ‘externalities’ inconsequential to the goal of profiting from the end product.

Relying upon and continuing the expansion of such production systems means that more and more ecosystems are degraded, damaged, and destroyed, and eventually will require restoration. Because of these unfortunate trends, restoration in the sense of ecological repair work will be necessary for years and even centuries to come, as we seek creative solutions to mitigating the effects of these land-use practices—recharging



Adding small-diameter trees and brush to check dams to rebuild stream channel structure. Photo by Abel Kloster.

depleted aquifers, stabilizing persistent organic pollutants, isolating nuclear material, and responding to the multiple intersecting pressures presented by a rapidly changing climate. This work is critical, but just as pressing is the need to design systems that meet our livelihood needs and that won’t eventually lead to a need for restoration. We need to phase out production models that degrade ecosystems and phase in ecologically responsible and regenerative models of meeting our needs.

To start thinking in terms of obtaining yields while maximizing biological diversity and enhancing ecosystem functionality requires a fundamental transformation in how we relate to the world. There are many interesting and important directions these shifts can (and hopefully will) take us, but in order to get started with the redesign and rethinking of the production systems that meet our daily needs, we must also work to transform the economic underpinnings that drive ecological degradation. Ecology and economics share the same root word (from the Greek word *oikos*, meaning ‘home’), so it makes sense that the production systems that devastate ecosystems around the world have similar effects on economies. Restoration of ecosystems goes hand in hand with restoration of economic systems, and identifying ways to address both simultaneously is necessary for a regenerative future.

The southern Willamette Valley region where I live is considered an economically depressed area. Although it was home to a thriving indigenous economy for thousands of years prior to colonization, the arrival of resource extraction-based capitalism upended the ecological, political, and economic foundations of the region. First, the trapping and sale of furs from beavers, mar-

tens, wolves, bear, cougar, and otters changed the terrestrial food web. Then, gold was discovered in the hills east of town, and the blasting and dredging of sediment changed the stream banks, releasing ore-bound mercury into the water where it cycles through the aquatic food web to this day. The timber economy took hold soon after, and today many people in the area live off of its dregs. There were once nine sawmills in town; now there is one, owned by the transnational corporation Weyerhaeuser, which also owns tens of thousands of acres in the watershed.

Business as usual in Oregon's Coast Range industrial forestland looks like monoculture Douglas fir plantations clear-cut on 40-year intervals, sprayed with herbicide and occasionally fungicide, then replanted and sprayed again. Proponents of Oregon's forestry practices say that there are more trees now in Oregon than ever, which is probably true—there are more trees but much less forest. Douglas fir planted on 6' (2 m) centers with all 'competing' understory vegetation sprayed with herbicide for years on end does not make a forest. I liken many of these patches to cornfields harvested on 40-year rotations. The loss of biological diversity is tangible in these hills, as is the lack of water-holding capacity. Streams that were year-round in living memory are now dry six months of the year. Spotted owls were once numerous in the area, their nests perched in craggy branches of large fir and hemlock trees; now there is one known nest in a 30 sq. mi. (75 sq. km) area, and owls haven't been spotted in it for several years. Pileated woodpeckers, Pacific giant salamanders, grouse, cougar, lamprey, and steelhead are rarities, becoming the stuff of legend within the course of a generation.

...even though there are few jobs, there is plenty of work.

The timber industry is considered one of the prime economic drivers in the area, yet in all my years walking along the graveled roads that wind through clear-cuts and crisscross the steep slopes around my home, I can count on one hand the number of times I have seen a person working in the forest. I once saw a person operating a feller-buncher machine, and have occasionally seen crews of workers in white vans with barrels of Round-up strapped to the roof, on their way to spray herbicide on the invasive Scotch broom and Himalayan blackberry from recent clear-cuts.

Resource extraction built the town, and although there were once abundant jobs, now they are scarce, and ten percent of the town's population lives below the federal poverty line. However, even though there are few jobs, there is plenty of work, and it is in this transition that economic restoration can partner with ecological restoration. The acreage that currently supports minimal intermittent paid work is calling out for people to engage with it and diversify its ecological and economic outcomes.

Monoculture Douglas fir plantations could be thinned, and valuable shade-grown medicinal plants cultivated beneath trees that grow to one hundred, two hundred, or three hundred years old, with spotted owls in their branches. Or they could be interplanted with coppice-able hardwoods for furniture making and timber framing, which could supply a number of entrepreneurs and local small businesses. They could be carefully burned to favor the oak and camas that once grew there, and supply a regional native food economy and robust populations of grouse, deer, bear, bobcat, and cougar. Small diameter trees could be harvested and used to build gabions in dry creek beds, harvesting sediment and holding water so that seasonal creeks would run year-round once again, harkening the return of cutthroat trout, steelhead, and lamprey. Food forests and micro-farms could dot the hillsides, with people harvesting and making compost from Himalayan blackberry and Scotch broom to feed their fruiting trees and shrubs.

The types of structural changes needed to make such visions possible aren't too far out of reach. Forestland owners in the area are coming to realize that their model based on infinite resource extraction may be coming to an end as plantations in their third and fourth rotation begin to fail. Aerial fertilization with synthetic nitrogen is becoming commonplace in forestry practice to enable continued tree growth in collapsing soils, but at the same time conversations are underway in my community between permaculture-minded folks and timberland owners about the benefits of diversifying yields and ecological outcomes. In our work at Aprovecho, my husband Abel and I have negotiated stewardship rights to adjacent Bureau of Land Management (BLM) land in order to begin working our way up the watershed with forest thinning, gabion-building, and oak savannah rejuvenation. We hope that these activities, because of their potential economic outcomes including small diameter timber and firewood, as well as medicinal, fiber, and food plant materials and seeds, will lay the groundwork for managing local forest resources in cooperative and regenerative ways.

Considering how the work of ecological restoration can integrate with small cottage industries and in turn stimulate local economies is an important piece of moving toward designing land management systems that support human life while enhancing biodiversity and ecological functionality. As we enter into an uncertain climatic future and embrace the possibility that the production systems we have come to rely on may rapidly become untenable, we must investigate and implement such locally-adapted and regenerative land stewardship models in order to meet our livelihood needs. In practice, rather than focusing on 'restoring' what previously existed, the defining characteristic of restoration as ecosystem enhancement should be built into our understanding and practice of natural resource stewardship, so that one-day restoration—and the damaged ecosystems it requires by definition—will be a thing of the past. △

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Re-membering the Future

Woodland Permaculture

Don Tipping

THE WAY FORWARD IS NOT BACKWARDS. As we contemplate how to navigate our way out of the quicksand of ecological degradation and cultural genocide, a sensible response is to head in the direction of restoration: let's go back to what was working in the past. However, when we consider the myriad dynamics at play in an ecosystem, which are all responding to one another, constantly creating new scenarios that may have never occurred before, going back to some perceived concept of a steady-state ecosystem becomes problematic. Considering climate change, cultural change, population dynamics, and more, even if we could be successful in restoring an ecosystem to some point in the past, what would we aim for? What species would be present or absent? Would the yields be utilized efficiently and recycled through the system? Contemplating these questions is dizzying, to put it mildly, like aiming for a moving target while flying in an open cockpit, backwards, with one eye, in the dark, left-handed—you get the idea.

Moreover, after 20 years tending overgrown woodlands with fire-restoration ecoforestry and developing multi-species polycultures broadacre for a living (aka diverse small-scale organic farming), I've come to the conclusion that we are guessing at best. At the risk of coming across as cynical, I think that

I come to conclusions that complicate the Eden-like self-maintaining food forests of popular permaculture lore.

the popular conception of restoration is a myth, like being able to clean up a messy room in a house full of toddlers, or herding cats. There are so many elements at play that each represents a new event horizon. Making the assumption that returning a landscape or an ecology back to some former state ignores the nature of evolution in systems. Nonetheless, I do believe that it is a crucial aspect of reading the landscape to study the historical aspects of a site from as many vantage points as possible, learning the botany, geology, ecological succession, indigenous land use, etc., to establish a foundation upon which we begin



This coppice craft gate at Seven Seeds Farm was made from materials on site.

to build to increase biodiversity, productivity, and resiliency as land stewards.

Perhaps we should take a step back, pause for breath, and remember the words of Taoist sage, Lao T'zu, "If you are depressed, you are living in the past. If you are anxious, you are living in the future. If you are at peace, you are living in the present." Moreover, as permaculture land stewards, we approach any system from a vantage point of observation, then we begin to make assessments, and typically our actions stem from trying to meet the needs of the site, its inhabitants, and future generations. I particularly like how Brock Dolman has rephrased the question by saying that maybe we need "ego-system re-storyation" rather than ecosystem restoration. What is the new story of the landscape? Can we behold it objectively enough to embrace it from a biocentric perspective that includes humans along with all the other beings? This is the challenge of the task in a landscape of rapidly shifting climatic norms.

The situation in the woods now

In the 23 short years I've had a relationship with the forest ecologies of southwestern Oregon's Siskiyou Mountains that straddle the Oregon/California border, I've just begun to notice some trends, only to have them shift with the climate. Recently, summer has come later, and it's hotter and drier. Winter is drier, with more sun and less snow, and weather events are like punctuation marks or episodes, rather than chapters. Whatever I figured out a decade ago is now only partly applicable. New phenomena like Sudden Oak Death Syndrome (*Phytophthora*

ramorum—an oomycete plant pathogen) is ravaging oaks to the southwest of us in northern California, drought-stress is causing heavy beetle kill on pines to the southeast, and wildfire has become more prevalent in forests to the north.

Here are some changes I've noted:

- increased incidence of severe wildfire
- decreased *salmonid* presence, hence decreased nutrient flow,
- lack of native burning for the past 150 years
- extirpation of large megafauna such as grizzlies and wolves
- fire suppression in fire-dependent forests for the last 100 years
- oaks (a keystone species) threatened by disease
- industrial forestry has left a legacy of clear-cuts and habitat fragmentation,
- non-nomadic settlement patterns predominate among humans,
- industrial food systems susceptible to collapse,
- prudent to produce food and shelter from available resources
- ducks, goats, sheep, turkeys, and pigs all love to eat acorns!
- controlled fire is a way to generate biochar for use in organic annual crops
- coppice-with-standards forestry is a great way to create fodder for browsers
- goats love to eat oak, madrone, and cottonwoods
- controlled burning stimulates the herbaceous understory and oak reproduction

Considering all these assessments, what stewardship models can we integrate into our management approaches if we truly want to inhabit these forests and woodlands for the long haul?

As I ponder how wildfires have become more severe in recent decades, simple forest thinning seems to make sense to reduce the fuel load, and minimizing ladder fuels that could carry flames into the canopy, to avoid dangerous crown fires. This is difficult, physically demanding work involving chainsaws and heavy machinery and well timed use of fire. I suppose that this is the cost of our collective delay in recognizing that something must be done, lest we succumb to wildfire near our homes and communities. Indigenous forest-dwelling peoples have long used controlled fire to promote certain species, a rich herbaceous understory, and general productivity through more thorough nutrient cycling. The degree to which they could actually control fire was influenced by the periodicity at which they were burning, thus related to the accumulation of fuels AND the fact that they were semi-nomadic with movable village sites. If a fire were to get out of control and torch their village, it was less catastrophic than it would be today. The modern disapproval of controlled burning done at sensible times of year when there is less likelihood of escaping control also limits burn options. When public land management agencies such as the Bureau of Land Management (BLM) and the Forest Service do burnings in spring and late fall, they are met with resistance and complaints about the smoke from neighboring communities. What to do? Damned if you do, damned if you don't. Either way, we must

recognize that these forests co-evolved with regular fire.

Food forests—emulating nature

The longer I spend doing traditional farming models—orcharding, row cropping with animal polycultures using modern low input, no-spray, rotational, regenerative farming approaches—I come to conclusions that complicate the Eden-like self-maintaining food forests of popular permaculture lore. Farming is work—no way around it, we're dealing with gravity and entropy. In my 25 years of farming experience, our yields are generally directly proportional to how intensively a system is managed. We have a 15-year-old food forest comprised of an overstory of traditional fruit and nut trees, interplanted with nitrogen-fixing plants like autumn olive, *aronia*, and sea buckthorn, plus other multi-use plants such as Rugosa rose, artichokes, prickly pear cactus, medicinal herbs, insectary plants, and so forth. We graze chickens, turkeys, and pigs in this half-acre (0.2 ha) area. The management is virtually hands-off, with no pruning, mulching, watering, or thinning. Trees have branches that break under the weight of fruit, plants die, volunteers (both cultivated and wild) come in, and a certain element of wild chaos predominates—yet it all works. However, yields in terms of volume and dollars are nowhere near what would be possible if we were to practice a more hands-on management strategy. We also have about 8 acres (3 ha) of alley-cropped row crops and pruned fruit and nut trees and vines, where we practice more active management. This ground pays the bills and feeds us and our community.

So where is the midpoint between wild, untended ecosystems and intensively managed gardens? Enter woodland permaculture!

Integrate rather than segregate

A number of years ago we built a 12'x24' (about 4x8 m) tree house 20' (6.5 m) up in the air supported by a ponderosa pine, two Douglas firs, and a California black oak, along a



Madrone coppice easily. Here, goats enjoy sustainably harvested madrone fodder.

year-round stream in a mixed riparian forest of conifers and hardwoods including aforementioned trees plus Pacific yew, red alder, bigleaf maple, Pacific dogwood, sugar pine, Oregon white oak, black cottonwood, willow, ninebark, mock orange, vine maple, madrone, serviceberry, white fir, and more. From my new vantage point up high, looking down at the understory of this riparian edge, I marveled at the diversity of the herbaceous layer with dozens of useful plants. Maybe I was just dizzy from the altitude, but I got a glimpse into the future of permaculture in the Pacific Northwest. That future involves deeply implicating ourselves into the woodlands, pruning, thinning, burning, planting, mulching, harvesting, grazing, and many other activities that don't require machines. In my Rip Van Winkle moment, I saw goats peacefully foraging on madrone and maple coppice, pigs snorting for acorns and truffles beneath giant spreading black oaks amidst forbs and grasses, turkeys strutting in the pine duff, and peafowl seeking the shelter of a bramble. I also saw brush fences fashioned from willow coppice protecting verdant spikenard (a Pacific Northwest native ginseng relative), Oregon grape, nettles, mints, and similar herbs from curious hungry goats. I saw corrals and paddocks made from Douglas fir poles thinned to open up space around oaks. I also made out the silhouette of black walnut and chestnut leaves against the blue sky; trees planted into clearings created through burning and thinning decades before. Here and there were both black and honey locust and persimmon trees, obviously planted, as we are far from their native range. And across slopes were contour trails formed from Douglas fir poles creating trails and terracing, directing water cross-slope.

To re-member

This fantastical picture is possible now. What other choice do we have? With climate change accelerating and seasonal norms shifting, I firmly believe that traditional agriculture will (or has) become impossible or impractical across large swaths of land. Leaving the forest to simply take care of itself may prove



Wattle fence made of interlacing thin branches from tree trimmings and coppice.

a sad testament to an over-estimation of natural systems' ability to bootstrap themselves back into shape after centuries of abuse, neglect, and fire suppression. Traditional ecological knowledge leader, Dennis Martinez once told me that a native word for "wilderness" generally translated as "uncared for land." If we interact sensibly and thoughtfully with natural systems, we bring benefit and increase biodiversity and productivity for the benefit of all beings. I know this to be true from decades of regenerative farming on one site.

If we consider the word "remember" more deeply, we can see that it is actually, "re-member" or "to become a member of once again." As I see it, we need to design a future reality with humans integrated into ecosystems, not separate from them. This viewpoint is my synthesis of many permaculture principles, such as turning liabilities into assets, stacking functions and making the least possible change for the greatest possible benefit and rolling them into one dynamic strategy. Perhaps blurring the lines between what is wild and what is cultivated is the highest level of stewardship we can offer to future generations? As some may say, you gotta rock what 'ya got!

What's on your plate?

An exercise I like to share with students and groups that visit the farm is to visualize our dinner plate 50 years in the future. For myself, I visualize chestnut flour crackers, walnuts, hazelnuts, dried figs, persimmons, Asian pears, aged goat cheese with herbs, apple juice-based kombucha, smoked meats, a wild greens-based kimchi, and so forth. I think you get the idea—that it be regional and seasonal and awesome. A friend once shared a concept that "body follows vision," and that if we can see it already done, then the path there has been opened up—all we have to do is follow it. △

Don Tipping has been offering hands on, practical workshops since 1997 at Seven Seeds Farm (SevenSeedsFarm.com) in the Siskiyou Mountains of southwest Oregon. Situated at 2,000' (~600 m) elevation with rushing spring-fed creeks flowing through the land and nestled among old growth forests, Seven Seeds is one of the best examples of small productive biodynamic and permaculture farms in the Northwest. Through Seven Seeds and other initiatives, Don helps people build sustainable life skills such as permaculture, biodynamics, organic gardening, eco-forestry, seed saving, and other traditional arts that help to build regenerative culture. He has co-taught with many respected people in both the seed and permaculture movements, including Tom Ward, Larry Korn, Michael "Skeeter" Pilarski, Bill McDorman, Dennis Martinez, John Navazio, Andrew Millison, Frank Morton, Harald Hoven, Jude Hobbs, Becky Bee, Rowen White, and more. He serves on the board of the Rocky Mountain Seed Alliance and is a regular contributor to the Oregon State University Small Farms educational programs. Don is regularly sought out as a teacher, collaborator, and consultant in the Pacific Northwest.

Ecological Restoration

Integrate, Not Segregate

Diana Sette

I DID NOT ALWAYS THINK of ecosystems as I do now. If you would have asked me ten years ago as a Religious Studies and Literature undergraduate at Drew University what an ecosystem is, I probably would have said it was a marsh with frogs eating dragonflies pollinating daisies photosynthesizing, or maybe a rainforest with monkeys and jaguars and fish and hissing cockroaches. Now, when I hear the word ‘ecosystem,’ I think of something completely different. I imagine a city. I imagine a no-name town off some major highway almost completely paved over with asphalt and maybe an occasional pile of dyed woodchips in a coffin of pavement. Are these not ecosystems too—just extremely degraded to the point where there is barely any sign of life aside from a car driver pumping gas and a courageous dandelion? I also envision communities of people, and the design of a neighborhood. I imagine urban farms, and intergenerational, interracial exchanges connecting people and cultures across invisible boundaries. I imagine a family, the trillions of microorganisms living on my hand or in my gut, or the complex web of memories, thoughts, and feelings that comprise a single human being. If an ecosystem is a set of relationships, are we ourselves, and the communities within which we live, not also incredibly complex and intricate ecosystems? Unfortunately, with patterns

All I could think to do was protest by refusing to sleep there the first weekend....

of oppression like racism, classism, sexism, ageism, and ableism, among the other degrading -isms, most of us are living in greatly damaged ecosystems. As the writers of the recent *Rights of Nature & Mother Earth* put it, we must “recognize that there is no separation between how we treat nature and how we treat ourselves” (1). For the process of ecological restoration to have the greatest impact, we must start work in the area upon which we can have the greatest influence: the ecosystem within. Only from a foundation of integrity can we design for ecological restoration that integrates rather than segregates.

Becoming aware of ecosystems

I grew up in a suburb outside of Philadelphia, a town with a strong Colonial history (George Washington’s military headquarters were based there) and a pattern of urban sprawl. Some of the development was a product of white flight, and

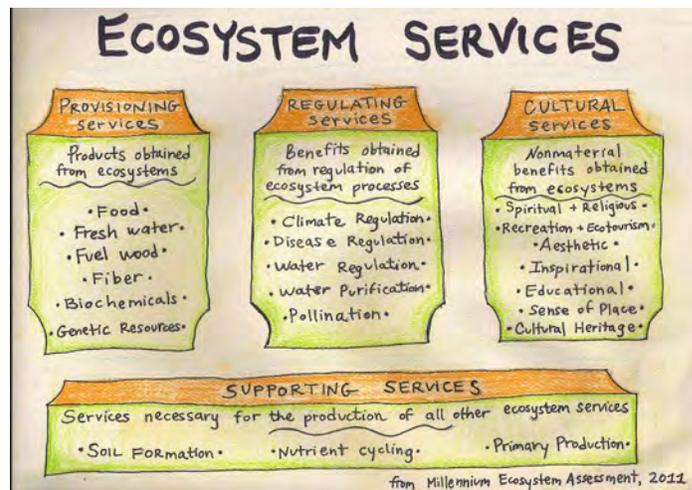


Illustration by Diana Sette based on chart from Millennium Ecosystem Assessment.

some of it was the product of a mostly white population climbing the economic class ladder that requires the colonizing of country and moving into a McMansion in order to be ‘successful.’ I remember it being heartbreaking for me as a child to watch the construction of our new home. It was the second phase of a new housing development called Forest Glen. I was entering fourth grade, and I was devastated to move into this new cookie-cutter home with brightly dyed green turf and a tree sapling out front. I was moving away from my community of friends to live where a young forest glen had been decimated in the name of my family. I saw only destruction. Perhaps, this was my first understanding of living within a damaged ecosystem.

The house didn’t feel like home to me. I felt as if I were moving onto ancient burial grounds, having taken over someone or something else’s home with no acknowledgment, let alone sacred reverence, for the place, or wildlife that had lived there before. All the trees were cut, lawns were rolled out, and template houses were erected in assembly-line fashion. I felt at the core of my being how myself, my family, our neighbors, and the developers were responsible for the destruction of this ecosystem. The nature of the development demonstrated a cultural belief that nature has no rights and no value aside from potentially adding to property value.

I was around ten years old at the time of my move. What could I do? All I could think to do was protest by refusing to sleep there the first weekend we moved in. My parents allowed my protest and did their best to make the house welcoming and cozy for me. They were providing for me the best way that they knew how.

In the years following, I watched as more and more old farms and abandoned forests were divided into parcels and sold to developers who quickly paved them and turned them



Early growing season in Gather 'Round Farm, Cleveland, OH. Teepees and trellises await the eager tendrils of beans, cucumbers, and other climbers, and the care of urban gardeners.

into strip malls. I remember thinking, isn't there anyone who has lived in this place long enough who will stop this horrible urban sprawl? By the time I was a teenager, my protests elicited responses like, "this is what progress looks like." When I finally moved away from that town at the end of my high school years, I felt like a refugee. My homeland had been destroyed. I no longer had a home connected to the land. I left in search of a place to live, because the culture surrounding me seemed one of death and decay despite the glitz.

I went away to college at Drew University in New Jersey and lived in 'The Earth House.' There I lived with a Vermonter, and another friend with a connection to that state (2). I visited the rural countryside of Vermont for the first time soon after. I was struck by un-mowed lawns teeming with wildflowers and vibrant local food coops in almost every little town center. My naive suburban upbringing probably contributed to my rose-colored glasses perspective, because everyone I met seemed to know how to cook and garden. People waved to each other passing by on the road, and knew each other's names at the convenience store. Initially, it was hard to believe that this place was for real.

I learned so much during my time living there. I lived in community while working at Rock Point School, a residential high school for at-risk youth where care for self and care for others are key (3). Later, I spent several years living and working at the over 50 year old Bread and Puppet Theater in a community that drew people from all over the country and world to make radical political puppet theater shows and live on the land (4). We made puppets giant and small from garbage pulled from the waste stream, including cardboard, bottle caps, and the inner tubes of bicycle tires. We insisted that art is for everyone, not something exclusive to art museums or galleries. We ground flour by hand, baked sourdough bread, and raised chickens and veggies to sustain our community. The number of residents staying at the farm ranged from 3 to 200 throughout the year. In the summer, I slept in a decommissioned school bus refurbished as a cozy abode. We heated our old farmhouse through the Vermont winters by wood stove and fed ourselves from the stored harvest.

After five years of living in the Bread and Puppet company full-time, I grasped the concept of the commons. I learned what it takes to live in community through conflict and celebration. I participated in effective grassroots political action, and engaged with the thriving world of microbes. I lived in alignment with the cycles of nature. Foraging through the forests on the 200 acres (80 ha), I learned which mushrooms and plants were edible, and then cooked them together with others in the summer kitchen on rocket stoves. I felt in my heart how a garden without art was only half the story. Having grown up in the suburbs of the mid-Atlantic, I had had no prior understanding of the potential of this type of cultural reality. My inner ecosystem was transformed in a deep way through living in a larger thriving ecosystem overflowing with abundant and resilient relationships.

I never would have guessed that five years and a marriage later, I would move to the post-industrial rust belt of Cleveland, Ohio: my current home. Transitioning from the ecosystem of the Northeast Kingdom of Vermont to Cleveland was a huge cultural shift. Cleveland is the most racially and economically segregated city in America (5). The city has over 12,000 abandoned properties and over 27,000 vacant lots (6). Cleveland is notorious for her Cuyahoga River catching fire 13 times due to egregious pollution. Cleveland is a prime example of a degraded ecosystem. Even though land was plentiful and cheap in Cleveland, growing on formerly abandoned city lots in declining neighborhoods seemed like a very different type of relationship with nature—one potentially lacking in connection.

The alignment of social justice, environmental justice, and community came to be my understanding of ecological restoration.

Surprisingly enough, it was only a month or so after moving to Cleveland where I found myself feeling a deep connection with nature and Mother Earth's wild spirit. I was at a community potluck at Gather 'Round Farm, an urban permaculture garden farm in the Near West Side area of Cleveland. I had heard of permaculture, although I didn't know too much about it. Gather 'Round was built atop a former parking lot. Every path was curvy and intimate alongside raised beds of intercropped heirloom abundance. There were chickens and a little waterway that flowed through the garden. Art made from found objects littered the lot, creating magical alcoves. Folks at the potluck were of all walks of life, coming from different economic, racial, and social strata. Everyone gathered to share community and the organically grown vegetables and other wild edibles in a delicious chili-filled soup. Sitting alongside a brick-lined bonfire and staring up into a star-filled sky, I stopped noticing the cars

driving past on the main avenue. I was utterly inspired by the transformation and resiliency of the space. I was encouraged by meeting the all-women volunteer collective who cared for the land. They were empowered with a strong sense of social justice and commitment to community through grassroots action and inclusivity. I knew then I was a permaculturist, too.

The alignment of social justice, environmental justice, and community came to be my understanding of ecological restoration. I spent the next year observing myself, the social climate and microclimates of the city, and the two vacant lots next to my house on the East side, while getting to know my neighbors in a primarily African-American neighborhood before cooperatively creating Possibilitarian Garden, an urban permaculture garden and community orchard grounded in racial equity, food, and social and environmental justice. Possibilitarian Urban Regenerative Community Homestead, or PURCH, is the name we use to include the cooperative living house and community workshop space alongside the garden on two formerly vacant lots. Permaculture design presents solutions to the problem of ecological degradation, and here we have the opportunity to co-create working ecological models.

What is ecology anyway?

Permaculture is grounded in ecological theory. Audrey Tomera in *Understanding Basic Ecological Concepts* (7) defines ecology as “the science that deals with the specific interactions (relationships) that exist between organisms and their living and nonliving environment.” Therefore, permaculture is simply the observing of and designing for optimal relationships between organisms and their living and nonliving environment—permaculture is ecological design.

Bill Mollison and David Holmgren, permaculture’s founders, were both trained ecologists. Holmgren dedicated his 2002 book, *Permaculture: Principles and Pathways beyond Sustainability* (8) to Eugene Odum, one of the founding scholars of ecology who brought ecological thinking to the mainstream (9). Interestingly, there are conservation ecologists, urban ecologists (10), deep ecologists, ecosystem ecologists, civic ecologists (11), human ecologists, evolutionary ecologists, schoolyard ecologists (12), microbial ecologists (13), and even ecosystems ecologists! Each ecology field is based on the study of relationships—the fields differ in the lenses with which they study those relationships (14).

Older ecological design studies tend to not include humans, never mind that most ecologists will agree that humans now have the largest impact on every ecosystem on this planet. Urban and social permaculture is the cutting edge for research and practice in ecological systems, as more than half the world’s population lives in urban environments. Within the permaculture movement, more buzz is growing around urban and social ecosystems. Recent books like Toby Hemenway’s *The Permaculture City: Regenerative Design for Urban, Suburban and Town Resilience* (15) contribute to the increasing study of urban ecologies.

Assessing ecosystem health

Analyzing separate ecosystem elements to assess ecosystem

impact (and arguably for other purposes as well as discussed below) is where I see the greatest divergence between colonized and indigenous ecological thinking. For example, in 2011, the *Millennium Ecosystem Assessment* (16) broke down the ecosystem services into four main categories: provisioning, regulating, cultural, and supporting services (17). The direct and indirect contributions of ecosystems listed are extensive, ranging from providing food, shelter, and clean water, to creating a sense of place and spiritual experience.

Identifying ecosystem services is one way to assess ecosystems. It is important to note, however, that to engage with the “ecosystem services” assessment tool is to work in opposition to indigenous people’s “Rights of Nature,” which demands “the rejection of all market-based mechanisms that allow the quantification and commodification of Earth’s natural processes, rebranded as ‘ecosystem services’ ” (1).

I respect and honor this perspective, as I have felt how assessing “ecosystem services” using monetary value is the first step to commodifying something with deeper qualitative and priceless value. I remember the first time I saw “ecosystem services” signified by an old centennial oak. Hanging on a sign pole, a big tag marked what the tree’s monetary worth was. It communicated to me that the tree was paying its due, and therefore was allowed to stick around for a little bit longer until humans decided it wasn’t worth it anymore. Marking ecosystem services in this way promotes and protects current laws that prescribe what Rights of Nature describes as “the ownership of ecosystems and other aspects of the natural world... upholding the control and dominance of humans over nature” (18).

While modern societies have clearly lost touch with indigenous wisdom regarding ecosystem health and needs, it can also be useful and necessary (at least for the time being during this Great Transition) for ecological designers to use ecosystem assessment tools as a gateway to observing and understanding ecosystems better. Tools like the EPA National Stormwater Calculator (19), National Tree Benefit Calculator (20), climate and weather patterns, soil quality tests, and other



Organic bed shapes form at Gather ‘Round Farm as beds are designed around contours of the sunken parking lot to help capture water and create the perfect environment for many native prairie plants.

Further Application of Ecosystem Assessments to Social Systems

WHILE THE MILLENNIUM ECOSYSTEM Assessment presents ecosystems as functioning in a potentially commodifying way, I am interested to develop further the implications of these 'services' to generate a deeper understanding of what an ecosystem really is, and what it really does. A designer can use the questions below in their site analysis of an ecosystem.

Cultural services. What is the sense of place in this particular ecosystem, and for whom? How does this space directly and indirectly educate people surrounding the space? What does the structure and process of the decision-making and/or governing body of the place communicate directly and indirectly in the ecosystem? What is the relationship to the space's prior and existing cultural heritage and spiritual sensibility of the community? Do diverse cultures intersect—if so, how? What role does art play, both directly and indirectly?

Supporting services. How are resources cycled or shared throughout the community? What is the ability of community members to produce their own food? How are people in the community able to access economic opportunities and pursue livelihoods? What is needed to give greater vitality and feed the 'soil' of the community culture of the ecosystem?

Regulating services of an ecosystem. How does the community handle the breaking of laws or social rules? How is waste regulated/recycled? What are people's self-care capacities? What are the opportunities for cultural and social cross-pollination? How are new and distinct ecosystem members included?

Provisioning services of an ecosystem. What does the community provide? What is the community's access to food and/or other services within the ecosystem? △

ecosystem services calculators and measurement tools (21) track non-human systems. Demographic surveys and cultural histories of a place provide foundational information for design considerations as well. Having a grasp of cultural, economic, and social patterns for your design site can be the keystone for truly resilient ecological restoration (22).

Moving forward

The notion of owning ecosystems brings to light several of permaculture designers' greatest risks in ecological design. If our cultural heritage is non-indigenous, we most likely carry within our personal ecosystem patterns of colonization,

oppression, and subjugation. We must work cooperatively, and engage and include various diverse voices of different demographic (and species) background in the design process (23). Restorative ecological design considerations can all be identified as issues of social and environmental justice, and we must work to understand them as such if we hope to successfully support Nature's ability to restore her ecological systems.

With that, we come full circle. We must start with our inner ecosystem, observing our thoughts, our patterns, and the ways our body, mind, and soul interact with each other. Whatever spirit with which we communicate will be what we transfer to any other ecosystem, including our family, organization, neighborhood, community, farm, or forest. We must bring awareness to unconscious biases, privileges, and personal cultural beliefs in order to be able to understand how we carry them forward as designers and how that impacts our ability to co-create resilient ecological restoration.

The global climate is changing fast, and new patterns are emerging and transforming constantly, such that we must trust our direct and attentive observations. We must not overlook the force of nonliving factors, as living things are in constant interaction with them. We must honor that every being, living or not, has a special ecological niche that only it can fill, and whether we understand it or not, there is a reason each being

**...keep all the pieces—
we will need them all
as we move forward....**

needs to do what it does currently. Let that allow us to direct our interactions and engagement with bumblebees, real estate agents, drug dealers, microorganisms, artists, fences, trees, and rocks. Let us be inclusive, remain curious, value complexity, and work the edge. We must work to understand as best we can, because even though it may be hard to see the value of some elements, keep all the pieces—we will need them all as we move forward to restore our damaged and degraded ecosystems. The principles and ethics are a road map and a check and balance; let us use them, take action, listen for feedback, and respond with change. And when practicing ecological restoration, let us remember the words of indigenous artist and activist Lila Mills who said, "If you have come here to help me, you are wasting your time. But if you have come because your liberation is bound up with mine, then let us work together." △

Diana Sette is a Certified Permaculture Teacher and Designer working primarily in Cleveland, OH, after almost a decade of growing in the Green Mountains of Vermont. She serves on the Board of The Hummingbird Project (hummingbirdproject.org) and Green Triangle (greentriangle.org), two permaculture-based non-profits working locally and abroad. Much of her work in social and urban permaculture experimentation is centered at Possibilitarian Urban Regenerative Community Homestead

(PURCH) in Cleveland (Facebook: Possibilitarian Garden). Diana currently works for Cleveland Botanical Garden as the Youth Manager of Green Corps, its 20-year-old urban agriculture work-study program for inner-city teens.

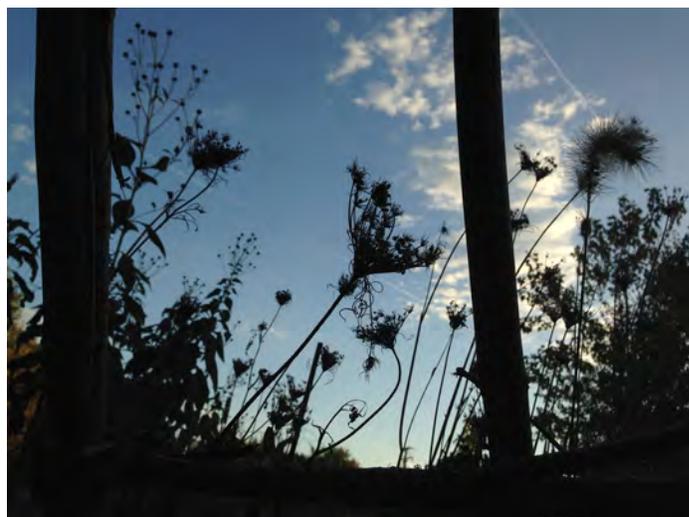
[Editor's note: We inadvertently misspelled the author's first name in *PcD* #98. We regret the error.]

Notes

1. Biggs, Shannon & Tom B.K. Goldtooth, eds. *Rights of Nature & Mother Earth: Sowing Seeds of Resistance, Love and Change*. therightsofnature.org/tag/rights-of-mother-earth/ Nov 29, 2015.
2. One friend, Graham Unangst-Rufenacht, is now an herbalist, edible landscaper, and owner of Robinson Hill Beef, a grass-fed cattle business you can find on Facebook at www.facebook.com/RobinsonHillBeef/. Another friend, Sarah Corrigan, later went on to co-found ROOTs—Reclaiming Our Origins in Traditional Skills School—in VT. rootsvt.com
3. Rock Point School in Burlington, VT, is now one of the leading providers of renewable energy for the city of Burlington with the construction of an extensive solar panel orchard. www.rockpointschool.org
4. Bread & Puppet Theater. Breadandpuppet.org
5. Frohlich, Thomas C. & Alexander Kent. "America's Most Segregated Cities" 24/7 Wall St. 247wallst.com/special-report/2015/08/19/americas-most-segregated-cities/4/ August 19, 2015.
6. A total of 12,179 vacant structures equates to 8% of the city's parcels; 27,774 vacant lots is 17% of the city. 2015 Citywide parcel survey of Cleveland. www.wrlandconservancy.org/wp-content/uploads/2015/11/WRLC_Loveland_Cleveland_Survey_Report_20151121.pdf Nov 20, 2015.
7. Tomera, Audrey N. & A. Tomera. *Understanding Basic Ecological Concepts*. Portland, ME: J Weston Walch (2002).
8. Holmgren, David. *Permaculture: Principles & Pathways beyond Sustainability*. Hepburn, Victoria: Holmgren Design Services (2002).
9. Odum, Eugene. *Fundamentals of Ecology*. Philadelphia: Saunders (1953).
10. Niemelä, Jari, ed. *Urban Ecology: Patterns, Processes, and Applications*. Oxford, UK: Oxford University Press (2011); Mark McDonnell, Amy K. Hahs, & Jürgen Breuste, eds. *Ecology of Cities & Towns: A Comparative Approach*. Cambridge, UK: Cambridge University Press (2009); "Nature of Cities," a collective blog on cities as socio-ecological spaces: www.thenatureofcities.com.
11. Krasny, Marianne E. & Keith Tidball. *Civic Ecology: Adaptation and Transformation from the Ground Up*. Cambridge, MA: MIT Press (2015).
12. Dank, Sharon Gamson. *Asphalt to Ecosystems: Design Ideas for Schoolyard Transformation*. New York: New Village Press (2010).
13. Antonio Gonzalez, Jose C Clemente, Ashley Shade, Jessica L Metcalf, Sejin Song, Bharath Prithiviraj, Brent E Palmer, & Rob Knight. "Our microbial selves: what ecology can teach us." *EMBO Reports* 12: 775-784. embor.embopress.org/content/12/8/775 (2011).
14. Many ecological theories have been developed, although many more are needed, as the world is quickly urbanizing,

and patterns are changing and transforming. Some ecological theories include: island biogeography theory, metapopulation dynamics, human ecology model, etc. Applying these theories in an urban versus rural context may demonstrate variation in behaviors.

15. Hemenway, Toby. *The Permaculture City*. White River Jct., VT: Chelsea Green (2015).
16. Millennium Ecosystem Assessment: www.millenniumassessment.org
17. More specific definitions of ecosystem services included at The Economics of Ecosystems & Biodiversity (TEEB) website: www.teebweb.org/resources/ecosystem-services/
18. RoNME
19. www2.epa.gov/water-research/national-stormwater-calculator
20. www.treebenefits.com/calculator/
21. California ReLeaf's website includes additional ecosystem service calculators and measurement tools: californiareleaf.org/resources/calculators-and-measurement-tools/
22. The City Repair Project based in Portland, OR. www.cityrepair.org/ and Cleveland, OH www.neighborhoodgrants.org/city-repair-cle-closes-the-season/ are interesting examples of community permaculture design working towards ecological restoration.
23. For a hefty start to understanding social and cultural patterns, see the in-depth articulation of social and architectural patterns in the following books: Alexander, Christopher, M. Silverstein, & S. Ishikawa. *A Pattern Language*. Oxford, UK: Oxford University Press (1977); Jacobs, Jane. *The Death and Life of Great American Cities*. New York: Random House (1961); Schuler, Doug. *Liberating Voices: A Pattern Language for Communication Revolution*. Cambridge, MA: MIT Press (2008) by Doug Schuler. Other ecology resources include these journals: *Ecology*, *Ecology & Society*, *Human Ecology: An Interdisciplinary Journal*, *Human Ecology Review*, and the *Journal of Political Ecology*.



Most plants at GRF go to seed, creating a vibrant and abundant array of volunteer plants the following season, as well as food for wildlife and pollinators.

Open Letter Reclaiming Environmentalism

Derrick Jensen and Lierre Keith

ONCE, THE ENVIRONMENTAL MOVEMENT was about protecting the natural world from the insatiable demands of this extractive culture. Some of the movement still is: around the world grassroots activists and their organizations are fighting desperately to save this or that creature they love, this or that plant or fungi, this or that wild place.

Contrast this to what some activists are calling the conservation-industrial complex—big green organizations, huge “environmental” foundations, neo-environmentalists, some academics—which has co-opted too much of the movement into “sustainability,” with that word being devalued to mean “keeping this culture going as long as possible.” Instead of fighting to protect our one and only home, they are trying to “sustain” the very culture that is killing the planet. And they are often quite explicit about their priorities.

For example, the recent “An Open Letter to Environmentalists on Nuclear Energy,” signed by a number of academics, some conservation biologists, and other members of the conservation-industrial complex, labels nuclear energy as “sustainable” and argues that because of global warming, nuclear energy plays a “key role” in “global biodiversity conservation.” Their entire argument is based on the presumption that industrial energy usage is, like Dick Cheney said, not negotiable—it is taken as a given.

And for what will this energy be used? To continue extraction and drawdown—to convert the last living creatures and their communities into the final dead commodities.

Their letter said we should let “objective evidence” be our guide. One sign of intelligence is the ability to recognize patterns: let’s lay out a pattern and see if we can recognize it in less than 10,000 years. When you think of Iraq, do you think of cedar forests so thick that sunlight never touches the ground? That’s how it was prior to the beginnings of this culture. The Near East was a forest. North Africa was a forest. Greece was a forest. All pulled down to support this culture. Forests precede us, while deserts dog our heels. There were so many whales in the Atlantic they were a hazard to ships. There were so many bison on the Great Plains you could watch for four days as a herd thundered by. There were so many salmon in the Pacific Northwest you could hear them coming for hours before they arrived. The evidence is not just “objective”—it’s overwhelming: this culture exsanguinates the world of water, of soil, of species, and of the process of life itself, until all that is left is dust.

Fossil fuels have accelerated this destruction, but they didn’t cause it, and switching from fossil fuels to nuclear energy (or windmills) won’t stop it. Maybe three generations of humans will experience this level of consumption, but a culture based on drawdown has no future. Conservation biologists should understand that drawdown cannot last, and should not be taken as a given when designing public policy—let alone as a way of life.

It is long past time for those of us whose loyalties lie with wild plants and animals and places to take back our movement

from those who use its rhetoric to foster accelerating ecocide. It is long past time we all faced the fact that an extractive way of life has never had a future, and can end only in biotic collapse. Every day this extractive culture continues, 200 species slip into that longest night of extinction. We have very little time left to stop the destruction and to start the repair. And the repair might yet be done: grasslands, for example, are so good at sequestering carbon that restoring 75% of the planet’s prairies could bring atmospheric CO₂ to under 330 ppm in 15 years or less. This would also restore habitat for a near infinite number of creatures. We can make similar arguments about reforestation. Or consider that out of the more than 450 dead zones in the oceans, precisely one has repaired itself. How? The collapse of the Soviet Empire made agriculture unfeasible in the region near the Black Sea: with the destructive activity taken away, the dead zone disappeared, and life returned. It really is that simple.

You’d think that those who claim to care about biodiversity would cherish “objective evidence” like this. But instead the conservation-industrial complex promotes nuclear energy. Why? Because restoring prairies and forests and ending empires doesn’t fit with the extractive agenda of the global overlords.

These and other attempts to rationalize increasingly desperate means to fuel this destructive culture are frankly insane. The fundamental problem we face as environmentalists and as human beings isn’t to try to find a way to power the destruction just a little bit longer: it’s to stop the destruction. The scale of this emergency defies meaning. Mountains are falling. The oceans are dying. The climate itself is bleeding out, and it’s our children who will find out if it’s beyond hope. The only certainty is that our one and only home, once lush with life and the promise of more, will soon be a bare rock if we do nothing.

We the undersigned are not part of the conservation-industrial complex. Many of us are long-term environmental activists. Some of us are indigenous people whose cultures have been living truly sustainably and respectfully with all our relations from long before the dominant culture began exploiting the planet. But all of us are human beings who recognize we are animals who like all others need livable habitat on a living earth. And we love salmon and prairie dogs and black terns and wild nature more than we love this way of life.

Environmentalism is not about insulating this culture from the effects of its world-destroying activities. Nor is it about trying to perpetuate these world-destroying activities. We are reclaiming environmentalism to mean protecting the natural world from this culture.

And more importantly, we are reclaiming this earth that is our only home, reclaiming it from this extractive culture. We love this earth, and we will defend our beloved. Δ

To view signatures or to sign on, go to: www.derrickjensen.org/open-letter-to-reclaim-environmentalism/

Thank you, Derrick

Movement Musings

Designing Self-Sustaining Non-profit Agricultural Organizations

Robyn Mello

DURING NOVEMBER'S Advanced Permaculture Design Course in Akron, Ohio, taught by Peter Bane, Jono Neiger, and Karryn Olson-Ramanujan, I challenged myself to work on a design team offering a redesign of a 115-acre nonprofit farm at the top of two watersheds with depleted soil. Though this farm was a larger piece of land than I'd ever worked with and outside of my familiar inner-city environment, I immediately saw challenges similar to those I'm experiencing among Philadelphia's nonprofit agricultural organizations (NPAO). I feel that I must work to find solutions to these challenges. Therefore, this is simultaneously an introduction, report on observations, contribution to a necessary conversation, series of questions for community input, and plea for more serious self-examination by the permaculture and nonprofit communities.

...the glaring disconnect between urban farmers, nonprofit administrators, and community members have been consistent.

Designing highly functioning NPAO—or a larger, emergent pattern Peter and I called “Social Benefit Permaculture Enterprises”—is more about social than physical permaculture design. If the structure doesn't support human dignity and equality, there's no hope for the land.

When implemented properly, I believe that NPAO will perform a major role balancing inequities in our highly dysfunctional and dangerous farm, food, and property ownership systems. Additionally, NPAO should be able to provide strategies to grow self-sustaining and resilient revenue streams, allowing for a larger number of organizations to drink from the funding pool. As of now, NPAO that I'm aware of have a long way to go before realizing this potential. Permaculture design seems the natural bridge to connect vision and reality.

However, I've been heavily involved in various combina-



Keith Johnson at a permaculture design course hosted by an alternative school in Bloomington, Indiana: which also hosts gatherings of a Nonprofit Agricultural Organization, the Local Grower's Guild. Photo by Rhonda Baird.

tions of permaculture design, community organizing, political activism, vacant lot gardening, farming, agroforestry, small business development, and NPAO work since moving to Philadelphia. Throughout that time, the glaring disconnects between urban farmers, nonprofit administrators, and community members have been consistent. For various reasons—among them, fear of losing one's job, maddening levels of bureaucracy in massive organizations, conservative boards of directors, having larger external battles to fight, lack of cohesion among workers, and the oft crippling sentiment in low-wealth neighborhoods enabling mediocrity that “something is better than nothing”—not a whole lot has been done to mend the disconnect. It seems the time has come.

Fortunately, I work for a small, wonderful permaculture non-profit where I'm able to design solutions around ethical concerns, and my world has been recently inundated with stories of organizations faced with the need to restructure, revision, and develop new strategic plans. Non-profits are losing large numbers of staff. Small NPAO are trying to figure out how to hire from within their target communities. Self-examining urban agriculture workers are questioning the status quo. Boards are restructuring, and some organizations are finding it's time to

hand off the proverbial torch to the next generation. This is great news, but there's no roadmap.

I don't pretend to be the first to think about these issues, and I surely don't take credit for all of the ideas presented here. I simply want to act as a medium, presenting to a larger audience to collect, synthesize, and contribute to an action-oriented dialogue, working toward a future of permaculture that is a permanent multiculture of holistic health, equality, and honor. If you have comments on any of the above, have answers to any of the below, or would like to be involved in this research in any way, please e-mail robyn@phillyorchards.org.

Some initial observations and food for thought:

- NPAO missions and/or programming must address and improve upon inequality and social injustice through a framework of true empowerment, not a framework of dependency.

- Have difficult conversations about race, class, and gender. Admit to confusion or ignorance. Face challenges. Question who's paid in the organization, and how much. As an employee or administrator in a NPAO, realize your privilege and use it to help level the playing field. Structural oppression is not personal, but it is everyone's personal job to address it daily.

- If growing food, addressing food justice, and including community members and their knowledge in every part of the process is not historically part of a nonprofit's mission, or if a nonprofit is experiencing "mission creep" due to new funding opportunities in the realm of farming and food justice, its members should seriously question their justification and qualifications.

- NPAO boards should absolutely be populated with people of color, women, and members of the target population. Figure out how to hire or recruit paid interns that have lived experiences necessary to the mission. Seek help and reach out to nonprofits successfully doing this. This is where novelty emerges.

- Farming is hard work, community building is hard work, and both take very unique skillsets. Asking a human to not only farm full-time (which often means more than a 40-hour week) but also run community programs, oversee interns, manage volunteers, distribute produce, and more is unrealistic. Combine that with low hourly wages or low-level salaries compared to other NPAO "superiors," and negligence, burnout, and high staff turnover result.

- Similarly, part-time and/or "seasonal" farming (March or April through October or November) is unrealistic, especially with large spaces or multiple sites. Farming is a year-round beast whose tasks change cyclically but don't stop in the winter. NPAO need to recognize this and commit to paying farmers year-round.

- Many NPAO have very high farm staff turnover, and some have the annual hiring of new farmers built into their structure. If no one is connected to a piece of land or community long-term, the design (or lack thereof) and health of the ecosystem will reflect that. It's also a direct reflection of an organization's dysfunction to the community, and word-of-mouth storytelling may result in fewer qualified applicants seeking positions over time.

- Perceptions of necessary community work swing widely,

depending on whether one is "on the ground" or "in the office." Often, NPAO farmers have far more contact with their target community than administrators, yet they often go unheard. Sometimes a young girl confiding in a farmer about being abused, or the need to bury a neighbor family's dog, or a really important game of hide and seek, or the community's interest in turning a garden into a basketball court are more important concerns than building trellises for legumes or harvesting all the peaches before the squirrels descend.

- NPAO that receive funding for training youth food growers are primarily run by older staff farmers. Youth programming is often far less time weekly or seasonally than is needed to grow food. This structure must be modified to accurately train the next generation.

- On-site or neighborhood-based housing must be available for farmers and their families if the farm is outside of an urban area, if livestock is being managed, or if median income in the area where the farm is located is higher than the farmer's salary.

- Many nonprofits are just as intent on self-preservation and perpetuation as for-profits. The goal of nonprofit farmers and organizations should ultimately be to perform such effective work as to render themselves irrelevant.

- NPAO could consider leveraging their land, status, and funding to incubate landless farmers or historically marginalized individuals interested in farming.

- If presented with professional designs and strategic plans, people with large parcels of land lying fallow or being rented to corn, soy, and hay monocroppers may be willing to work with NPAO instead. The tax breaks for agricultural use, tax-deductible donations, and the appeal to "make a difference in the world" are all valuable assets.

Questions geared toward NPAO administrators and board members:

- Why do you do what you do? What is your nonprofit's mission?

- Is it a nonprofit with many programs of which farming is one, or is it specifically a NPAO? Are you experiencing "mission creep?"

- When it comes to agricultural programming, what are you most proud of? What is the greatest challenge?

- What is the demographic makeup of your board and staff? What is the demographic makeup of the community or communities you serve? Are they at all similar?

- Where are farmers or food-related workers within your organizational hierarchy? Are any of your administrators or board members experienced agricultural workers? How often do you hire new staff?

- Is there a model NPAO that can be designed in which farm or food cooperatives are involved in the structure? What about an NPAO acting as a land-holding, training, or small agribusiness development hub?

- What is the percentage breakdown of your revenue stream? Do food or value-added products or programming generate any revenue? If not, how could you change that?

- How are issues of race, class, gender, and ecology factored into your programming?

Questions geared toward NPAO employees:

- What are your thoughts on the above questions? Do you think your answers would differ from administration? Why?
- What kinds of work do you do in your day-to-day life? In what ways does permaculture design factor? Why are you doing the work you do?
- Do you have a community of peers or colleagues to whom you are able to reach out?
- Do you feel adequately supported by your employer? Do you feel that you're compensated appropriately? Are you full or part-time?
- Is there enough transparency within the nonprofit where you work? With you? With the target community?
- Do you feel qualified to do the work you do? Why and why not? What kinds of professional development and training do you feel you and others in your NPAO need?
- Are you from the community where you work? If not, would you be willing to train your replacement if they were a community member?

Questions geared towards community members impacted by, but not directly involved in, NPAO:

- What are your thoughts on the above questions? Do you think they would differ from NPAO administration or employees?
- Do you feel the NPAO is adequately serving you and your community? How could it do better?
- How does the NPAO seek community input and involvement? Does that outreach feel sufficient?
- What were things like prior to this NPAO entering your community? Would you rather see something else in its place?

Question geared towards all other permaculturists, farmers, and readers:

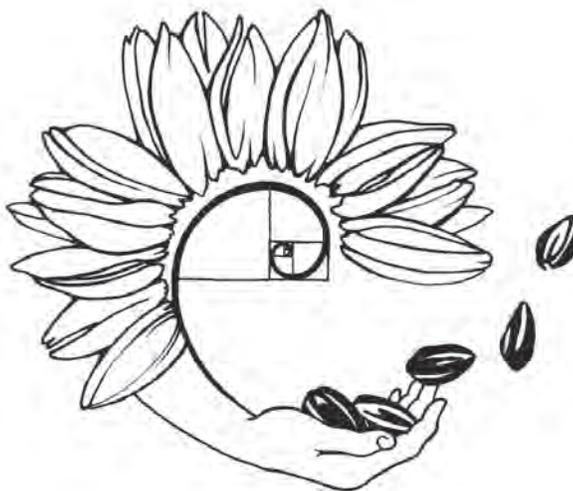
- What are your thoughts on any of the above questions? How do you feel that you can contribute to this conversation? How can permaculture design facilitate the creation of model NPAO?

Please share this article broadly with the appropriate constituents. My vision is to receive feedback, conduct interviews and site visits with various NPAO interested in critical self-examination, and compile a report on best practices

for designing highly functional NPAO with both ethical and supportive human structures and wide-angled strategies towards regenerative land stewardship. Δ

Robyn Mello lives in Philadelphia, PA. She is Program Director for the Philadelphia Orchard Project, a 501(c)(3) nonprofit that has planted over 1,000 fruit trees in 50 partner community orchards throughout the city since 2007. She also consults, designs, organizes educational programming, and teaches permaculture at regional music festivals and is lead siren and guitarist in earth-worshipping fusion band, The Radicans (phillyorchards.org, theradicans.com).

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Goddard College and PINA Partner to Offer College Credit

Karen Stupski

GODDARD COLLEGE and the Permaculture Institute of North America (PINA) are partnering to offer students the opportunity to earn two undergraduate credits for completion of a PINA-recognized 80-hour Permaculture Design Course (PDC) when they enroll at Goddard College. This agreement is significant because it strengthens the permaculture movement as a whole by encouraging high standards, recognizing the college-level learning of the PDC, and creating new opportunities for permaculture students. The partnership also gives college students a unique opportunity to study permaculture in greater depth as part of their degree program using Goddard's radical pedagogy of independent, self-directed, transdisciplinary learning.

Goddard College is a small, progressive, liberal arts school in Vermont that offers low-residency programs leading to accredited bachelor's degrees. It has been a leader in alternative education for over 150 years, and has many unique advantages for the study of permaculture design: there are no classes, no tests, and no grades. Students create their own study plans and

are assessed on a portfolio of samples from their work. They can live anywhere and can learn about permaculture through internships and hands-on projects. In addition, Goddard's focus on social justice can help students critically analyze permaculture and learn how to create systems that are just and inclusive. Many Goddard students already study permaculture and have done projects such as building a strawbale chicken coop, creating permaculture designs for multiple sites, and starting a regenerative landscaping business.

PINA is a professional association of regional hubs working across North America and Hawaii to grant diplomas, preserve the integrity and quality of the PDC, and facilitate networking among permaculturists. The institute upholds professional standards of practice for graduates of the PDC offered at numerous sites across North America by PINA-recognized educators. The Core Curriculum follows the schema of Bill Mollison's internationally recognized 72-hour curriculum but enhances it with contemporary understandings and social and cultural components, and encourages the inclusion of regionally based information.

Under the agreement with Goddard, students who complete the 80-hour PINA-recognized PDC will receive two credits for Natural Science when they enroll at Goddard College. PINA recognition means the course curriculum has been reviewed and found to be in compliance with PINA standards. This quality control is an essential component of the Goddard-PINA partnership because permaculture courses of varying quality have proliferated in recent years, while college-level equivalencies can only be offered for coursework that meets high standards.

Any instructor teaching permaculture design can benefit from the partnership with Goddard by joining PINA and complying with its standards. In addition, instructors who participate in PINA's diploma program in Permaculture Education will be supported to meet PINA's standards for the PDC through mentored and self-directed programs administered by regional hubs and field advisors. △

Karen Stupski directs the School of Living, a land trust for intentional communities in the mid-Atlantic states. She lives and teaches permaculture design at Heathcote Community in Freeland, Maryland and also works at a distance for Goddard College. She is a member and diploma candidate with the Permaculture Institute of North America. For more information about the Goddard-PINA partnership, see the Goddard College website at <http://www.goddard.edu/permaculture>, email admissions@goddard.edu or call 800-906-8312. The PINA PDC curriculum is available on the PINA website at <http://pina.in>. PDC instructors who want to have their PDC recognized by PINA should contact PINA via the website.



University students touring an established homestead in Paoli, Indiana. Photo by Rhonda Baird.

International Convergence Reports

Understanding the Ebb and Flow of Permaculture

David Holmgren

David Holmgren delivered his opening address to the IPC Conference over a Skype link to his home in Hepburn Springs, Australia.

WELL, GREETINGS FROM HEPBURN SPRINGS to everyone gathered at this IPC, which I am confident will be a very well organized event. Those of you who have read my essay “Why I am Not Flying (Much)” (holmgren.com.au/why-i-havent-been-flying-much) will understand why I am not there. Of course, although I have been a critic of the down sides of fossil-fueled globalization, I really experience it as a privilege of the current era that I can contribute to this global meeting from a small village that might seem at the end of the Earth, at least from the perspective in London.

I wanted to reflect on how understanding the ebb and flow in the adoption of permaculture, and its spread over the last 40 years, can inform our plans with permaculture in the future, a future full of challenges that can be turned into opportunities. The waves of adoption and spread of permaculture over the last 40 years have been strongly correlated with large-scale geopolitical and economic cycles and events.

...it took the Global Financial Crisis to create the fourth wave which is now unfolding....

It's interesting that *Permaculture One* was published in 1978, bracketed between the oil crises of 1973 and 1979, and strongly informed by the *Limits to Growth* work which was published by the Club of Rome in 1972. There was a huge interest in what today we would call sustainability, and I am certain that if *Permaculture One* had been published a decade later, there would not have been the same interest. I date the end of that first wave of permaculture as being 1983, when the Paul Keating government introduced the Thatcher/Reagan revolution with a bit of a human face in Australia, and a whole generation of environmental activists came to the conclusion that the limits of

Publisher's Note:

resources were not going to lead to a fundamental change in society. There was actually a consolidation period during that time in permaculture—it didn't expand very rapidly as the Western economies again grew.

The second wave I really relate to the stock market crash of 1987 and IPCC (The International Panel on Climate Change) being formed in 1988 with the formal recognition of climate change. That was the same year that Mollison's encyclopedic *The Permaculture Designer's Manual* was published, and there was a huge explosion of interest in Australia and many other countries around the world. Ironically, I date the end of that second wave as being the Rio Earth Summit of 1992, which so many people put so much hope in.

By the late 90s, I sensed a third wave, which had both the oppositional sides, and the positive sides as well. My book *Principles and Pathways Beyond Sustainability*, published in 2002, coincided with that, but in many ways that third wave was still-born by the events of September 11, 2001. Really, it took the Global Financial Crisis to create the fourth wave which is now unfolding after the peaking of conventional oil, the onset of real climate change, and economic contraction.

This history suggests that the future form of permaculture will be shaped more by these forces than the desires and plans of individuals or organizations. As the limits to growth crisis is unfolding, the inevitable transition to a renewable energy future in some form holds a lot of uncertainties. If that transition follows the energy transitions of the past, the last 250 years, to higher quality, denser, more reliable energy, then I predict that permaculture will remain as an ethical or lifestyle choice of a minority in a conflicted but materially abundant world. On the other hand, if the renewable future is one of energy descent, then permaculture in principle, if not name, will become normalized, adaptive behavior for rediscovering our place in nature.

So we might all have strong opinions, hopes, and fears about possible futures and how to shape them, but the necessary transformation, I believe, is as much an external process as an internal one. I think seeing energy descent as an opportunity rather than a problem, might just be the largest and most significant contribution of permaculture thinking to a prosperous way down for humanity. Δ

Abundance from Small Spaces

Graham Bell

THIS ARTICLE DERIVES from three sources: the blog I wrote for FAO (Food and Agriculture Organization of the UN) to advertise the 12th International Permaculture Conference (IPC-12) during the UN Year of the Soil (www.fao.org/soils-2015/blog/the-answer-lies-in-the-soil/en/); my presentation at IPC-12 (grahambell.org/the-answer-lies-in-the-soil-2/), and 30 years of my life spent creating forest gardens and fertile soils and helping others do the same on four continents. I should say ‘we,’ rather than ‘I,’ because many people have contributed to this garden, not least my wife and children Nancy, Ruby, and Sandy.

I called my presentations “The Answer Lies in the Soil.” And it does.

First of all, though, we need air and water. Without these two things, we can’t live today. So clean air and clean water in sufficient quantities are prerequisites for sustainable human life. However, for long-term survival, we need soil. Not just any old soil—we need enduring, well nourished, and nourishing soils which just keep getting more and more fertile. In fact, soil is demonstrably the true foundation of civilization—that is, fertile, accessible, living soil.

For soils to feed us well, they need themselves to be fed well.

The answer lies in the soil.

Soil and life—neglect it at our peril

We neglect soil at our peril. Within historical memory, Syria was a forest kingdom (1), Iraq the birthplace of agriculture (2), and Libya, the breadbasket of the Roman Empire (3).

I expect anyone reading this article will be familiar with the essential components of soil: the mineral fraction (sand, silt, clay), humus, air and water, and adequate soil structure to admit and retain these.

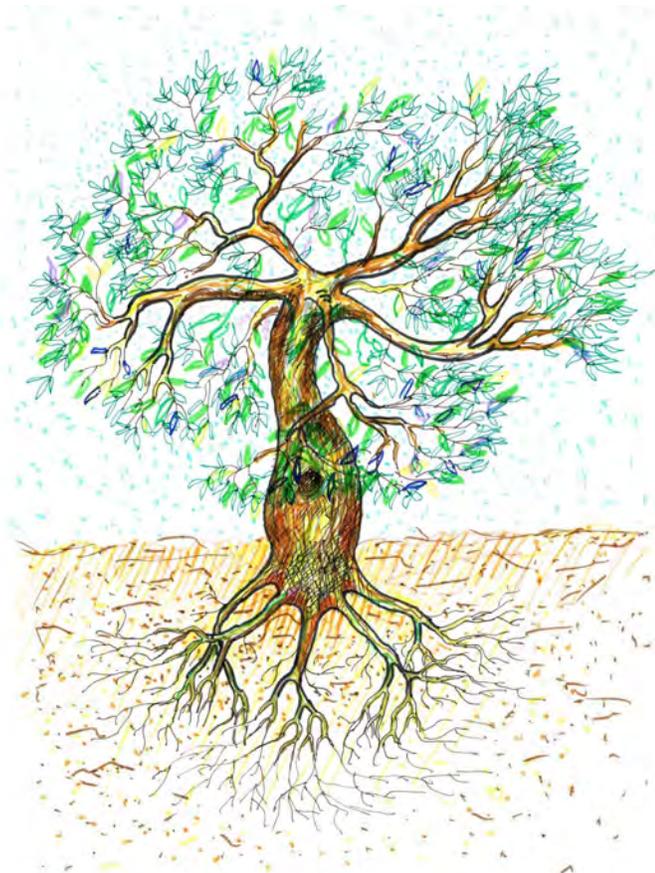
But the most important constituent, the one that resists erosion and minimizes workload the most, the one which makes nutrition most available to plants and animals alike, is the life in the soil itself: both the web of life and the products that come from the ending of the life cycles of all the living creatures in the soil. And they are myriad.

Does your tree have roots?

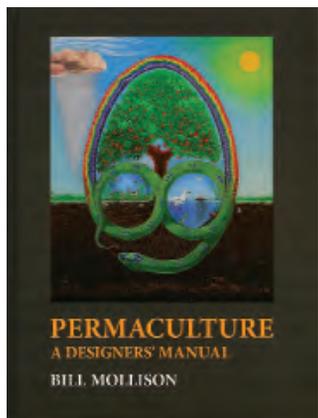
For many years now, we have started permaculture design courses with a light-hearted “entrance exam,” part of which is to ask people to draw a tree—not as a contest in drawing skills or species accuracy, but looking for one thing only. Does their tree have roots? Once folks get this, they become much more aware of the earth beneath our feet and how so much of what we depend on is not (in ordinary circumstances) visible to us.

The life in the soil may be millions of individual organisms in a single handful. Animal and plant life coexist in a constant process of exchange. Plant and tree roots provide the most astonishing marketplace, where bacteria, other roots, nematodes, earthworms, etc. mingle in the jelly-like rhizosphere doing what they do best. Green-leaved plants ensure their energy supply by producing sugars through photosynthesis which they may swap for nitrogen (nitrogen to make amino acids to make proteins) from air in the soil harvested by (for example) leguminous plants.

We all know legumes produce nitrogen, don’t we? No? Of course they don’t! Bacteria, staying in the little root nodule hotels that the plants produce, do that job. And hugely significant are the largest living organisms yet found on Earth. Blue whales?! No, fungi—not mushrooms, which are only fungal fruiting bodies, but hyphae and then mycelium, vast underground networks of whitish thread-like material [largest yet discovered: 965 ha (almost 2,500 acres) which would accommodate a whole lot of blue whales] (4).



Tree drawing helps us gauge our understanding of soil life.



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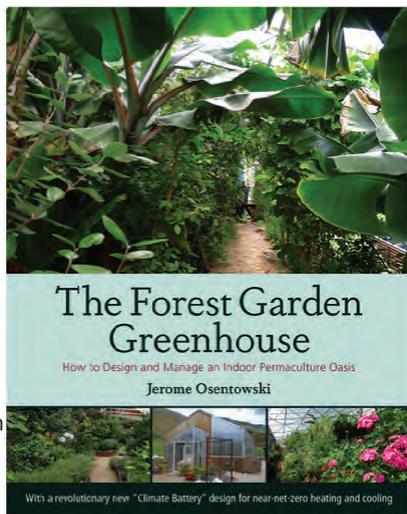


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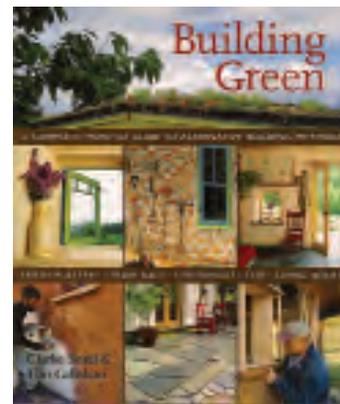
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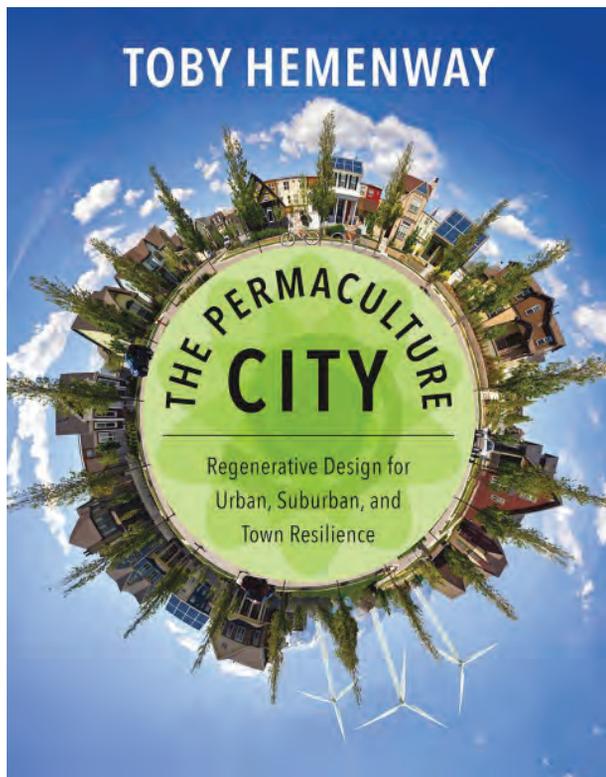
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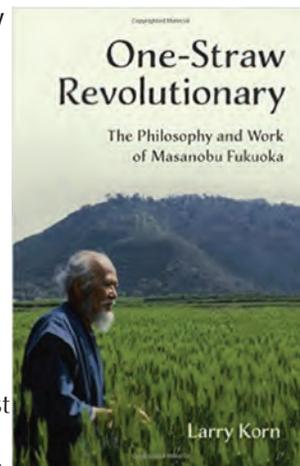
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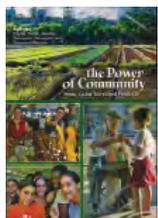
An excellent work that should advance permaculture's credibility and acceptance, The Permaculture City provides a great guide to local action and big-picture thinking at the same time. —Peter Bane

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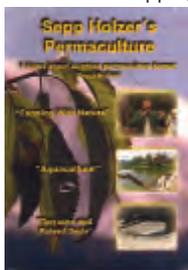
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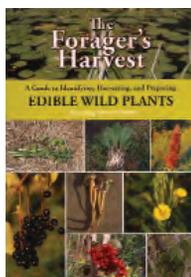
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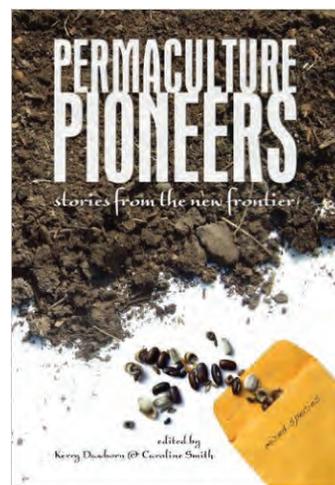


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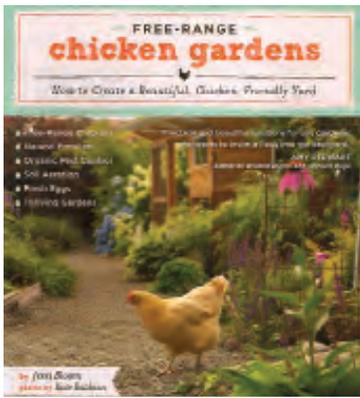
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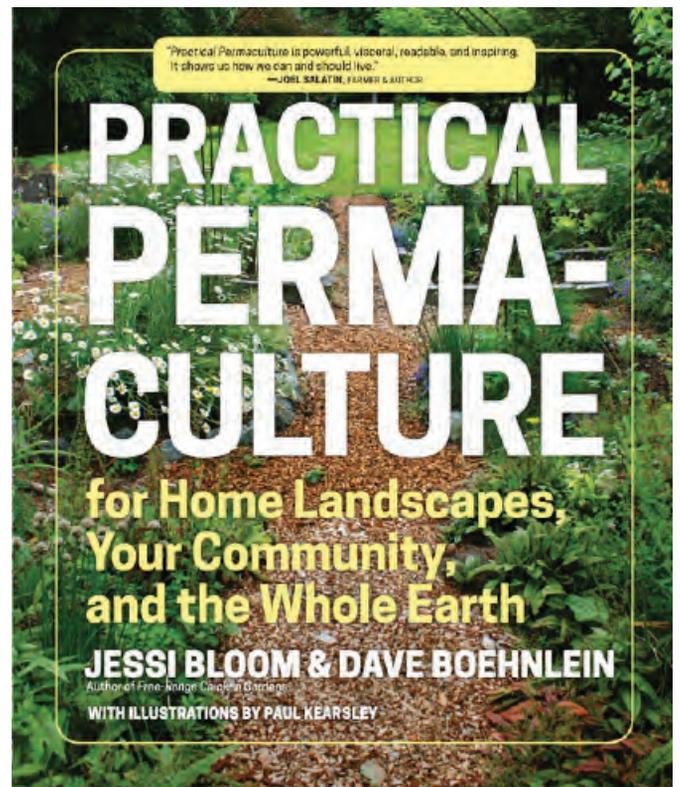
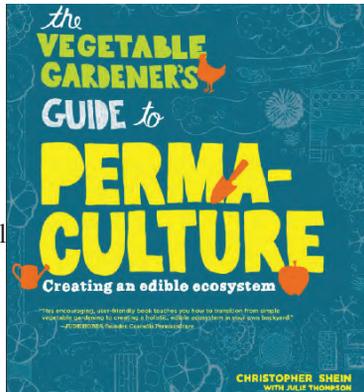
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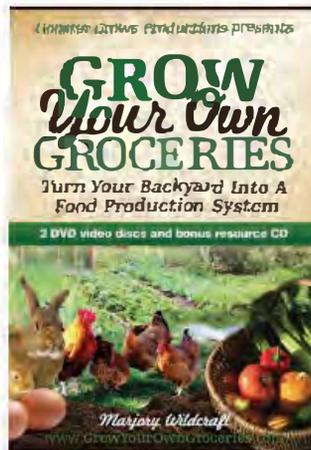
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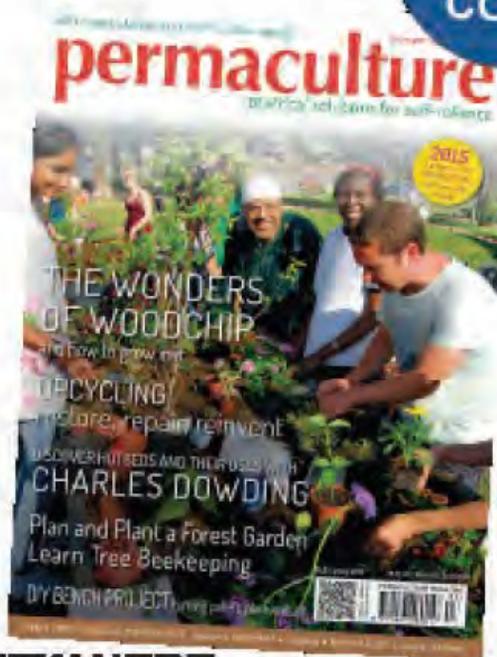
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Healthy soil brings abundance

I talked at IPC-12 about our experience and recorded research at Garden Cottage in the Scottish Borders (5): 800 m² (rounds up to one-tenth of a hectare or one-fifth of an acre for folks who still think in Imperial) which has so far this year produced 1.2 metric tons of food (that's 14 tons per ha), all our firewood, and 5,000 plants and 500 trees a year for sale in our nursery—oh, and a vast harvest of rainwater and half our electricity—plus a soft living room, playspace for adults and grandchildren, an open air classroom, a wildlife haven, and a place of general wonder.

With a thousand visitors a year, we are often asked three things: “Where is your worm farm?” “Do you keep bees?” and “What companion planting do you use?” Hmm... “companion” from the French meaning those you eat bread with. Answer: all our trees and plants are companions. Worm farm? You're standing in it. We estimate a worm population of two tons—based on the work of Charles Darwin (6)—but that's another story, which is the same weight as at least 20 big strong men. Worms are a bit slower in winter, but they don't take tea breaks, weekends off, fail to get out of bed, or insist on six-hour days. And they're free—best WWOOFers we ever had. And bees—well, we have at least 20 species, and they keep themselves, and very healthy they are, too.

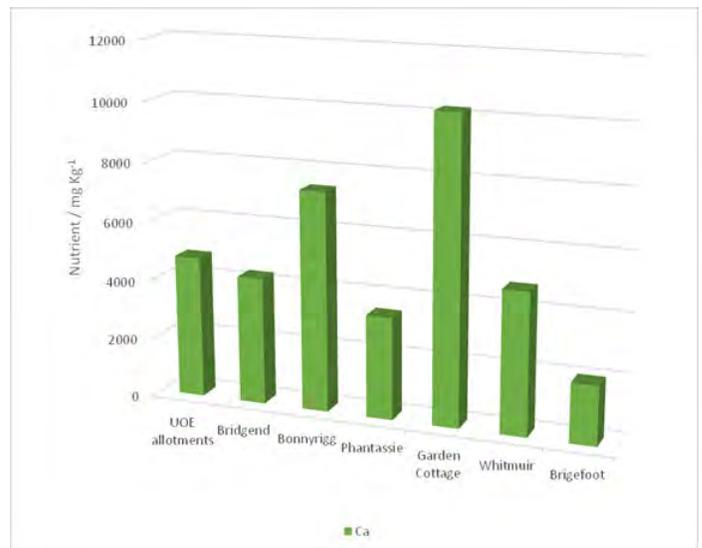
It's all about habitat. If you create the right habitat, you get what you need. I often ask people, “What is the biggest predator in this garden?” The answer, of course, is “us”—because that's what it's designed for. Before we were farmers, we were hunter-gatherers. What the word “forest” (from the Anglo-Norman) means is not trees at all, but “the king's hunting ground.” So, what we are doing in creating forest gardens is to get ourselves back as close as we can to being hunter-gatherers: less work, more harvest, no pollution, making the system as self-fertile as possible, recycling wastes into nutrients, and entirely dependent on the best nuclear reactor of all—the sun, and on the rain (or other precipitation) and wind cycles which are driven by the sun's energy.

If the soil biota are our work force, the energy management bosses are surely the trees. If you do only one thing to realize your permaculture dream, plant some more trees, and more again. Trees and the continental shelves of our oceans are the things that make life possible for humans on Earth by harvesting carbon dioxide and creating oxygen. They ameliorate the extremes of climate. Continental shelves we can't manage (except to stop killing them through water-borne pollution), but trees we can.

Research

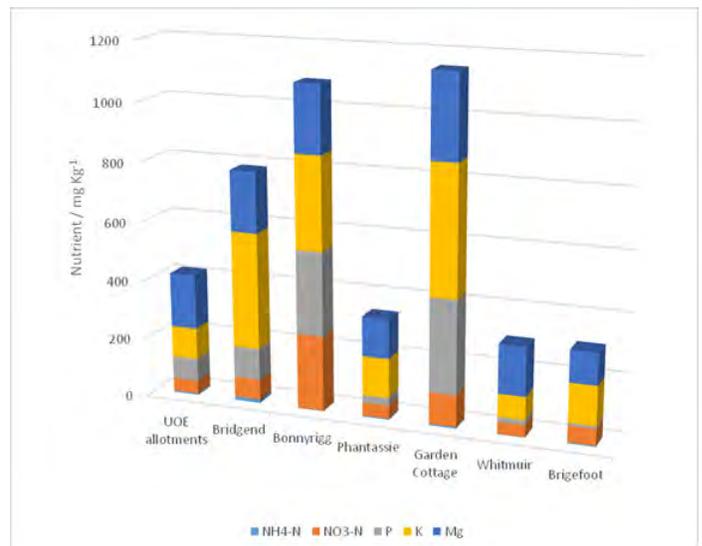
It's not a lot of good making extravagant claims about what you do if you don't do research to support your theories. All you really need to do is measure things (in as simple a way as possible) and document them.

So, for several years now, we have been weighing everything we harvest by the month, by species and cultivar (in some cases)



Calcium levels on seven comparable organic sites in Scotland 2014.

and recording them in spreadsheets. We are the same latitude



Levels of five key nutrients on seven comparable sites in Scotland 2014. Ammonium nitrogen (NH₄), nitrate nitrogen (NO₃),

as Moscow and Alaska you might care to notice, in the Scottish Borders. As I am writing, it is the end of October 2015, and we have had one of the coolest summers I can remember (10°C or 50°F in July—it was warmer in February). Despite this, we have our highest yield ever: 1.2 metric tons as mentioned above, and two months of the year to go. You can check the yield records here: grahambell.org/the-red-shed-nursery/garden-cottage-research/. A big challenge for us is preserving food so that this yield (which mostly happens between June/July and October) can be enjoyed year-round. We have now started teaching food preservation courses to help others do the same.

How can we achieve this? Well, the answer does lie in the soil. Soil surveys done (by a student from Edinburgh University plant sciences course) on seven productive organic sites around



Shiitake mushrooms from Garden Cottage 2015.

Scotland yielded the following results for major nutrients. Calcium is shown separately as it's much more prevalent than the others.

Notice Garden Cottage is significantly out in front. How is this achieved?

- Avoid bare soil as much as possible.
- Feed soils top-down through mulching.
- Minimize tillage.
- Tread lightly on the land.
- Create habitat for songbirds.
- Create habitat for invertebrates.
- Encourage flowering plants.
- Learn about and treasure “weeds.”
- Respect all the layers of the forest garden.
- Encourage fungi.
- Practice polyculture at every opportunity (there's a world of difference between organic sequential monoculture and what we do).
 - Know your plants.
 - Plant trees.

And what do you get? Well, we are what we eat. Measured from last year's harvest on a quick analysis:

soft fruit	21 species	60 varieties
herbs	16 species	30 varieties
vegetables	47 species	80 varieties
salads	62 Species	100 varieties
top fruit	10 species	90 varieties
nuts	6 species	10 varieties
fungi	still counting...	

On the species front, a little more detail: there are 35 species of birds that nest in this small space, another 20 who come for their lunch and 20 more who come on their holidays. Then add in thousands of species of invertebrates—literally.

Bugs are not going to inherit the earth. They own it. So we

might as well make peace with the landlord. Thomas Elsner

This garden for many years took two hours a week. Now that we're traveling less and harvesting it more intensively, it takes two days a week. This abundance springs from the intense focus on creating as much life as we can. There are no bad plants or bad insects in our garden. They are all part of God's creation (whichever God you believe in). If you create an abundant habitat, you get an abundant harvest. Let nature do its work, and it will. △

Graham Bell lives and works in the Scottish Borders. He and his family have created a forest garden, now approaching its 25th anniversary, which provides a great deal of food, fuel, and company (wildlife). He has written two books on permaculture: The Permaculture Way and The Permaculture Garden, which thousands of people have enjoyed as easy introductions to what permaculture means in a Northern temperate climate and the society that goes with it. He has taught permaculture on four continents. For more information, visit his website—visitors are welcome on open days, courses, and by appointment (www.grahambell.org).

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How does permaculture stack up in the real economy? A New Framework for Sustainability

Kristín Vala Ragnarsdóttir

ONE THING I HAVE DISCOVERED since I got out of my box of geochemistry in the year 2000 and began learning about sustainability issues, is that the Earth can be viewed as shrinking. In the year 1900, we had approximately one and a half billion people on Earth, each one of us had just under eight global hectares to support our food, waste, and consumption. Now, we have over seven billion people, and we have less than two global hectares for each of us. Collectively, we are using 1.6 Earths every year, as the Global Footprint Network has calculated (Global Footprint Network, 2015). This is what is causing the crisis we all face today.

The Stockholm Resilience Centre and collaborators define nine global boundaries, and we have already surpassed three: biodiversity loss, climate change, and the nitrogen cycle (Rockström et al., 2009; Steffen et al., 2015). We see exponential growth everywhere, as shown with the curves in Figure 1. Whether we look at global population, Gross Domestic Product (GDP), urban population or the number of MacDonaldd's restaurants, in the period from 1750 to 2000, all the curves look the same.

We need to address all of these in order to have a sustainable world.

We need a new development framework, and as I started looking into what a geologist could do, I realized that it was not enough just to look at nature. I needed to investigate other issues, including the economy. Kenneth Balding stated in the 50s, "Anyone who believes that unlimited growth is possible in a limited world is either a mad man or an economist." And his colleague at the University of Boulder, Arthur Allen Bartlett, stated many times, "The greatest imperfection of mankind is that it does not understand the consequences of exponential growth." It follows that we need to address the consequences of exponential growth in the education system, and from there we need to conceptualize a new

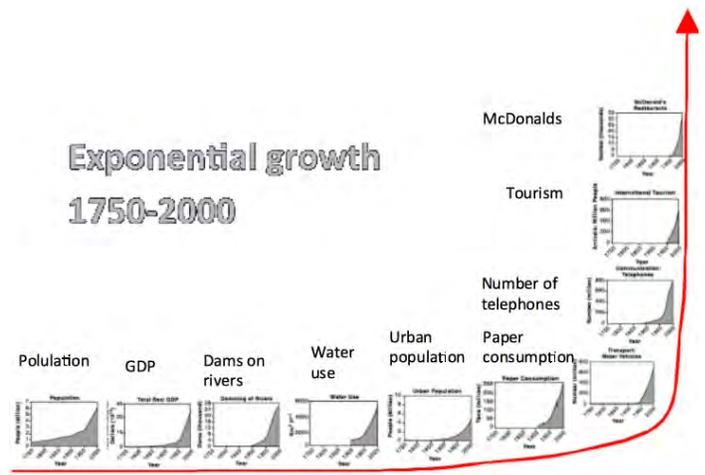
framework for development.

When I started looking into what sustainability really means, I found such a framework, created by my friend Alan AtKisson, in the form of a compass (Figure 2; AtKisson, 2010). On the compass, north is for nature, east is for the economy, south is for society, and west is for the well-being of people. We need to address all of these in order to have a sustainable world. If we plot the ethics of the permaculture movement on this compass, earth care, fair share, and people care all fit very neatly.

For the last five years, I have been working on the current availability of natural resources and how long they will last, how they are linked to the economy, and what sort of new economic systems we need. I have also been working on the UN Sustainable Development Goals (2015-2030) and what a society that achieves these goals might look like.

Natural resources and Peak Everything

At the basis of our economy are natural resources. You could say that energy (or oil) plus phosphorus creates food and people. Work and energy can turn resources into wealth, and on top of this wealth, we can build a creative bubble of culture; without the basic resources, we could not have an economy. We can make an analogy with trophic levels of an ecosystem, where the first level is primary production—the energy and food that creates the



Exponential growth curves 1750-2000. From AtKisson, 2010.



The sustainability compass (AtKisson, 2010, 2015) with the permaculture ethics.

people—and the secondary production is work, and the third tier is civilization. Until now, we have had plenty of primary resources, but the time has come to investigate how long into the future we can continue to have our current economic system as these resources begin to run out.

Over the past few years, I have been working with Harald Sverdrup, a Norwegian engineer and system dynamics modeler, to analyze over 40 natural resources and how long they will last (Sverdrup and Ragnarsdóttir, 2014). It is very similar to the work of Donella Meadows and Dennis Meadows and their colleagues in *Limits to Growth* (Meadows et al., 1972). If we analyze where we are today, we have followed the ‘Standard Run’ scenario, one of the scenarios the Meadows and their team proposed—also referred to as the ‘business as usual’ scenario. Forty years on, we are right on track for this scenario, which is not good. In the Meadows analysis, they ran energy and all the other resources together, and looked into the consequences of population growth and the use of resources. In our analysis all the resources and energy are separated because computer capacity is now greater. When they ran their model, it took three weeks at the biggest computer in the US at MIT, but we can run our model on a laptop in seconds! Our work just came out in *Geochemical Perspectives*, it’s over 200 pages long (“Natural Resources in Planetary Perspective”).

Can we have unlimited growth? Figure 3 uses a logarithmic plot: if you take the log of an exponential curve, you get a straight line. You can see that the annual production curves for all these resources from 1900 to 2010 continue to rise and rise and rise as near straight lines. If annual production growth is 7%, then production

doubles every ten years. In other words, after just ten years, the additional production is greater than the entire production that existed before. If you think that this can continue forever, then we will start mining away large parts of the mass of the Earth, and of course that is not possible.

Indeed, we have already passed peak oil. We’re about to pass peak coal, which means we will pass peak energy. This occurs because we can never produce as much renewable energy as the cheap oil we have had. We will reach maximum resource production, and then we go down to the other end of a normal curve, but where the resources are much more difficult and expensive to mine.

It doesn’t matter how much we complain—this is where we are. We have consumed half of the oil. The same is true for all the other resources that we investigated; we have either reached peak production, or we will reach it very soon—in most cases before 2030. We know

We need to address all of these in order to have a sustainable world.

pretty well how much is available of all these resources. This is very well collated—both by mining companies and various geological surveys. Among these coming production peaks is phosphate, which we use for fertilizer. We have already passed peak tilled soil. This is why permaculture is so important. We have used and destroyed half of our soils. We will not have industrial fertilizers much longer because they will be too expensive for most people to use.

If we continue with business as usual (BAU), how long will these resources last? Table 1 shows over 40 resources: everything that is colored red will be completely consumed within the next hundred years. If it’s colored dark orange, the supply will last between one and two hundred years. If it’s light orange, it will last up to a thousand years. It’s only when there is over 10,000 years remaining supply that a resource gets colored dark green. So the only way to ensure an on-going supply of all these key resources is by recycling, and we are not very good at that. The second column shows recycling at 50%, making resources last a bit longer, and the third column 90% recycling, so they last even longer. 95% recycling gets into thousands of years supply for most resources. Then, if we decrease the population by half, as shown in the fifth

column, they last even longer. These are scenarios to show that population is important. In the final column, we have a scenario of half the population, half the consumption that we currently have, and 95% recycling. These three factors: the consumption level, the population level and the recycling level, determine how long these resources can last.

More recently, as stated above, we have built a WORLD system dynamics model, similar to *Limits to Growth* but in much more detail. We have population, economy, and resources, and a food module, as well as an ecological module. We have tested our WORLD model back to Roman times. For example, we looked at the actual amount of silver in coins in ancient Rome, and then we modeled the relative Roman army size, cash flow, and so on. We found we could actually predict the great economic crashes, we were able to predict the fall of the Roman Empire, the fall of the Russian Empire, and the British Empire was dismantled just before they collapsed—maybe they knew what they were doing!

GDP, happiness, and equality

Of course, it would be nice if by consuming all these resources we had generated equal societies, but what do we find? Globally, GDP has risen steadily by about 3%, but the General Progress Indicator (GPI), which subtracts all the negative effects of the economy, such as environmental destruction from industrial activity, and adds on positive inputs like voluntary work, has leveled or even gone down since the 70s. Therefore, GDP is not a good indicator for the success of nations.

GDP in the US has continued to grow since the early 70s, even though oil production peaked—that growth is built on debt. In other words, we have been raising debt to ensure that we're having economic growth. We have created societies with incredible inequalities between countries and also within countries. We have a financial system on steroids where the GDP globally is £63 trillion (about \$100 trillion), but £600 trillion (almost \$90 trillion) are traded as futures and derivatives—future resources which probably do not even exist are being traded. This whole system is operating legally, and gambling with our money and our future. There are currently shaky markets all over the world. When we will have the next collapse I don't know, but it might be soon.

Moreover, it is clear that in unequal societies, we also have many more societal problems. Countries like the US, Portugal, and UK, which are very unequal, also have very high health and societal problems. Countries with low inequality, like Japan and the Scandinavian countries,

have lower societal and health problems. Also, if you look at the happiness of people since the 50s, it has not really changed. Maybe it has even gone down, but the income level has gone up. Money does not make us happy.

How did we get here? We have had this very linear way of thinking—we dig up a natural resource like phosphorus in one country, we make fertilizer in another, we dump it on farms around the globe, it goes into rivers and causes algae blooms and death zones in rivers and coastal seas. What we need to do is recycle everything, also phosphorus. If we recycle, then we have the basis for the circular economy that the EU is now working towards. In industry, we need to learn from nature and create industries that use the waste of another industry for their production material.

This is all possible. We just have to put our minds to it. Resources are the basis of the economy, and we always need to remember that.

The Gelato Society

In 2012, I got an incredible email from the Prime Minister of Bhutan, signed by the King, inviting me to

Element	(1): BAU	(2): 50%	(3): 90%	(4): 95%	(5): 95%+3bn	(6): 95%+
Bulk materials for societal infrastructures						
Iron	158	254	1,285	2,574	6,007	
Aluminium	132	372	1,876	3,756	8,764	
Nickel	82	82	424	851	1,986	
Copper	83	83	317	638	1,488	
Zinc	38	72	372	748	1,745	
Manganese	35	38	306	616	1,437	
Strategic materials for technology						
Indium (Zn-dependent)	35	74	385	771	1,798	
Lithium	47	90	496	997	2,325	
Rare earths	924	1,759	8,809	17,622	41,147	
Yttrium (REE dependent)	120	616	1,235	2,473	5,770	
Hafnium (Zr-dependent)	12,649	12,649	25,303	50,609	118,087	
Zirconium	133	214	1,085	2,173	5,071	
Tin	38	59	304	611	1,425	
Molybdenum	46	289	728	1,459	3,405	
Rhenium	99	99	252	507	1,183	
Lead	43	81	181	365	852	
Wolfram	62	102	523	1,049	2,447	
Cobalt	227	365	1,840	3,683	8,594	
Tantalum	346	556	2,795	5,594	13,053	
Niobium (Mo-dependent)	88	143	731	1,466	3,420	
Helium	18	32	175	353	823	
Chromium	175	262	1,310	2,600	6,100	
Callium	1,017	1,425	7,139	14,292	33,325	
Arsenic	60	123	627	1,258	2,936	
Germanium	201	282	1,425	2,854	6,559	
Titanium	813	813	4,078	8,160	19,039	
Tellurium	784	784	3,942	7,888	18,405	
Antimony	49	69	354	711	1,658	
Selenium	422	8,500	19,690	39,380	94,690	
Precious metals						
Gold	94	94	142	225	1,693	
Silver	38	38	94	142	1,012	
Platinum	145	145	442	2,223	5,187	
Palladium	121	121	369	1,860	4,340	
Rhodium	86	86	266	1,343	3,135	
Fossil energy resources						
Oil and gas	100	-	-	-	330	
Coal	174	-	-	-	574	
Uranium	121	240	1,215	12,184	28,400	
Thorium	379	747	3,746	37,500	87,500	
Planetary life support essential element						

Calculations of how long resources will last: 1) business as usual, 2) 50% of the resource is recycled, 3) 90% recycling, 4) 95% recycling, 5) 95% recycling and population down to 3 billion, or 6) 95% recycling, population 3 billion and only half of the current use. From Ragnarsdóttir et al. (2012).

the UN. I and many hundreds of sustainability experts discussed how we could put the Gross National Happiness (GNH) measure of Bhutan, which is a societal indicator that they use instead of GDP, into the UN Sustainability Development Goals (SDGs) that were then in preparation. In 2013, we continued this discussion in Bhutan. Sadly, we didn't quite achieve the incorporation of GNH into the SDGs, because the government in Bhutan changed, and the new Prime Minister didn't think that GNH was so important and perhaps GDP was important after all—this is how politics can change the course of events. However, we did send a report to the UN (International Expert Group to the Government of Bhutan, 2013). Inequality (Goal 10) and well-being (Goal 3) are among the agreed goals from September 2015 (UN Sustainable Development Goals 2015-2030).

From this beginning, a group of us formed the Alliance for Sustainability and Prosperity (ASAP) in 2013. We have been writing papers together. For example, one paper in *Nature* (Costanza et al., 2014) and another in *Geoscientist* (Ragnarsdóttir et al., 2014) explore how a society committed to the Sustainable Development Goals might look. Basically, we need to live within the Earth's support system—we need to have society and economy within Earth's boundaries. The ultimate goal would be sustainable, prosperous, and equitable well-being for humans and the rest of Nature. We could do that by including all the capital aspects natural, built, human, and society to build a living economy—that is to say build on ecological economics principles. We would have a new development paradigm that aims for ecological, sustainable and fair distribution, regenerative economy, and living democracy. We would meet all human needs. We would teach happiness skills, and then this ultimate goal could be reached.

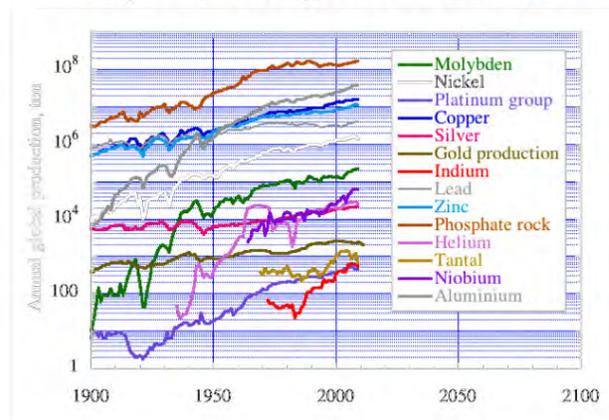
We have classified the various targets in the SDGs. There are 17 goals and over 100 targets. We have considered how they are linked with the natural, social, and economic capitals. We have dreamt up a society we call the 'Republic of Well-being,' or the 'Gelato Society,' that was recently featured in the British newspaper *The Guardian* (Fioramonti et al., 2015).

So why the Gelato Society? Because everybody likes ice cream! Our model sees the ecological life support system as the ice cream cone—society is one scoop of ice cream, and the economy is the other, all three are in balance. Who wouldn't want to live in the Gelato Society? We would work on nature regeneration and the regenerative economy. Business would have environmental responsibility policies. Nature would have its own rights, like human rights, as already established in Bolivia, Ecuador, and New Zealand. We would map the

environmental and economic effects of electoral programs, put sustainability in our constitutions, create living democracies, and would be committed to the SDGs and thriving ecosystems and human well-being. I welcome all of you to this new society!

However, it's complicated to get there, because some of the SDGs may interfere with the others. So now I have a student working with me doing systems analysis on the SDGs and all the individual targets. What struck us straight away is that natural resources aren't really within the SDGs, and neither are equality or corruption or social trust. There is something missing that we need to point out to those who want to achieve the SDGs. The ideal ethical principles for the Republic of Well-being are the permaculture ones: earth care, fair share, and people care

Exponential growth forever?



Annual production of 14 natural resources. The logarithmic plot shows near straight lines of exponential growth of 3.5-7% per year.

which I showed in Figure 2.

Reasons to be hopeful

There are many hopeful signs. There is a lot going on around the world. For example, the EU is now aiming for the circular economy. There is a huge de-growth movement in France and Spain. China has a new constitution stating that they will build an ecological society. There are parallel currencies sprouting up. Different economies such as sharing and solidarity economies are emerging. Of course, we have the Transition Towns, ecovillages, and permaculture—all going in the right direction. People are claiming the rights of the commons through, for example, the initiative of "Claiming the Sky" (Costanza, 2015): we should claim the atmosphere as ours and sue polluting companies. There are just 90 companies that emit 70% of the CO₂ and

other greenhouse gases, so that's fairly easy to do. Join us please, sign Claim the Sky! We have young people suing the governments in the Netherlands and the US and winning. The courts are telling governments that they have to think about young people and their future and curb greenhouse gas emissions. We have the "Eradicating Ecocide" campaign, led by British lawyer Polly Higgins. My latest fun activity is to train 12 PhD students in new economic thinking. For the Republic of Well-being, permaculture ethics are absolutely at the core. Resources form the basis of our economy: we need to close the inequality gap and focus on corruption. The economic system is undergoing amazing changes—going from complex and often corrupt and global to simpler, ethical, and local. In spite of all the challenges we face, I am an optimist for achieving a new development paradigm. Δ

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A Guided Tour of The Central Rocky Mountain Permaculture Institute

Jerome Osentowski

We have forgotten what rocks, plants and animals still know. We have forgotten how to be—to be still, to be ourselves, to be where life is, here and now. Eckhart Tolle

MY FAVORITE PLACE is in the aspen groves. This is where we really get our inspiration for forest gardens—where we look at the models of how the natural world grows and what the combinations are, how they interact and co-operate—the over-story and the mid-story. I love to immerse myself in the landscape and bring it totally into my awareness; nature reciprocates, and you are no longer alone.

On the site where I started my forest garden, back in 1988, you can see the succession. You can see the red clay soil in the background that I started with, my one acre of land, my first greenhouse Pele. In front of that, we grew spinach, basil, herbs, and plenty of salad greens for 15 years. We did lots of the research and market development for the diverse salad greens



We get our inspiration for forest gardens from models of how the natural world grows.

that people eat today. We grew a variety of crops every year in simple cloches. It was USDA climate zone 3 back then—now we're zone 6. I even have some zone 6b areas in my forest garden just from creating microclimates.

Fast forward to today—the forest garden is bursting out over the entire one acre. The centerpiece is my new greenhouse which is tropical, and behind that, my passive solar home. There's another greenhouse attached to the house which is Mediterranean, and there is a 6.3 kW PV system mounted on the roof of the house. The landscape around me has not changed, but we have built up our soils over the last 30 years. In front of our Mediterranean greenhouse, we plant medicinal plants. On the east (right) side of the greenhouse, we have four different grape vines spilling onto the greenhouse. Further to the east is more of the forest garden all the way to the fence line. So there's a lot of abundance—we actually had to use machetes this year to get in and clear out some of the growth. It's like being in the

...I think with climate change all of this fruit will be moving to higher elevations.

tropics, but this is at 7,200' (about 2,500 m) in the arid high-alpine region. Inside this greenhouse is the fig forest—we get five months of fresh figs and enough propagation material for up to 50 new trees for our nursery each year. The large fig leaves intercept the solar radiation so that there are no cooling problems for the passive solar home and the greenhouse. This is a much more efficient solar collector than the PVs on the roof, which are only 30% efficient. The fig tree is a good example of multiple functions for a single element. This greenhouse is probably the most productive square footage we have on the property, and requires the least amount of maintenance.

We have a small pond that creates another microclimate: the ducks are swimming in their dinner, the duckweed. On the other side of the pond, it is climate zone 6b. The sun in the spring hits the water, reflects upwards, and you get double sun onto the rocks. I have all these exotic temperate zone plants over there that I can't grow any other place in the forest garden (persimmon, Asian pear). The piñon pine in the center of the photo also acts as a trellis for a large rosette grape that climbs to the top of

the tree. Last year, we harvested a couple bushels of grapes as well as pine nuts. We have 25 different varieties of grapes on the property, with over 50 producing vines. They are mostly table grapes, but I think with climate change all of this fruit will be moving to higher elevations. A lot of the vineyards and peach orchards at lower elevations in Colorado already are losing their fruit every other year due to late frosts—it could become harder to sustain a viable business at lower elevations. When in doubt, go higher.

In this now-lush landscape, the sloping land and the terraces we've built allow us to take advantage of stacking, so that the plants can all get the required amount of sun they need to thrive. In addition, the rock walls that support the terraces create microclimates.

Sometimes, you have a very special gift from a seedling tree, like one of our seedling mulberry trees. I call it Basalt Mountain Bliss. It fruits for about three months. When I returned from the

The whole mentality of not mulching for the sake of aesthetics, being afraid of embracing nature, is so universal, and makes a garden more susceptible to pest problems, evaporation, and erosion.

IPC in late September, we were still eating mulberries. I have four or five other seedling mulberry trees, plus various grafted varieties planted throughout the forest garden, all in different microclimates to give us about five months of mulberry season. Most of the five-month-plus growing season, we have apricots. I have 20 varieties of apricots in various microclimates. We have early, late, and mid-season cherries, and the birds leave them for us to eat. Another gift from God is a plum peachcot which came from a seedling tree, so it's three-in-one: peach, plum, and an apricot taste! This was just a seedling I was going to pull up that was off to the side of our annual gardens, but I just left it there. We have to trust in the seed, and now we're saving all the seeds from every apricot, washing them, and putting them in the freezer, and we'll do that for most of the seedling trees except for apples. I have 20 varieties of apples! We salvage some of the 100-year-old heirloom varieties from down in the valley, and we graft them on to good rootstock. I have many good heirloom varieties myself.



Bananas fruit prolifically in the forest garden greenhouse.

Despite these bountiful harvests, we don't sell anything anymore. We burned out on market farming, and now we just give it away, swap it, or put it up for the winter. We have smoothies every day with bananas and figs.

Since the canopy for the forest garden is closing in, we need new beds for planting annuals. We're going up into the piñon and juniper forest. We received a grant to limb up an acre for fire protection, and we laid down all the small branches on contour, dug a trench behind that, and used that dirt to mostly cover the branches. We then heavily mulched the area and planted in either cover crops or annual vegetable production for the first year. Last year, we planted winter squash in those beds; now we've put in garlic, and then we'll move onto summer crops. We also plant mushrooms in between the swales. It's exciting to watch the evolution of these ecosystems. After a couple of years, we're now planting apricots and Siberian pea shrubs to move it into the first stage of a food forest. The deer and the turkeys come through and do minimal damage. We always plant extra grasses and legumes for the animals, who in turn leave behind some of their manure.

I experimented with bringing the forest garden into the greenhouse with my first greenhouse, Pele. In 2007, this greenhouse was destroyed by a fire, which was a blessing in disguise. I was able to rebuild with new technology and a new design with my indoor tropical forest garden, Phoenix. I salvaged all the steel for this greenhouse, and it was a community effort

to put it all together. To build our soils, we sheet-mulched the entire greenhouse, grew annuals for a year, and then transitioned into our perennial tropical food forest. It took less than a year of growing perennials for the entire thing to close canopy. It's got pomegranate, papaya, key lime, banana, and an understory of medicinal plants such as ginger, spilanthes, brahmi, and comfrey. *Spilanthes oleracea* is my favourite super-herb. On the north wall of Phoenix, we position the compost tea machine, aquaponics, propagation area, gabion wall, and water tanks—there's even a sleeping platform in the northwest corner.

All of the greenhouses we design and maintain function on near net-zero energy input with several methods of low energy heating, including the climate battery. The climate battery is a simple version of geothermal heating. In the daytime, warm air from the greenhouse is drawn into a series of pipes five feet below ground by electric fans powered by PV panels. Then, at night when the ambient temperature in the greenhouse drops to 50°F. (10° C), the same fans turn on automatically and push the cooler air down into the warm soil to be pumped back into the greenhouse at around 10°F. (about 6°C) warmer. In addition to this heating system, we have lots of thermal mass such as the patio, rock walls, water tanks, and aquaculture tanks. We also have a wood burning sauna and a pellet stove for additional backup heating as needed. On the north side of the greenhouse, we plant passionfruit or beans that shade the patio and position other thermal mass there so that we don't have to cool the greenhouse in the summer time; we just rely on natural convection. In the west side of the greenhouse is a tropical nursery, and we have worm farms in the pathways—there isn't one square foot that is wasted.

Outside the greenhouse, we have a small strawyard with ducks, rabbits, and chickens. The animals recycle our carbon, creating valuable mulch that we regularly spread throughout the forest garden. They eat cut-and-carry weeds, comfrey, nitrogen-fixing coppiced material, and our kitchen scraps so that we don't have to buy feed for the animals.

Let me say a few words about pest problems. I've gone through the whole gamut of doing all sorts of biological sprays,



Animals like ducks and rabbits are integrated into the greenhouse.

but compost tea gets rid of most pests. We foliar-feed with compost tea twice a month, which gives everything a boost. I first saw the GeoTea machine demonstrated in Hawaii. It's a 250 gallon (1,000 L) actively aerated compost tea machine that sits in a tote. We recently built a simple 60 gallon (240 L) one for \$50 with plans we got off the Internet. We put in worm castings from our worm farms, humic acid, kelp, sweetener, and some mycelium at the end. The mixture is aerated for 24 hours to multiply the microbes in an aerobic environment. We can also inject the compost tea down into the root systems with a special probe

I had the opportunity to get it all right....

that fits on a garden hose. We used to order beneficial insects, and now they have become naturalized in our greenhouse and outdoor in the forest garden. The lacewings, ladybugs, and beneficial wasps come in and out of the greenhouse in the summer and over-winter there.

Soil health is key to a healthy and thriving garden. We mulch continually to provide organic matter to worms, shredders, and soil microbes, creating a biomass-rich and healthy soil. Our society has become infatuated with the annual un-mulched garden. The whole mentality of not mulching for the sake of aesthetics, being afraid of embracing nature, is so universal, and makes a garden more susceptible to pest problems, evaporation, and erosion.

I'll finish with a word about my inspiration for the forest garden greenhouse. I worked in the tropics over many years, helping set up a demonstration farm in northern Nicaragua, where I traveled all over doing tropical consulting and growing. After the fire in Pele, I had the opportunity to get it all right, and I decided to take all the tropical plants that I knew about and liked to eat, and grow them right here on my property in Colorado. And now with the climate battery, we can do it with minimal fossil fuels. Many greenhouse companies are still building shells that are glazed on all sides—they just plug in a gas heater, and they don't think about saving energy. I've learned and continue to learn a lot through designing, maintaining, and growing in near net-zero greenhouses, and much of that knowledge went into my tropical prototype Phoenix. Phoenix and other private and commercial greenhouses that I have designed along with my business partner, architect Michael Thompson of EcoSystems Design, as well as many lessons I've learned from the maintenance of my system here, are all chronicled in my new book, *The Forest Garden Greenhouse*, available through Chelsea Green Publishing. △

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Can Arable Be Permacultural?

Federico Filippi

THIS CONFERENCE PAPER aims to explore the possibility and potential of permaculture principles for arable agriculture. It is based on my postgraduate research at The Centre for Agroecology, Water and Resilience (CAWR), Coventry University, and fieldwork at New Gokul Farm, Hertfordshire, England. The permaculture movement is generally not associated with arable farming; in fact it is often presented as its antithesis.

The definition of “agriculture,” and therefore its origins and meaning, can be understood from its Latin roots: the word comes from *ager*, “field.” Unlike “horticulture,” which comes from the word *hortus*, “vegetable garden,” agriculture very much refers to the maintenance and management of fields. Fields are usually associated with “arable” farming, a generic term generally used to refer to the mainstream conventional cultivation of annual staples, such as wheat and barley. Indeed the word arable comes from the Latin *arare*, “to plough” and an *aratro*, in modern Italian, is a plow. Therefore, from these basic definitions, it is clear that the basic features of arable agriculture are: it is a field- (as opposed to tree/wood/forest-) based activity; it involves tillage/cultivation of the soil; it is dominated by annual plants, especially grasses.

It is not the aim of this paper to dwell on the most valid definition of “permaculture.” For the purposes of this paper, permaculture will be understood according to uncontroversial definitions, as per mainstream permaculture literature:

A philosophy of working with, rather than against nature; of protracted and thoughtful observation rather than protracted and thoughtless labour; and of looking at plants and animals in all their functions, rather than treating elements as a single-product system (Mollison & Slay, 1991)

The conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability and resilience of natural ecosystems (Mollison, 1979)

Agriculture and permaculture

Permaculture literature abounds in its criticism of conventional arable farming. Permaculture literature also generally presents a negative view of agriculture per se, from its earliest history to the present day. While recognizing that the industrialization of agriculture is at the heart of agriculture’s main problems, the movement sometimes presumes that industrialization acted on an agriculture that was already inherently flawed.

Examples of this perspective are not hard to come by in the alternative agriculture literature:

Gamboling about the plain and forest, hunting and living off the land is fun. Farming is not. (Manning, 2004)



How do plough agriculture techniques fit with creating permaculture? Photo by Richard Pfeiffer and used under CC.

Sustainable agriculture [is] an oxymoron. (Hemenway, 2006)

10,000 years of conflict between agriculture and nature (Cox, 2008)

With the adoption of annual crops as the staple foods in our diet, humankind has indeed lived the biblical curse. (Shepard, 2013)

We have to accept that agriculture is an artifact and must always be artificial. (Tudge, 2014)

The gist of the permaculture critique is that agriculture is inherently unnatural, unsustainable, and ultimately doomed to failure. Industrialization has massively accelerated its negative trends, but it is not the cause of them.

Arguments for incompatibility

There are indeed some interesting and well supported arguments for the incompatibility of agriculture and permaculture.

For example, it is often pointed out that regular soil disturbance and exposed soil are not the norm and are uncommon in Nature (e.g., Fukuoka, 1978). The continuous turning and cultivation of the soil, which is undoubtedly a central feature of traditional arable farming, creates conditions that could not come about without human intervention. Similarly, as part of what I would call the “arguments from Nature,” it is observed that perennial plants, as opposed to annuals, dominate wild ecosystems (e.g., Holzer, 2004). Not only are annuals rarer than perennials, flora are generally very diverse; monoculture, which

is a main trend in agriculture, is uncommon in Nature where diversity is the norm.

Apart from arguments from Nature, another line of argument draws on historical, political, economic, and sociological sources (e.g., Diamond, 2005)

On the historical front, proponents of the case against agriculture point to examples of agricultural failure, both ancient (the Fertile Crescent) and recent (the Dust Bowl). It is suggested that the endgame of agriculture is failure, through loss of fertility, topsoil, and the onset of arid, harsh conditions. It is not a case of *whether* this happens, but *when*: those parts of the world where agriculture is still practiced are the Fertile Crescents of tomorrow (Shepard, 2013).

Nature will tell us whether an agricultural system is compatible with her laws or not.

It has also been argued that, historically, the adoption of agriculture has led to poverty, malnutrition, famine, and disease. This, supposedly, is the result of key factors such as: the hard physical labor inherent in agriculture, and its relationship with slavery; the close and unsanitary proximity of dense human and animal populations, which are inevitable in sedentary agricultural societies; rapid population expansion; the adoption of limited and unvaried diets based on the consumption of a few basic grain staples. Similarly, agricultural societies have been characterized by more inequalities and hierarchies. The hard labor required to build settlements and cities and to work the fields allowed for societies with, on the one hand, a vast class of manual laborers and, on the other, those who—no longer needing to grow food—could administer society; engage in art, writing, and other intellectual pursuits; and, command, govern, and engage in warfare. The predominance of storable staples, such as grains, also allowed for the trading of food, along with its hoarding and control by a minority within a given society (Hemenway, 2006).

The arguments from nature and those from the “humanities” meet at an interesting point: agricultural societies, it is claimed, as they deplete fertility and as their populations expand, always require expansion and the conquest of additional land to cultivate. Consequently, agricultural civilizations are inherently imperialist—imperialism has agricultural roots.

Arguments against incompatibility

While, without human presence, regular turning and disturbance of the soil would not normally occur, the extent, method, and consequences of soil disturbance and tillage vary enormously depending on the arable system: for every example of reck-

less cultivation, there are examples of carefully tended fields. Also, the assumption that regular soil disturbance is “unnatural” in virtue of the fact that it requires human activity is a weak one. Human activities always have an impact on soil, vegetation, and the overall makeup of the planet: don’t hunter-gatherer societies also select and favor certain trees and useful plants, clear forest patches, make fires, and hunt certain animals and not others? Where is the line between natural and unnatural drawn? Which human activities are unnatural or natural should arguably depend on an assessment of whether a given activity is compatible with the continuity and flourishing of life as a whole, on whether it is or is not compatible with the basic laws and rhythms of Nature. Ultimately, I would argue, Nature will tell us whether an agricultural system is compatible with her laws or not.



Intercropping in Kerala, India with coconut and tagetes erecta . Photo by Ezhuttukari via Wikimedia Commons.

Similarly, annuals are no less “natural” than perennials. Domesticated plants and animals are simply plants and animals that live in symbiosis with humans—no less natural or important than their wild counterparts. Is there any sense in which a squash or corn plant, that requires a human to collect its seeds, to cultivate and fertilize soil, and to protect it throughout its life, is any less natural than a wild grass or cactus? Does it not serve the same Gaian purpose as any other plant? It is also a mistake to presume that an arable farming system necessarily involves monoculture and lack of diversity: there can be a large diversity of domesticated plants and animals on a farm. Also, wild plants and animals can adapt and thrive in a domesticated environment—from the inevitable weeds that favor plowed soils, to the pollinating insects feeding on our many domesticated crops, to the scavenging birds who follow the plow or those that feed on our grains and live in our barns.

On the historical front, for every dried up Fertile Crescent, there are examples of successful, sustainable farming systems in many parts of Europe, India, China, and Japan. It is not a given that agriculture will fail in any of these regions.

As for all the sorts of various ills, from disease, to famine, malnutrition, and poverty, that have been a constant presence in all recorded history, these are not necessarily the result of agriculture, nor are non-agricultural peoples immune from these

problems. Infant mortality rates in hunter-gatherer societies are very high (Hill, et al. 2007), and as anyone familiar with the lives of Kalahari Bushmen or Inuits will testify, the life of the hunter and his struggle for survival is not to be trivialized as mere “fun.” There is a sense in which some in the permaculture movement, and Western culture in general, idealize the life of the hunter-gatherer. They are the intellectual inheritors of the 16-18th Century Western romantic primitivism movement, of the idealists taken by the concept of the “noble savage.”

Similarly, inequalities, hierarchies, and conflicts are common to all societies. Hunter-gatherer societies, from the Amazon to Papua New Guinea, are more often than not plagued by conflict, violence, and struggles for power (Diamond, 2006; Pinker, 2011), as anthropological studies reveal (Chagnon, 1968, 1974, 1992, 2013). The confusion that arises when hunter-gatherer and agricultural people are compared is due to the huge difference in the size, scale and complexity of their respective societies. It is to be expected that agricultural societies, where not everyone has to be involved in food production and where food can be stored, will include more hierarchies, social classes, trades, and occupations, some purely artistic and intellectual. It is also to be expected that this will lead to greater inequality. Similarly, while clearly all humans are prone to violence and warfare, agricultural peoples have historically had greater numbers, more sophisticated weapons, and the aid of horse power, rendering them far more capable of conquest, expansion, and genocide. Therefore, there is nothing inherently more cruel or violent about agricultural peoples. The differences lie in the greater means that agriculture allows.

...agriculture must remain connected with and include other primary activities....

While there is no doubt that imperial cultures are all agricultural, is agriculture the cause of imperialism? It is clearly a necessary condition, but a necessary condition is not a cause. Also, not all agricultural societies have an imperial history. China and India, for example, unlike Europe, do not have a notable history of travel and expansion beyond their respective regions. There is no Chinese Alexander the Great or Indian conquistador.

Arable permaculture

The goal of “arable permaculture,” by definition, must be “the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability and resilience of natural ecosystems.”

Permaculturists tend to promote no-dig horticulture, forest

gardening, and other perennial-based systems, especially arboreal, as the main food-producing activities for mankind. The arable permaculture system should differ from other permaculture systems by virtue of being characterized by a different ecology, one which is dominated by domesticated annuals, grassland, and herbivores. Arable fields and grasslands should be managed in conjunction, as diverse ecosystems dominated by domesticated plants and animals.

Agriculture, when understood as a field activity, can be understood as the symbiotic, perennial alliance between humans and large herbivores. Both keep fields largely free of arboreal cover, and both depend on each other for their wellbeing and survival. It is, by definition, a mixed farming system, in which herbivores (horses and oxen in England) play the central role in the maintenance of both grass and arable fields.

Arable permaculture has to be a mixed farming system ideally suited to local soil, climate, and flora/fauna. No single model fits all—the arable agriculture of England cannot look like that of Italy or France. It must include important perennial plant elements, whether in the form of trees (e.g., agroforestry, orchards/groves, and hedgerows) or perennial pasture/grasslands—it cannot be entirely dominated by annuals.

Importantly, agriculture must remain connected with and must include other primary activities: horticulture, forestry, foraging, gathering, hunting, and fishing.

A basic model

Here in England, but also across the Northern Hemisphere and other temperate climates, this “grass model” would rely on a dynamic and balanced interaction between arable land, grassland, and herbivores, with each element limited by and dependent on the others.

Cultivated grasses, mostly cereals, and legumes would be the annual crop staples, complemented by other annual crops (e.g., potatoes, *brassicas*) suited to local conditions, livestock needs, crop rotations, and the maintenance of soil health and fertility. In England, during the Agricultural Revolution, some of the characteristics of this model were in place: integration of arable land and grassland, folding livestock on arable fields, maintenance of fertility, crop introduction (e.g., turnips), diversity, and rotation. A modern arable permaculture would no doubt involve the introduction of novel arable crops, as well as polycultures.

There would be a definite return and re-establishment of the hedgerow which, with permaculture knowledge and access to non-native plants, could be even richer and more useful to humans than those of the past. Similarly, large scale orchards (visited by Spots, the orchard pigs of England: a perfect example of permaculture thinking at work), forest gardens, and modern agroforestry-based systems would blend in with the grass/arable system.

Arable permaculture in action?

New Gokul Farm is part of Bhaktivedanta Manor, Hertfordshire, the Hare Krishna Movement’s headquarters. New Gokul is a mixed farm with around 60 cows/oxen/bulls/calves, 100+

acres of pasture/hayfields and 9 acres (3.6 ha) of arable land. Cow protection is practiced: animals are used solely for milk and labor. Needless to say, while everyone involved with New Gokul is proud and respectful of its traditions, the very same model I will shortly describe could be applied to any English farm that does not practice cow protection and that includes other livestock. The arable permaculture model in fact presumes mixed farming and omnivorous human diets.

Field methodology at New Gokul is guided by broad permaculture principles and design methods:

- complete dependence and integration with livestock, from reliance on manure to the use of draft animals
- complete exclusion of any conventional industrial method
- polyculture, crop rotation, and ecological intensification
- crops selected to be ideally suited to local conditions
- cultivation of crops designed to provide a complete diet to the local community
- the on-farm processing and manufacturing of raw materials
- the inclusion of perennials in a system dominated by annuals
- selective, purposeful, and minimal tillage and cultivation

Practical examples and methods

Grains

A core goal of the project is to successfully implement the cultivation of ancient annual cereal varieties (spelt and wheat) which produce lower grain yields, but exhibit a range of highly desirable attributes: very low fertility requirements, substantial biomass/straw productivity, co-existence with arable weeds, provision of wildlife habitat, and the modest production of higher quality grain. Grains are grown in rotation, no more than once every four years (albeit rotation could include other grain types). A very important practice is the cultivation of traditional catch crops, such as turnips. Other grain-producing crops, including “false grains”/“pseudo-grains” such as buckwheat and amaranth are also important.

Legumes

A large acreage is devoted to legumes, a higher percentage than both conventional and organic systems. Legumes are important for soil fertility, for pollinators, and in order to obtain quality nutritional outputs from the land. The same crop can be used both fresh/seasonally and dried, a significant advantage. So far, winter broad beans and peas seem to be the most suited and valuable crops. Vetch is grown as a cover and fodder crop, and clover is grown as a companion plant, cover, and fodder crop.

The Three (or Four) Sisters

This method, very popular among permaculturists and often mentioned in the literature, is a traditional Native American companion planting method: a polyculture of squash, maize (corn), and beans (with sunflowers or tobacco as a fourth sister in some variations).

I have experimented with a field-scale arable version with mixed, interesting results. Squash/sunflower/corn seems to be the best combination, considering our conditions and methods.

The aim is to raise most or all crops from seed and to achieve great diversity and abundance of outputs. Indeed, this polyculture is a source of fresh vegetables (courgettes, marrows, and sweet corn), oilseeds (sunflower and squash seed), winter vegetables and fodder (pumpkins), grain (corn). In full bloom, a field-scale Three Sisters plantation is truly an example of biodiversity, rich in wildlife, producing abundant biomass and maximizing horizontal and vertical space.

If proven successful in successive seasons, this could be a perfect example of arable permaculture in action.

Fodder crops

Arable land is dedicated to growing food for both humans and domesticated animals. However, unlike conventional arable farming, staple crops, especially grains and legumes, are designated for human consumption. Herbivores should primarily feed on what they naturally eat and on what humans cannot possibly eat: grass and its derivatives, hay and straw.

Dedicated fodder crops include: perennial fodder crops, annual grasses/winter cover crops (ryegrass/vetch), winter catch crops (stubble turnips, radish) and main crop *brassic*as. There are plenty of dual purpose crops: *brassic*as (such as kale, turnips, and radish), sweet corn, squash, and others. Agricultural waste and by-products are also very important: cereal straw,



People need to become more comfortable around animals from an early age. Photo by Rhonda Baird.

corn stalks, damaged/unsold potatoes, vegetable cuttings/waste, and overgrown marrows. Through livestock, all biomass can be turned into energy, food, and manure. Weeds can also be a source of fodder: all but a couple of weeds on our fields are edible to cattle and at times purposefully harvested, with chickweed a particular favorite for the animals.

Draft animals

Arable systems require energy for cultivation and tillage, and draft animals are the ideal source, from a permaculture viewpoint. It integrates arable land, grassland, and herbivore; creates a closed, sustainable, clean energy cycle; animal-driven tillage is kind to the soil, as opposed to tractors and heavy machinery.

A common objection to the use of draft animals—that it

would require a lot of additional land to grow feed for draft animals—is misguided. Draft animals, like other animals on the farm, can be largely sustained without staple human foods. They are also necessary for the overall ecological balance of the system and, importantly, can themselves be eaten by humans.

In any case, while perfectly compatible with permaculture principles, a gradual adoption of draft animals would involve great changes and challenges. Presuming the political will and policies were in place, such an agricultural “revolution” would involve the need for a substantial re-ruralization, a vast increase in agricultural labor and the need to quickly address a skills and knowledge shortage. Another valid option, and one which would arguably be required alongside draft animals, is the production and use of on-farm biogas/biofuels/alcohol from crop waste/surplus or dedicated crops—there are already some examples of this in the permaculture movement.

It is unimaginable and unrealistic to suggest that the abandonment of fossil fuels in agriculture could be either easy or sudden. The adoption of arable permaculture would gradually decrease fossil fuel farm power, while likely retaining, and gradually phasing out, conventional tractor use.

It is crucial to point out that, even if a large percentage of British agriculture still relied on fossil-fueled machinery for many years, the adoption of arable permaculture would still eliminate massive amounts of fossil fuel use: much of the fossil fuels used and the pollution caused by industrial agriculture and food production come from the production and application of agrochemicals, from the industrial processing of raw materials and from the unseasonable and delocalized diets characteristic of the modern age. Not to mention that the immediate elimination of animal factory farming, a major consumer of energy and toxic polluter, would greatly decrease overall fossil fuel use.

Most importantly, with soils, plants, and animals restored to their natural functions, there would be very few holes in the system: carbon, nitrogen, and nutrient cycles would by and large be self-contained. This would be the exact opposite of the input-output, linear processes of industrial agriculture.

Weeds

Domesticated crops on arable fields must coexist with undomesticated plants that thrive in the same soil and environment: weeds. Weeds should be seen as an inevitable management challenge (and even as a potential resource) but never as an absolute problem. No arable permaculture system could be conceived without weeds.

Management options:

- weeds as fodder
- weeds as food: fat-hen (*Chenopodium album* L.) and pigweed/common amaranth (*Amaranthus retroflexus* L.) are regularly harvested, sold, and eaten by our community
- cultivation
- mulching including as a ley or green manure, with regular topping and mulching before incorporation when cultivating

Most importantly, weeds can act as a guide for the farmer: fat-hen and pigweed are wild relatives of quinoa and domestic amaranth.

The latter two crops should therefore thrive on our soils and must be grown. Amaranth (both vegetable and grain varieties) has been tested on our field and grows very well. It will cross with the weed variety, and unique local varieties should develop over time. This is probably as good an example of applying permaculture principles to arable farming as can be given.

Conclusions

Agriculture is the fundamental, necessary, and most important activity of mankind: permaculture and agriculture are not incompatible.

Permaculture needs to offer a critique of arable farming, both preindustrial and industrial, without promoting its abandonment. Arable farming can be reformed, improved, and innovated through permaculture theory and methodology. Δ

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The Big Idea with Seven Billion Solutions Permaculture

Rosemary Morrow

This article is an edited transcript of the talk given at IPC-12, London, September 4, 2015.

WARM GREETINGS, THANKS, and recognition for all who have lived on and cared for the land we are on today. Thank you, Alba Teixidor and Andre, for the drawings.

“To create a mess in which we perish by our own inaction makes nonsense of our claims to consciousness and morality,” said Bill Mollison, co-originator of permaculture.

There is always an on-going and unsuccessful search in varying forms by the Establishment for the BIG solution. They cannot find the solution because there is no such thing as THE solution. There are many smaller solutions found in our everyday activities

We permaculturists have been active for 40 years working to fix the mess. Permaculture is the transitional process that can help. We have made significant achievements, and we are on the side of life. Some elements and patterns have made permaculture successful and enabled its infiltration into almost every country and profession in the world. And we will look at these.

Its success is due mainly to three factors: Need + Content + Processes.

NEED

Across the world the realization is accelerating that we are on the edge of something big and environmentally and economically cataclysmic. Those of us who have internalized the tragedy now have words for it: The Great Grief. We regret the loss and

potential loss of all that has created a glorious and miraculous world. We need all present solutions and many new ones. Our solutions are not to ignore the future but to contribute to it.

Accelerating anxiety creates the need and readiness to act. Readiness is most urgent in countries where people live close to precarious essentials. This need puts growing pressure on governments, and creates provocative new social movements (1).

Permaculture content is my generation’s gift to future generations.

CONTENT

The PDC has solid and enduring content. This content is a great gift. The content is elegant and rigorous and teaches us how to see and interpret the natural world: its degradation and building up processes. It provokes a deep appreciation of Life.

We can analyze and repair Earth’s soils, clean its waters, regrow forests, integrate agriculture, and build our cities and towns so future generations can enjoy a better quality of life than we have had with too much. We teachers are constantly in awe of how it has served us over the tumultuous 40 years since Holmgren and Mollison gave it to us.

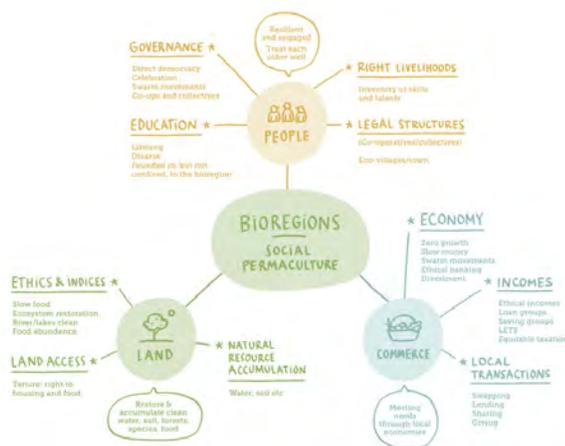
Permaculturists are solution thinkers according to their concerns, passions, and knowledge. These are their strengths and opportunities.

I hold that the PDC curriculum with its ability to repair ecosystems and human societies is sacred knowledge. I love the way it grows in depth and possibility the more I work with it. Evidence from across the globe and across time has substantiated every part of the curriculum.

We face a future with issues unforeseen when Mollison and Holmgren created it. Parts of the syllabus have grown and flourished; a few are new and although hinted at, were largely unforeseeable in the 70s.

The PDC is no longer completely adequate. A major factor has been the acceleration of climate change impacts so that some topics are insufficiently covered in the PDC. Here is a short list of topics that I consider are needed for the future and must be covered more rigorously:

- ‘swarm’ movements such as perma-occupy
- alternative economies that work globally



PDC content based on communities

- non-violent communication (NVC) and useful feedback
- regenerative agriculture for every biome and niche

We need the best permaculture minds thinking about these questions for the PDC:

- What should the curriculum be?
- What can and should the teachers teach?

The diploma

The original permaculture diploma tended to focus on six areas and, of these, design and education flourished and expanded. Let's expand and strengthen others: media, community development, ethical finance, and design implementation with networks to resource them. Let's add new ones such as these:

- Dana Wilson for a worldwide network of permaculture media people
- Lis Bastian with The Big Fix.org, a solutions-based website
- Nick and Thomas, two university accounting lecturers from Sydney teaching future generations of accountants and bankers to change their language from one of money to one of accountability
- PIRN is providing methods and results of collating permaculture research
- Six people at an IPC edge event drafted Designed Resilience for Disasters courses and training materials for teachers and communities in several world biomes.

We need networks for permaculturists in formal training institutions, relief and development, transition, and permaculture progeny. You know them.

With its relevant, effective content, permaculture spread fast and easily because the first waves of pioneers developed two super-effective processes: network organization and infiltration.

PROCESSES—moving across the world

Mollison and Holmgren began with the content. They responded to a need and vacuum. Then, we were drawn in. We just started. Impassioned, we began as teachers, gardeners, and community development workers and were the first wave. We all taught in the long lineage of Confucius, Mahatma Gandhi, Socrates, Freire, Jeanne d'Arc. We went to plazas, market places, community centers, carparks, and even hospitals.

We were committed, often abandoning comfortable lives to pursue this one. And it gave us meaning and made us happy. No organization or executive leader sent us out. There was no organization or leader. This was a huge strength. We responded, adapted, and expanded. Did we teach the same thing to the same people in the same way? Were we "credited" or approved by institutes or governments? Was our curriculum approved? Of course not.

We were random pollinators who with a magic curriculum, courage, and perseverance launched ourselves. We were confident, and the results were unpredictable and astounding. All of us were alike in saying "YES" to life.



Tima Lymberis in Greece and translation of the permaculture curriculum into Greek—the end of two year's work.

The success of the permaculture course can be attributed, in large part, to the teachers: those who have taught the students who have become the teachers who have taught the students; moving in an exponential way spreading the teaching and learning and translating it into effective practice. And the permaculture mothers went into schools to make gardens.

Their seedlings were the Global Ecovillage Network (GEN), community and school gardens, divestment campaigns, forest gardens, relief and development, and Transition Towns. You can think of more. Some are more established than others. Some require greater resourcing.

What do we call this result: a permaculture dispersal, diaspora, migration, a web, movement, or scattering? Certainly, its pattern is a network with nodes and links developing randomly and germinating all around the world. This pattern is our strength because it facilitates acceleration and adaptation.

What would have happened if we had chosen the dendritic, branching, pattern characterized in formal education: top-down, fixed curriculum, and difficult to change, with invisible walls, whereas networks are characterized, for non-formal education, as: egalitarian, open to new concepts/ideas, able to evolve to meet changing conditions, and with equality of experience and authority.

We are fluid, moving any direction and across boundaries drawn in by attraction to a vacuum or imbalance. We grew spontaneously through this pattern of evolution and responsiveness and created a multi-directional network.

In the teaching network, we, active permaculture teachers, researchers, and innovators are the links; the nodes are the content. Look at our heritage. Bill taught, while David tested the



Aylatte, Ethiopia finished his PDC and every Monday taught women farmers.

content rigorously by producing tested integrated models. Both created nodes—one of curriculum and the other of a model.

What would happen if someone wanted to suppress us? Because we are a People's Movement and freely expand according to our concerns and invitations, we simply do it. Most permaculture is in our heads and hands. Bureaucracy can't control it. There are not too many books and materials to lose, and if they were lost, we would continue anyway.

Network growth

Some put down roots in towns and nations and helped permaculture grow; some explored new ground and seeded permaculture in nations, such as Chile, Nepal, Cuba, Spain, Vietnam, and East Timor. Their progeny working, with experience and solutions, became the next wave of pioneers opening up new ground and/or consolidating existing knowledge. Their motivation was to reduce the "mess."

A little aside. In this tradition, Paula Paananen, is now on a remote island in the Solomon Islands working on solutions with villagers who must move as the ocean rises. Some of you gave to this work in the crowdfunding. The results will be the basis of a model, we hope, for other coastal and island communities in danger of being swept away.

Others deepened the PDC curriculum through testing, adapting, stretching, and enlarging topics. They rigorously examined the adequacy of content and provided the detail that enabled successful implementation.

Emerging new nodes in this tradition of providing "grunt" and depth to the curriculum topics include grasslands, woodlands, food forests, kitchen gardens, and permaculture in schools.

Others borrowed from the people such as Sepp Holzer in Austria, and Peter Andrew's work to restore rivers in Australia. They add regional strategies like hugelkultur beds and cell grazing.

Sometimes a topic/node floated away and, lightly linked to its permaculture parents, founded new, independent nodes. We have in-depth groups and even conferences on Transition

Towns, GEN, ecocities, ethical money, resilient communities, and soil as the carbon sink.

Next were the local visionaries who found permaculture in organizations such as Scouts and Guides in Cameroon and East Timor, Agriculture and Women's departments in Vietnam and Cambodia, NGOs in Albania, orphanages in Uganda, and education in Malawi. Think of John Nzira in Soweto.

The dispersal and germination of permaculture continues. You, whether permaculture trained or not, will have gained from permaculture. Sometimes, ecological introductions don't recognize their permaculture origins (2).

And there is another process. We infiltrate.

My story, greatly truncated, is about infiltration and networks. It's like guerrilla gardening.

In Cambodia, women trainers in the Department of Women's Affairs learned permaculture and learned centered education. They went into the villages, and marketplaces and, under houses, where they taught the farmers.

But first, and this is important, they spent six months establishing permaculture in their own gardens and, then used this for teaching farmers. They talked about design and implementation. We don't know how many farmers in Cambodia practice permaculture, and we would like to have them here today. We know they are thousands.

After their terrible civil war with so many people killed, Cambodian permaculture became the in-service training for several government departments. Staff having no other knowledge to offer farmers rapidly embraced it. Women staff training teams were employed and paid by the government, and so permaculture became sustainable knowledge.

In Vietnam, I was not allowed to teach until the National Peoples' Committee of the Communist Party had approved the first course to which they sent department heads (3). They were a little irritated by learner-centered teaching. When I asked about their agriculture customs they replied, "You are the visiting expert, you tell us."

How could I? I didn't know what they knew because they were super experienced gardeners for over 3,000 years. At the end of the course, Ong Hanh who queried the facilitation methods (4) said he could see now how much they had all learned from interactive learning. I plugged gaps and gave a framework. They grafted "design and strategies" onto their techniques.

After that PDC, and with the official translation of permaculture, as Nong Nhiep Ben Vung by the National Language watchdog, they sent me to the Vietnamese Association of Gardeners (VACVINA). And the spread of permaculture moved through district agriculturalists and women—each teaching farmers and each other. It was placed into institutions as in-service learning. They had not experienced in-service training before.

At provincial level, we taught counterpart staff from almost every overseas service organization. We trained FAO staff to teach half the provinces in Vietnam, and VACVINA trained the rest. Every district in every province received some training.

We went to the most disadvantaged provinces and districts—up to the northern border with China, the high mountains, to ethnic minorities and sandy cyclone-battered coast around the 17th parallel, and villages still suffering napalm damage and

bombed into degraded ecosystems.

VACVINA estimated that if 30% of the village received training, then 60%+ would be implementing it within two years.

In Cambodia, the Provincial Women’s Department in Pursat who had learned and implemented permaculture sent their trainers to the ‘white skirt’ zone, no man’s land, in Svey Rieng province. Here, every living thing had been wiped out. Farmers were re-occupying a desert land. They succeeded beyond our hopes.

This team then moved to other provinces. They learned monitoring, regularly visiting farmers to learn how they had productively transformed their farms.

All these farmers are permaculturists. They are us.

I learned that:

- If one local person grasps the potential of permaculture, they will advocate for it and spread it, and the project will be successful.
- Only about 30% of each village needs the training, but at least 60% will eventually implement it.
- Model farms set up by overseas organizations don’t work (5). Trainers making permaculture gardens do.
- Farmers adapt and localize the knowledge and skills—square mandala beds.
- Local trainers spread knowledge and skills about 50% faster than any foreign trainers.
- Teaching methods must be adapted to the topic, literacy, and the culture.
- Foreign trainers need at least one local person as a trusted friend.
- Big budgets don’t achieve what relevant training does.
- Women trainers are particularly effective.

This way, permaculture grafted on to local agriculture and organizations such as Kastom Gadens in Honiara, Permatil in East Timor, Rakai Department of Agriculture in Uganda—all have permaculture embedded in their practices and outreach. There are many others.

We don’t know how many permaculturists worthy of certificates and diplomas there are in Vietnam, Cambodia, East Timor, Solomon Islands, Ethiopia, Uganda, and so on. In East Timor, at least 800 farmers have learned permaculture. They are tens of thousands. They are our silent permaculture majority. Not here in London, they are our missing colleagues whom we sometimes forget.

Unexpected outcomes

In Cambodia, it was the impact of learner-centered teaching. In three provinces, the heads of the provincial department of Women’s Affairs, Em Ponna, Chamony, and Chunn Sarim all trained and practiced learner-centered methods. When it came to the commune elections (6), they used the new methods for electioneering. Instead of 3% women elected to commune councils, 30%+ were. And all three women were later elected to the National Parliament of Cambodia.

In Bavi village in Vietnam, the Dao received new varieties of fruit trees. When we monitored the project, half

the trees were gone. They told us monkeys had eaten them, but later in a kitchen, I was told they gave them to the Muong, their neighbors, who didn’t have trees. We couldn’t have done better to spread knowledge and resources.

Permaculture as an occupation

Permaculture has not emerged strongly as a solitary economic occupation. It normally infiltrates, or is grafted on to another profession, and so is dispersed through many organizations and professions. There are doctors, engineers, architects, gardeners, teachers, cooks...almost every occupation. It is excellent when your plumber is a permaculturist, and so is your handyman and carpenter. Welding on to existing careers is a strength for permaculture.

In Australia, the Blue Mountains City Council has about eight permaculturists on staff. The City of Sydney had several, and so do other local government authorities. In France, The City of Paris has at least three (7). Many universities have staff holding PDCs, as do schools, colleges, and food co-ops. Where will permaculture not infiltrate?

Learners need back up materials

In Vietnam, Cambodia, Uganda, and Albania, participants had no permaculture material in their language. So they translated my book and now write materials in their own languages. In Cambodia, without translators yet many smart illiterate people, we developed a “soap”—a series of posters telling the story of a family who implemented permaculture and a family who did not. Farmers took home leaflets with illustrations and a few key words for families and reading matter for their children who were learning. This approach slightly backfired when they were kept locked up in cupboards. In this tradition in East Timor, Ego

Challenge	Evidence	Permaculturists must
Cities	In the 50s, the number of people living in cities was about 750 million. It is predicted to be 5 billion by 2030. The challenge is to transform urban areas so that they offer safe and sustainable places for future generations.	Derive principles for renovation and construction. Learn micro-scale techniques for abundance. Work with housing blocks as communities and increase capacity of residents. Train their trainers. Focus on small scale protein and energy e.g., spirulina, aquaponics.
Refugees	The global migration shift has begun. In 2014, 60 million people fled their homes.	Offer permaculture in the camps, centers, and towns. Restore the lands and towns they fled from. Make camps educational and restorative.
Low coastlands, deltas, and islands	Rising oceans, storm surges, and tsunamis threaten to destroy them	Prepare people to leave through permaculture training. Help negotiate new permaculture-designed land.
Water	This element will be our challenge, our joy, and possibly our disaster.	Become expert designers in too much, too little, too often, and too irregular water. Skill up in every aspect of water, including aquifers and rivers.
Soil		Find more ways to store carbon in it. Consciously build it and measure results. Protect it.
Oceans	Great store of CO ₂ but becoming dangerously acidic	???????????
Consumerism	Greatest user of non-renewable resources and polluter of all living preserving systems	Make frugality desirable.

Lemos, Lachlan McKenzie, and a team produced their permaculture book for the hot, wet tropics which is now being revised. Chris Evans and his team produced local materials in Nepali. Some permaculture success stories from cultures across the world demonstrate small scale, small budget, permaculture solutions that worked.

How these stories inform the future

These permaculture solutions are flexible, adaptable to any culture and environment, and easily scalable and replicable. Our survival and risk management depend on how well we manage to diversify, innovate, and constantly adapt. There are many other individual solutions, yet I can't find any other discipline that challenges permaculture through integrating so many systems.

THE FUTURE lies in accelerated succession

We face unprecedented problems that our governments are not ready for. The UN has just rewritten its Development Goals as a new set of Sustainability Goals. Of the 17 major goals, permaculture is directly pertinent to six of them.

Permaculture responded to the global need, and has processes and content. However, we must find new methods of disseminating permaculture without eroding the quality of our graduates. This is your task, and it will probably be media-based.

We have "swarm" movements, unpredictable younglings such as perma-money and perm-occupy among the most extreme, and bankers and university professors in accounting among the most mainstream. Will we be co-opted by governments and defense forces?

We have connexions everywhere in the world, skilled people and examples on the ground with 30+ years of experience. Where will it take us? What must we do to scale up, to accelerate permaculture dispersal? I think these are some of the big challenges, and you will need extensive specific knowledge and skills to solve them. (See the chart below.)

Set goals for:

- resilient communities of permanence, resilience practicing the precautionary principle
- disaster recovery after disturbance
- phytoremediation from chemical agriculture and accidents
- Transition Towns evaluation
- food forest strategies for all biomes, e.g., tropical and desert
- zone 3 agriculture demands better strategies and techniques
- developing indices for the evaluation of permaculture works/projects
- evaluating PDC graduates to know what the best teachers do

How we will do it:

- Accelerate the succession of the first waves of pioneers.
- Use media compellingly, make films, write, argue, sup-

port, advocate for, photograph.

- Stay open and accepting of positive changes and adapt.
- Tackle the big questions with lightness and creativity.
- Establish model communities where you live.
- Work with everyone who is for Life.
- Establish quality trainees and evaluate which teachers produce the "best" permaculturists and copy them.
- Train more trainers.
- Use the web, research, model, and establish greater evidence.
- Find and multiply the best large or small models in every environment.

Where do you want to work? Are you equipped to work effectively in these areas? What excites you? What further training do you need? Where will you get it?

You have the capacity to solve the challenges of the future, and you will enable the next flush of permaculture. We are not alone. There are many people out there with working solutions that we can borrow, and we can exchange ours. We know our network pattern is the best for our time and age. We weave the ribbons of systemic change.

When we teach, write, talk, cooperate, design our homes and gardens and divest, change starts happening. We are the alternative, and we have 40 years experience, the right structures, and the right content, and we are here at the right time.

We are ready for the next wave of permaculture. We have no choice. We love this world, and we love Life. We have a vision: There is not one single solution. There are seven billion solutions—and YOU are one of them.

Thank you. Go in peace, loving Earth and working for just, restorative solutions. △

Rosemary Morrow is a highly regarded permaculture teacher who has been practicing and teaching worldwide for over 20 years. Rosemary has worked across an incredibly broad range of environments, including community-scale projects in Uganda, Somalia, Thailand, the Pacific islands, the Middle East, and Bhutan.

Notes

1. Observe how governments were pressured for positive results from the Paris talks in December.
2. Rainwater tanks, roof insulation, school gardens
3. VACVINA: the National Gardeners Association hosted the PDC
4. That was one of my things; learner-centered teaching processes that model Care of People.
5. We tried model farms in several countries, but in every case they were subverted; either a wealthy person ended up with them, or the committee used them otherwise, or they had little credibility because they were funded by "rich overseas." So we had trainers make their own farms as teaching models. Then, permaculture spread well and equitably.
6. within one party, because Cambodia is a dictatorship
7. In the City of Paris conferences on Future Food for the City, November 2015, two of five speakers were permaculturists.

Harnessing Permaculture for Sustainable Development and Resilience

Gisele Henriques and Lachlan McKenzie

PERMACULTURE PRODUCES TANGIBLE RESULTS towards sustainable development, both in quantitative and qualitative terms. It also provides a broad framework for long-term programs by reaching a range of development objectives. The permaculture approach addresses some of the structural issues affecting the poor, while focusing on the needs and realities of communities. This article aims to present the potential of permaculture to development interventions. It starts with a brief overview of the aid industry, how it functions and some of its challenges and opportunities. This is followed by a discussion of permaculture's added value and concludes with some considerations and lessons on how to best operationalize the approach.

The aid industry

After decades of “aid” to countries in the global south, we are still living in a world where one in seven people go to bed hungry every night and although poverty statistics may be decreasing in some places, inequality is growing. Environmental degradation is rampant—putting in question our future capacity to survive on this planet. In the last 70 years, the aid industry

...smallholders cannot access their own local markets....

has waxed and waned, pursuing a series of approaches, at times incoherent with the goal of people's self-determination and social justice. The industry is broad and diverse. Whilst it is not fair to generalize, because there are also many good programs interspersed in the whole; there are ubiquitous trends which are set, by and large, by big donor governments and international institutions.

One of the greatest critiques of the industry is the “project cycle” approach, which it uses to disburse funds and implement projects. This cycle is usually three to five years in length and is largely insufficient to support the transformative processes that are truly needed in the poorest and most vulnerable communities. This is compounded by short-term thinking, usually a symptom of the humanitarian approach which aims to distribute goods and reach massive numbers of “beneficiaries”—the higher the number, the better “value for the money.” Treating people as numbers and having a short-term vision can often lead



Chicken aquaculture integration project near Turiscai. Photo credit Permatil (Permaculture Timor Leste)

to volatile programming which is not grounded in the needs and realities of local communities, but rather responds to the aid environment and donor demands.

Such an approach can cause harm to communities who end up seeing themselves as “beneficiaries,” rather than as agents of change and in charge of their own destinies. It can be patronizing and worse, disempowering—the effects of which can last generations. In seeing themselves as the passive recipients of aid, communities create a dependence on the charity of international and local NGOs who are the primary implementers of aid programs. Beyond the risks that this poses to communities, it is wasteful, as donations and taxpayer monies go to programs that may not be effectively addressing the real causes of poverty.

In many cases, donor money provides only a temporary solution to a structural problem. For instance, a plethora of projects focus on food security by distributing seeds, tools, and pesticides and attempting to “teach” people who have been growing food for generations “how to do it properly.” But the reality is that for most smallholder food producers, what is trapping them in poverty is the fact that they have been largely ignored by their governments. Structural adjustment policies imposed by international organizations in the 70s, 80s, and 90s encouraged a general divestment from smallholder agriculture, terminating support services, marketing boards, subsidies, and protection mechanisms. This neglect not only left smallholder production systems out in the cold, it was a concerted move away from supporting them and in favor of unsustainable large-scale industrial models, that depend on expensive and polluting external inputs. Under such a regime, smallholders cannot access their own local



Making clay stoves. Photo credit Permatil (Permaculture Timor Leste).

markets because their governments have been encouraged to open their economies to food traded under the auspices of the free-trade regime. Many smallholders cannot compete with the imported cheap food that floods their markets. Food that has been subsidized by wealthier nations and dumped in the global south, squeezes out local producers. Under such a scenario, it becomes very difficult to implement any project that ensures farmers can gain a dignified livelihood.

Design from pattern to detail

But not all is lost! Thanks to the diversity in the industry, there are some who have stepped out of the rat race of securing big donor bids and who aim to support communities differently. Permaculture’s approach is one such silver lining.

For instance, permaculture’s concept of no waste and closing loops allows programs to look beyond the project’s specific objective toward a more holistic orientation which includes all aspects of life and wellbeing. Through such an integrated approach, solutions respond to the real needs of communities. The multidimensional and multifunctional approach results in multiple dividends to the community, rather than just a specific project goal or objective.

Permaculture’s ethics and principles provide a moral and practical compass when applied to development efforts. As a design-based science, permaculture allows for full and thorough observation of the realities on the ground and the opportunities which can then be built upon. The principles guide us toward true sustainability and resilience and offer the opportunity to go from response and relief to preparedness and sustainable development. “Slow solutions” are precisely what are needed when people have been trapped in a cycle of poverty for generations, particularly as behavioral change is a precondition for supporting long-term solutions. Also, because permaculture favors a scaled approach, it avoids the “big numbers” game that the traditional development industry chases. Finally, one of the most promising aspects of the permaculture approach is that it honors

and safeguards ancestral knowledge, proven methods, tried and tested by communities themselves for generations. These are the entry points through which the analysis for the design of the intervention starts.

When faithfully followed, the ethics and principles of permaculture ensure that each and every design is unique because it fits with the land, people, resources, aims, etc. The form that projects take on adhere to those same ethics and principles and thus will be unique and compatible with the situation and the context.

Partnerships are an important part of integrating permaculture into communities. These partnerships can take many different forms, and are critical to ensuring continuity, bottom-up participation, and hands-on accompaniment. They also address root causes of the issues plaguing communities and ensure holistic long-term solutions at the local level.

There are a few models, however, that we have seen firsthand that have been successful in their longevity, reach, and results. They can be used as a template, and often programs will see these elements merged for optimal results. This is by no means an exhaustive list:

There are many ways to find funding for projects.

- ***Local organizations as service providers***—often creators of training and demonstration centers, these organizations provide services either through contracting or subcontracting by larger INGOs (International Non-Government Organizations), government agencies, and others, to deliver on specific pieces of work, such as trainings.
- ***Embedded solidarity***—initiatives can be foreign-driven or not, but are deeply rooted in the local context, integrating the project and outcomes into the community, tapping into global connections, facilitating long-term accompaniment and local skill building, connecting the dots globally and locally, and setting up training and demonstration centers. This approach works only if the communities are central to the design, and projects employ community members.
- ***Mentoring***—existing organizations or individuals provide support (not necessarily financial) to new or budding local organizations. This support often focuses on more technical capacity development and is done on an ongoing basis as an accompaniment-type support.
- ***Insider approach***—there is a role for donors, INGOs, and universities to support permaculture efforts either financially or through capacity development. Whenever possible, we should link prospective allies in high-level places to our work to showcase the potential of permaculture so that it can be supported and shared more widely.
- ***Local organizations as movement builders***—organizations

or local NGOs that are staffed by locals, who also design, manage, and implement the programs. These groups are much more than traditional NGOs—they are movement builders for positive change, strengthening communities and sowing seeds for larger social awareness and action. Programs can include partnerships with larger INGOs such as long-term accompaniment with community building projects, developing the capacity of field officers and trainers, support, advocacy, and linking with government departments and donor processes for wider change.

For all models, certain key actions will enable better spread and integration of permaculture strategies and techniques. These include: fostering links with other key actors [governments and other civil society organizations (CSOs)], encouraging exchanges between communities, and including already existing CSOs and Community Based Organizations (CBOs) in our efforts. There is a need to keep rooted in the realities of communities and avoid parachuting in, or trust and respect will be hard to earn. Women's roles are critical, and their engagement will ensure much better results, especially in the long term. In all programs, trainings, educational materials, demonstrations, and projects make sure that "everything is available to everyone"—the poorest and most disadvantaged must be able to access and use project resources as much as possible.

Use small and slow solutions

Here is an example of a long-term partnership approach driven by a local organization, a model created for the circumstances in Timor Leste by local NGO Permatil (Permaculture Timor Leste), after recognizing that the PDC format was not appropriate.

First, a community consultation process is undertaken to determine needs, resources, challenges, goals, and solutions. The results are then turned into a multiyear program of trainings, demonstrations, and monitoring. All work uses a permacultural approach, and the end goals are broken up into bite-sized trainings that could easily be absorbed, tested, and duplicated. Training topics include an introduction to permaculture, home gardens, nurseries, and seed saving, clay cookstoves, solar food driers, animal and agro-forestry integration, System of Rice Intensification (SRI), annual crop production techniques, aquaculture systems, and so on.

This system allows the trainings to be much more appropriate, to be accessible to ALL community members, especially women, and is based on practical, low-cost techniques and strategies. While the trainings are separate, each training revolves around permaculture systems, and fits together in a larger holistic picture. The practical demonstrations from the various trainings also fit together into an overall design.

Catch and store energy

There are many ways to find funding for projects. The more established the group is, and the longer the track record, the easier it will be. Transparency and financial accountability is

vital for attaining ongoing funding, especially for longer term partnerships. Some examples:

- Tapping into locally available resources as a local organization and developing project proposals for INGOs, government ministries, foundations, local grants, etc.
- Volunteering and solidarity—a system for volunteer workers can help in many ways. However, you need to be able to provide the basics, orientation, suitable jobs, and cultural mentoring—otherwise, a volunteer program can do more harm than good. If well managed, volunteers not only provide extra oomph, expertise, and skill sharing, but also the cultural and friendship exchanges can be just as rewarding for all parties involved.
- Solidarity-based donations, crowdfunding, and o Getting Started their external revenue sources.
- Start a cooperative/business to fund other work. Examples include plant nurseries, compost, biochar, farm equipment rental, and other asset rentals (such as buffalos). IDEP Foundation in Indonesia (www.idepfoundation.org) has designed and installed beautiful wastewater gardens for hotels and businesses to generate income.
- Harnessing community resources, collaboration, and work exchange between or among community members, called "Gotong Royong" in Indonesia and "SWEAT Equity" in the Philippines—such systems are often already embedded into



A workshop on making and using natural pesticides with Permatil near Behedan. Photo credit Permatil (Permaculture Timor Leste).



Wastewater gardens in Aceh, Indonesia. Photo by Lachlan McKenzie.

the local culture and could be harnessed for the benefit of projects to decrease dependence on outsiders.

- Creating economic sovereignty—creating your own sources of income, such as selling your resources: modules, guidebooks, PDC trainings in situ or in demonstration plots, selling of produce or value added products, running a cafe or restaurant, contracting and subcontracting for other organizations with payment for services rendered, etc.

Obtain a yield

A very important note, not just for funding but also for programs generally: don't get caught up in the word permaculture. You can tailor the permaculture approach to appeal to multiple interests, such as sustainable agriculture, agroecology, renewable energy, health and nutrition, waste management, water and environmental resource management, agroforestry, capacity development, good governance, and participation. Permaculture yields multiple dividends, and we must not be shy in drawing these out.

The creation of appropriate educational resources in the local language is vital not just for the success of specific projects and programs, but also for broadening the reach and infusing permaculture practices into general practice through self-education opportunities, providing program structure and workbooks for NGO programs, government department reference materials, university and school curricula, and so on. Educational materials can be books, comics, posters, films (funny stories or how-to short documentaries), kids' books, flip-chart teaching sets, PowerPoint presentations, etc.

Here are some tips for material development:

- They must be appropriate:
 - Able to be understood by as many people as possible, especially low-literacy users. Drawings and images are essential, and in many cases are the core method for sharing information.
 - Include techniques and strategies that everyone can use, no matter the economic or geographic constraints.

- Culturally appropriate and in the local language
- In a user-friendly format for using and sharing
- They must resonate with the users—illustrations, stories, relevant examples, inclusion of local plants, animals, tools, etc. and use of cultural symbols.

Then, they will last and be used and spread. Some permaculture resources have even been used in literacy programs.

The Tropical Permaculture Guidebook is an upgrade of a successful publication in Timor Leste. The original is an example of an appropriate resource that resonates; in this case, it has been used and shared in more than 15 other countries. It will be free to download and available through www.permaculture-guidebook.org.

Apply self-regulation and accept feedback

The diversity of communities and contexts vary so widely it is difficult to provide clear directorates that are applicable to all cases, but in our experience there are a few key lessons which must be kept in mind.

Communities must be part of the design, analysis, implementation, and monitoring of any initiative. They must also integrate and disseminate the learning from the experiences. Communities must be empowered to be the agents of change—it is their vision not ours—we are mere catalysts and supporters of their processes. The vision and ultimate outcome is theirs to craft. Be flexible and respond to what is feasible and needed by people—not everyone needs an herb spiral! For many, especially women, a two-week course is unimaginable. Most smallholder food producers cannot afford the luxury of taking time away from their fields and other responsibilities to participate in a PDC. It is therefore critical to design training modules and courses that fit around people's schedules and whenever possible accompany them after the trainings to ensure that they feel supported to make the changes needed to manifest their vision. Equally important is to include youth in this process, inspiring them to see agriculture as a viable livelihood. This is a precondition for the survival of many of these communities, as migration to big cities is proving to be an inviable solution. We've also learned through our work in East Timor, that embedding a permaculture approach into school curricula is a great way of working with youth and encouraging them to see the big picture and create a vision for the future they want to manifest.

But all of this must ultimately lead to a viable livelihood and without addressing the root causes that trap people in poverty and injustice, there will be little progress, and we may be doomed to repeat the mistakes of the aid industry. It is therefore critical that processes that encourage voice and agency are integrated into programs. Creating a lifeline between the project and local governments or institutions is an important way of integrating the solutions into the local context. Many permies don't want to get their hands dirty with politics, but this work is political in essence anyway, and if people are not empowered to demand their rights and influence government plans toward the realization of their vision, very little will actually change. And finally don't forget to have a little humility—after all, what is

success and who gets to decide? Ultimately, it is the community who should be answering these questions.

Observe, interact + integrate

There are many opportunities to work in developing countries on permaculture projects, as a trainer, advisor, practical helper, volunteer, and so on. As permaculture spreads, so do the opportunities to get involved. It is richly rewarding, often challenging, incredibly needed and personally transformative. If you think this is for you, either short or long term, then we say go for it! But don't go unprepared or unaware.

Some advice for getting you on your way:

- Attend a respected orientation course for working in developing countries, if possible. For longer term aspirants, a community development course or degree is needed. (See Robyn Francis' "Sustainable aid for permaculture development work" at permaculture.com.au/product-category/courses/advanced-courses/; look out for others next year in the UK and Europe).
- Get local! Learn at least basic language skills. Orient yourself with cultural and community norms and respect them.
- Work to make yourself redundant! Development should be about local people taking agency for their own futures.
- Help build capacity—educational materials, technical trainings, management skills, and be an organizational development advisor.
- Accept that mistakes will be made, and that things will

probably move slower than you want. Find the balance of good technical advice and providing options, somewhere between total hands-off and control freak!

- Practice equality on all levels. People are different, skills are different, cultures are different, knowledge bases are different, but everyone is still equal, and often wiser and more able to achieve results in local contexts than you might think.
- Act as connector—reporting, networking, developing proposals, etc. Foreigners can often fill this role more easily.
- Have an 'apprentice' who is learning, being mentored and practicing as you work. Remember, your work is to support people and communities to understand and use permaculture and other practices to create resilience and manifest their visions for their future.
- Get your own contract work—the longer you are in a place, the easier it is to get contract or consulting work with other INGOs providing training, program development, and assessments. This can be very helpful for keeping the money flowing, especially if you are volunteering.
- Follow the permaculture principles, they really do help! Δ

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Rights of Nature—Why Do We Need It?

Mumta Ito

Our planet Earth in its present mode of fluorescence is being devastated. This devastation is being fostered and protected by legal, political and economic establishments that exalt the human community while offering no protection to the non-human modes of being. There is an urgent need for a system of governance which recognizes that the well-being of the integral world community is primary, and that human well-being is derivative—an Earth Jurisprudence. Thomas Berry

IN THE LAST 40 YEARS ALONE—the time from which the first environmental laws were enacted, we have extinguished 50% of the populations of all species on earth, climate change is upon us, and the world’s ecosystems are collapsing. One of the key reasons this is happening is because our laws—designed around an economic paradigm that is coupled with the destruction of nature—legitimizes it.

In my career as a lawyer, I have advised multinationals, investment banks, and governments as well as grassroots communities and NGOs working to protect the environment. One thing I learned was that our current structure of law is inadequate to face the challenges of our time. At best, it can slow the rate of destruction, but it cannot prevent or reverse it. This is why I set up Rights of Nature Europe—to bring in new innovative structures of law that can do just that.

Outdated paradigms

Our modern legal system operates within the following outdated paradigms:

- mechanistic (i.e., viewing the world as made up of separate unconnected objects interacting in a predictable way);
- anthropocentric (i.e., viewing the world as existing solely for the use of human beings—this is where ideas about “natural resources” and “natural capital” derive basing nature’s value on its utility to humanity rather than on its intrinsic value); and
- adversarial (competitive/retributive model where one party wins at the expense of another)

None of these paradigms reflects the full scientific reality of how natural systems operate. This gives rise to the illusion of a “power-over” relationship with nature which has led to our current predicament.

Law facilitates economics

There was a time when law facilitated human values—today law facilitates economics. The problem is that it is facilitating an economic paradigm of perpetual growth that is coupled with the destruction of nature.

Our economic paradigm is based on one key concept: the



The author, Vandana Shiva (Navdanya), Doris Ragettli (Rights of Mother Earth), Alexandra Postelnicu (Pachamama Romania) at the Rights of Nature Conference in Ecuador

utility value of nature, or valuing nature as a resource for human consumption—the source of ideas like “natural resources” and “natural capital.” However, nature is infinitely valuable—because it is the source of life. Our health and wellbeing are integral with the health and wellbeing of the Earth. We cannot have a viable human economy that destroys the Earth economy because one derives from the other. The logical conclusion is societal collapse.

The European Union has committed to strive toward an absolute decoupling of economic growth from environmental destruction. To achieve this, we need innovative laws that recognize the intrinsic value of nature—if we’re changing the game, we also need to change the rules that govern the game.

Utility value translates in law as nature being an “object” under the law—either property or fair game unless special rules apply. However, this approach, which in the past has been applied to slaves, indigenous people, women, and children who were also deemed by law to be “objects,” has several practical drawbacks that make it almost possible for people and governments to protect nature using current law.

The problem with our current structure of law

The law doesn’t recognize a relationship between us and the rest of nature. Law governs relationships—but only between “subjects” of the law—there are no obligations or legal duty of care toward nature. As a result, anybody has the right to destroy nature that doesn’t belong to anyone. And property owners have the right to destroy ecosystems on their property, unless the law specifically says otherwise. This vacuum in the law leaves nature outside the system, fundamentally unprotected. We are left with the impossible task of reactively legislating to carve out

protections, rather than proactively creating the legal frameworks needed to create true sustainability.

As a result, we end up with piecemeal protection and a reductionist approach. This ignores the uncertainty and unpredictability involved in dealing with interconnected living systems. A good example of this is our endangered species protection system that relies on listing which species are under threat, which takes years of scientific research. However, scientists say we are losing literally dozens of species each day—in the time it takes to update the lists, it's already too late. Also, in a radically interconnected world, who is to say which species is a VIP, and what the loss of a seemingly insignificant species would have on the ecosystem as a whole?

Another consequence is that environmental issues are dealt with almost exclusively by the planning and administrative courts. The only conversation that can happen in court is whether the correct planning procedure was followed, and the outcome is simply a referral back to the planners. There is a presumption in favor of economic benefits, but environmental impact has quantified and proven (even though scientists agree that it is impossible to do so because of the complexity and unpredictability of interconnected living systems), favoring a precautionary approach.

The only avenue left in law is if a disaster happens and people litigate—the courts will compensate people for proven monetary loss—but there is no obligation to restore the damage to nature, because there is no relationship in law between us and the rest of nature.

Our governments and banks recognize that regulation has failed.

There are also problems with enforcement, piercing of the corporate veil, the lack of flexibility in sanctions, and the fact that a model of law that is adversarial and retributive does little to uncover the root cause of the problem and co-create solutions. Finally, it leads to a cultural attitude of separation from nature which is at the root of our environmental crisis.

Our current system of law is missing an overarching framework that puts our existence on this planet into its proper context—the Earth system being primary because our existence on this planet depends on its healthy functioning—and our human systems (like the economy) being secondary to that as they are derivative. This means that there is no legal requirement for governments to formulate policies that prioritize the health of ecosystems and integrate this requirement across all levels and sectors of society. Accordingly, environmental decisions are made exclusively at the micro-level under individual planning cases, with no regard to the cumulative effect of such decisions

in eroding ecosystems and Earth system resilience as a whole. Scientists say this is dangerous because ecosystems can suddenly shift state when certain stress levels are reached, and there is no guarantee that the new state will support human life.

Financialization of Nature

Our governments and banks recognize that regulation has failed. However, their solution is to leave the future of our ecosystems—and therefore the lives of our future generations—in the hands of market forces.

Realizing that the value of nature has been left out of economic equations, the components and functions of nature, including biodiversity, are priced according to their utility value and assigned an economic value that forms the basis for the creation of financial instruments that can be traded on the primary and secondary capital markets. The instruments are acquired by corporations to offset their overuse, degradation, or pollution of the environment, and they can further profit from trading them. Pollution permits, natural capital bonds, biodiversity banks, and offsetting already exist. Essential prerequisites for financialization are pricing nature, characterizing nature's functions as 'ecosystem services,' and redefining nature as 'natural capital.'

This approach has several drawbacks that could seriously accelerate the rate of destruction:

- Ecosystems are living systems—each one is unique and interconnected. It is not possible to destroy one and mitigate by restoring another somewhere else without destabilizing the whole;
- Offsetting speeds up the planning process—so long as mitigation credits can be bought, environmental impact assessments are not required. This gives citizens even less of a say in environmental matters and less grounds to protect nature.
- Segregation and pricing of the interconnected components of an ecosystem is an artificial construct. It does not reflect the reality of how ecosystems operate, their cumulative function, or their true value in the web of life.
- The system favors the status quo by legitimizing environmental destruction. Instead of encouraging corporations to change their ways, it allows the same actors to make additional profits through financial speculation.
- Decision rights over how to live in a territory and manage the ecology there are increasingly transferred from the local sphere to multinationals and financial institutions. Communities are often violently displaced.
- It leads to profit-driven speculation. If a company stands to profit from the price of clean air going up, then it will invest in activities that ensure that clean air is more scarce and in high demand in the future. In the case of biodiversity, investors can profit from speculation on the extinction of species, as if it were a game.
- All markets are susceptible to crashes—in the case of nature-based financial products, crashes could have disastrous consequences for the underlying 'conservation' project when the land is repossessed.

- Conservation policy is decided by what is more profitable rather than by what is best for the ecology as a whole.
- Carbon credits and Reducing Emissions from Deforestation and Forest Degradation (REDD) have been ineffective in halting climate change or deforestation.

Through the years—with nature being property under the law—there have been different forms of the commoditization and privatization of biodiversity—such as the policies that privatize biodiversity itself and other tools like intellectual property mechanisms that lay claim to genetic or biochemical elements. Today, we are witnessing a new wave of privatization through the application of financial mechanisms. In this context, large corporations are pushing for reforms in international and national policies to enable their control of biodiversity.

This new wave of privatization of nature cannot be controlled under the existing structure of law. We need fundamental and systemic transformation—and that's where rights of nature comes in—as a powerful counterbalance to corporate excess.

...recognizing Nature as a rights-bearing subject of the law equal to humans and corporations.

Recognizing the rights changes the game

Rights of nature shifts the paradigm by reversing the structure of law that treats nature as an object separate from us—which is at the root of the problem—by recognizing Nature as a rights-bearing subject of the law equal to humans and corporations. This is the game-changing step that brings nature into our governance system as a stakeholder in its own right and transitions us into a whole-systems framework of law. Instead of reactively legislating to carve out protections, we start with the premise that all of life is protected, and we carve out the level of human activity that is acceptable to maintain the dynamic balance.

On a practical level, it brings about the following changes in the way our legal system operates:

- It provides an overarching context for our existence as part of the Earth as a whole, enshrining interdependence in law, with a legal requirement for this context to be embedded in all levels of society. It recognizes that the economy is a subsystem of human society, which is a subsystem of the Earth.
- It empowers people to pro-actively reject governmental actions that permit unwanted and damaging development to occur, by enabling us to assert the rights of those ecosystems that would otherwise be destroyed.
- It goes to the heart of our economic system by valuing

nature intrinsically. Property rights are no longer absolute—they are qualified by the rights of the ecosystems and species living there.

- It creates a relationship in law with the rest of nature: a legal prerequisite for a duty of care. This enables obligations toward nature, including the obligation to restore.
- Rights are a legal tool for addressing power imbalances (e.g., slaves, indigenous peoples, women, children). Currently, the imbalance is between the corporations, financial institutions, and everyone else. It is the only effective counterbalance in the face of policies that concentrate corporate power, such as TTIP and financializing nature.
- It creates a fundamental basis for the human right to life because without nature we cannot exist.

Paving the way to a different approach to law

Rights of Nature is a holistic framework of law underpinned by the principles of Earth Jurisprudence, the purpose of which is to return to a mutually enhancing presence on Earth through embedding these principles in all aspects of our lives and society. Earth Jurisprudence can be distilled into the following key principles:

- **Wholeness**—the earth is a living being, a single Earth Community webbed together through interdependent relationships. All life is sacred with inherent value, and the earth has her thresholds and limits. The well-being of each member of the Earth Community is dependent on the well-being of the Earth as a whole.
- **Lawfulness**—the Earth is part of the universe, which is ordered and operates according to its own laws, which govern all life, including human beings. We need to discover nature's laws and comply with them for our own well-being and for the well-being of the whole.
- **Duty of Care**—Earth Jurisprudence is a living law, a way of life, guided by moral responsibilities. We have a duty of care to all present and future members of the Earth Community to contribute to its integrity and well-being. If we create imbalance, then we cause disorder in the Earth's dynamic equilibrium, which we have a duty to restore.
- **Rights of Nature**—the Earth and all of the Earth Community have three inherent rights: the right to be, the right to habitat, and the right to fulfill their roles in the ever-renewing processes of life.
- **Mutual Enhancement**—relationships within the Earth Community are reciprocal—a cycle of giving and receiving. Our role is to participate and contribute to the health and resilience of the Earth Community. That which does not enhance the whole will ultimately not enhance us either.
- **Resilience**—all healthy living systems have the ability to grow, evolve, and adapt to change and disturbance, without losing inner coherence. By complying with the laws that maintain life's health and vitality, we strengthen Earth Community resilience as well as our own. To learn from nature and understand its laws, we must become eco-literate and engage other ways of knowing: feeling, sensing, and intuition.

Practicing this approach to law requires that we prioritize the interests of the whole and of future generations, over short term self-interest.

How feasible is it?

Given that our current legal and economic models have been ineffective in halting the widespread destruction of the biosphere, more and more countries are looking at rights for nature as a sensible way forward. It is the new emerging paradigm in environmental law, and here are some of the examples:

- **National level:** Ecuador (constitutional recognition of the rights of nature and holistic concept of “wellbeing”); Bolivia (Law and Ombudsman for Mother Earth);

- **Court decisions:** New Zealand, Costa Rica, Ecuador, India, Argentina

- **Local/municipal level:** over 36 US municipalities including Santa Monica and Pittsburgh, the state of New Mexico; Mexico City, and a municipality in Spain. In the US, these laws recognize the rights of communities and ecosystems, and subordinate corporate interests where they work against the common good.

- **Customary law:** legal recognition of indigenous governance and sacred sites—mainly in Africa—protects the living and promotes community ecological governance.

- **UN level:** The UN has a Harmony with Nature Department to promote rights of nature. In 2010, Bolivia presented a Universal Declaration for the Rights of Mother Earth. Since then, various UN resolutions have moved in this direction. Actual documents and legal precedents can be found at: <http://www.harmonywithnatureun.org/rightsofnature.html>

Although society has talked about sustainability for decades, there is no current legal framework for this.

How can we make this happen?

Historically, a rights-based approach has never come from those in power. It has to be claimed by the people. In Europe, we have participatory democracy where citizens can propose laws. One million statements of support across seven member states will enable us to put the collective rights of nature on the legislative agenda of the EU. We are bringing a European Citizens Initiative to do this.

Our team has produced a Draft law: a Directive to show how a framework for rights of nature and ecological governance

could work at the EU level across different legal regimes. We focus on collective rights which include ecosystems, species, and the atmospheric climate—also pioneering a new paradigm for climate protection.

Although society has talked about sustainability for decades, there is no current legal framework for this. In our rights of nature framework, we include the human right to a healthy environment, the rights of future generations, Ombudsman for nature, alternative court system, rewilding, ecological governance, and more. When the EU adopts a Directive, it has to be transposed into law in all member states. To download a copy of our Draft Directive, visit www.rightsofnature.eu.

In Europe, participatory democracy also exists at the local and national levels in several European countries; therefore, we are also working to support people to start initiatives. If you would like to find out more about our work, support us, or get involved, please contact us at: info@rightsofnature.eu.

Conclusion

The EU set out a vision in its environmental policy of a circular economy that brings peace and prosperity for all. To achieve this, we will also need a new paradigm of law that operates in harmony with Nature.

Certain natural universal laws govern all of life. When our laws are aligned with these natural laws, we create peace, prosperity, and harmony for all. When our laws are not aligned with these universal laws, we create a spiral of destruction as we are seeing in the world today. All societies that have ignored this truth have perished. WE have a choice. Δ

Mumta Ito is one of the world's leading experts on rights of nature. She is the founder of Rights of Nature Europe and the International Centre for Wholistic Law, and a Director of the Association for the European Citizens Initiative. Previously in her career as a lawyer, she advised investment banks, multinationals, and governments, as well as NGOs and grass-roots organizations. She also set up an NGO in the Caribbean to create a peoples' movement to save an island of global ecological importance.

2016 Home Grown Food Summit

March 7-13, 2016, Online

Join the world's leading experts in sustainable food production, permaculture, herbal medicine, and homesteading skills for this annual online educational event.

This event is sponsored by *Mother Earth News*, The National Gardening Association, The Livestock Conservancy, and *Permaculture Design*.

Scheduled presenters include Joel Salatin, Susan Weed, Paul Wheaton, Marjory Wildcraft, Carol Deppe, Ronnie Cummins, and many more.

Cost: Free

Registration: www.homegrownfoodsummit.com

Skills and Practices

A Perennial Food Guild for the Arid American Southwest

Michael Ford

IF YOU LIVE IN AN ARID REGION, at some point you have probably felt envy when looking at pictures of food forests from other climates. You see countless varieties of plump fruits as far as the eye can see, with beautiful flowers, herbs, and annual vegetables growing from every nook and cranny.

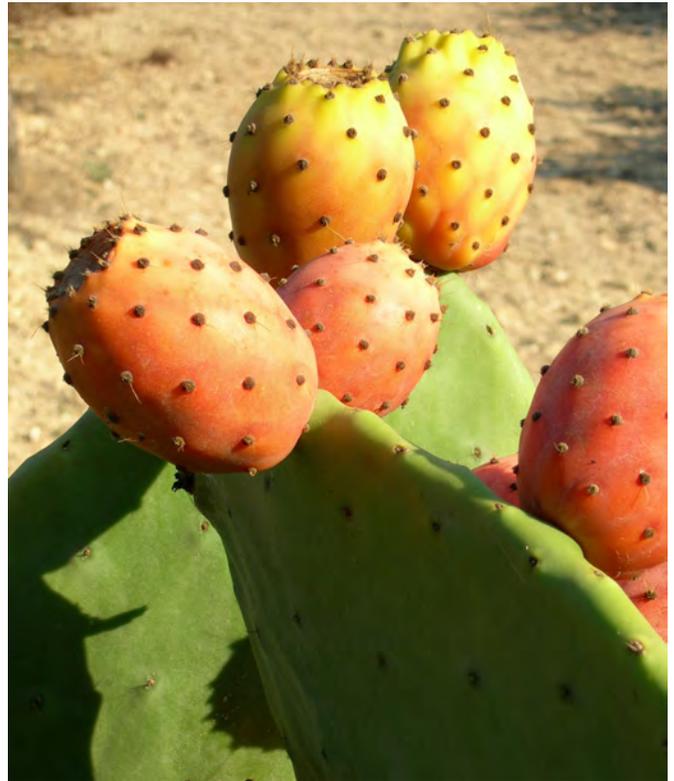
It doesn't seem fair. The idea that you could just go out and plant apples, blueberries, and strawberries in the middle of your yard is laughable. You might pull it off, but it will be a full-time job and your water bill will go through the roof. Many of us just shrug and say, "Well, you can't do that here." And that's partially true—you can't easily grow blueberries in your yard in Texas, New Mexico, or Arizona. But if you are willing to open your mind to wolfberries and other lesser-known plants, you can grow an edible guild just as useful, and beautiful, as those you see in wetter climates. There are some great perennial edibles that are well suited to the high temperatures and dry conditions of the Southwest. They may not be as glamorous or as well-known, but there are some good candidates that deserve a place in a perennial desert food guild.

In the list that follows, I have omitted many more desirable edibles—like citrus, stone fruits, and blackberries—that might fare well on your property, depending on the amount of water and shade that you have available. For the moment, we're going to focus on native and well-adapted edibles that can survive harsh summer conditions with little supplemental water, and that also enable function stacking in tough spots.

The Maligned Mesquite Tree

Frequently regarded as a "trash tree," the mesquite is perhaps the most important plant in this list. Infamously long thorns make it unwelcome in many yards and gardens, but it provides several valuable services to the soil and its neighbors, and it has many practical uses for the permaculturist.

Mesquite is renowned for its status as a pioneer plant. In dry, poor soil, mesquite is often the first sizable plant to repopulate clear cut or overgrazed dry land. And its presence is sorely needed. As a legume, mesquite is a nitrogen fixer. There is an old saying in Texas, known to be true by ranchers and cattle alike, that during times of prolonged drought, the last green grass will be found underneath the mesquite trees. The free nitrogen around mesquites is only part of the reason why this grass is still green. Thousands of tiny deciduous leaves make the shade cast by mesquite trees much like that of a commercial shade cloth. It casts a light, evenly distributed shade that



Ripe prickly pear fruits or tunas are prime food for desert tortoises or gardeners in arid lands.

protects the ground underneath from intense sunlight, while allowing enough light through to sustain most sun-loving plants. Each autumn, the tree sheds its tiny leaves, allowing winter sun through and blanketing the surrounding ground with a speedy layer of natural compost. These factors make mesquite an ideal nursery tree for establishing edible perennials in arid environments.

With a little work to collect and process its beans, mesquite can also be a valuable source of food. By some accounts, mesquite beans were the single most important food for the Native Americans of the Sonora Desert; more important than any grain, including corn. These beans are a great source of plant-based protein. Gruel made from ground mesquite beans sustained desert tribes through the winter, in between harvests of cultivated crops. In addition to gruel, mesquite flour was used in broth, gravy, pudding, bread, and even a slightly alcoholic punch (1). Today, adventurous home brewers and distillers are rediscovering the potential of the sugar-laden mesquite bean for fermenta-

tion in wine, beer, and liquor.

Mesquite can also provide a nice supplemental income stream for those with enough land to grow it as a production crop. Mesquite wood fetches a high price for its use in cooking meats. It can also be sold as a raw material for furniture, flooring, and various crafted and carved wood products. Any wood that cannot be sold is useful at home as firewood, fence posts, tool handles, and mulch. Beans that are not used make great fodder for cattle and other livestock.

If the pesky thorns are a deal breaker for you, one good alternative to mesquite is the *leucaena* (lew-SEE-nuh). This tropical import fixes more nitrogen than mesquite, but its seeds must be cooked before being eaten, and are poisonous to some animals. There is a wealth of information available on mesquite, *leucaena*, and other desert legumes from The University of Arizona's Desert Legume Program (2).

Wolfberry

Wolfberry is a native shrub that grows naturally throughout the United States. There are many edible varieties of wolfberry, a few of which do well in the arid southwest. Our native wolfberries are close relatives of the Asian goji berry, which is famed as a "superfood" for its nutritional density and high concentration of antioxidants.

Torrey's wolfberry is a native species that grows naturally among mesquite trees in Texas, New Mexico, and Arizona. It

This plants spreads so readily in dry conditions that it has naturalized around the world....

grows in dense thickets, regularly reaching six feet in height, occasionally growing up to 12 feet. It grows well in poor, dry soils, and benefits from the presence of the mesquite. In addition to providing a nutritional boost in your diet, the berries are favored by birds and the bush provides habitat for birds and small creatures.

Agarita

Filling in underneath the mesquite in our desert food guild is the *agarita*. This wonderful shrub is native to Texas, New Mexico, and Arizona. It regularly grows to six feet, and can reach eight feet in good conditions. *Agarita* is evergreen, and its holly-like leaves are tipped with sharp spines. *Agarita* is a true survivor, able to withstand punishing summer heat with minimal water. It grows wild in full sun to partial shade, and it thrives

along edges, often flourishing naturally under the canopy of mesquite trees.

The sweet and tart berries of the *agarita* are edible for humans and wildlife. These berries earned it another common name, the wild currant. The berries can be eaten raw, but they are most commonly used to make jelly and pies (3). In a crunch, the berry's seeds can be roasted and ground to be used as a coffee substitute.

Agarita is especially effective for drawing wildlife in to the guild. Birds and mammals relish the sweet berries. Bees are drawn to its fragrant yellow flowers, and many beekeepers use *agarita* as an early season honey plant.

Rounding out its usefulness in this guild, the roots of harvested *agarita* can be used to make a yellow dye which was popular with Native Americans and early settlers. *Agarita* also has many medicinal qualities. The berries are useful for making a tea to treat mouth sores and sore throats. The flowers can be used to prevent infection in fresh wounds. The root is used as a laxative, a fever reducer, and an eye wash (4).

Prickly Pears

Prickly pears are cacti in the genus *Opuntia*, easily identifiable by their flat, oval-shaped pads (cladodes). The USDA classifies at least 71 species in the US, and many more exist in Central and South America. Prickly pears are known to hybridize in nature, making identification notoriously difficult. The pads and fruit of all *opuntia* are edible. The most common culinary variety is the *Opuntia ficus-indica*—the Indian fig. Like most prickly pears, the growing requirements for the Indian fig are simple. It makes due with very little water, in any well-drained soil. This plant spreads so readily in dry conditions that it has naturalized around the world and is considered invasive in parts of the Mediterranean, Africa, and Australia. It needs plenty of sunlight, but fares just fine in along the outer edges of a mesquite canopy.

The pads and the fruit are edible, though care must be taken to ensure that none of the spines are eaten. Spineless varieties are available to make preparation easier. These varieties are "spineless" in the same sense that seedless watermelons are "seedless." The spines are fewer and smaller, but the plant must be prepared carefully to ensure that no spines are ingested. In Mexican cuisine, the pads—or nopales—are often diced or cut into long slices, and prepared fresh as a salad called nopalitos. The dietary fiber of *opuntia* pads is reputed to be especially beneficial, and is widely marketed as a health supplement. After the cactus flowers, sweet fruits are left behind, called tunas. The tunas turn red as they ripen, and when ripe are a sweet treat that can be eaten fresh, used as a garnish, or used in any number of deserts, candies, and drinks. There are countless recipes and variations for the pads and the fruits—too many to list here.

Prickly pears are increasingly grown as a fodder crop for cattle and other livestock. They require much less water per kilogram of dry fodder than most other fodder plants. Luther Burbank selected nutritious, spineless *opuntias* for this purpose—and descendants of his selections are used widely today



Purslane is a powerhouse plant in many conditions.

as drought-resistant fodder sources in South Africa and Namibia (5).

Ripe *opuntia* tunas can be juiced to make a red dye or fermented to make a tan color. *Opuntia* also boast many medicinal uses. The flowers of Indian fig are used as an astringent, a diuretic, and to treat irritable bowel syndrome. The pads are used as an anti-inflammatory and as an anti-infective agent (6).

Common Mallow

Everything you need to know about the growing conditions for this perennial food source is revealed by its botanical name, *Malva neglecta*. Common mallow grows naturally throughout the US without supplemental water or care, including in the arid southwest.

Common mallow doesn't taste like much, but its leaves are rich in protein, vitamins, and minerals. The young leaves, flowers, green fruits (called peas), and ripened seeds are edible. Tender leaves can be eaten raw in salads or cooked, and mallow is often dried and added to smoothies for its nutritional value.

The mucilage from its peas is used as a thickening agent for soups, stews, gumbo, and confections including whipped cream, meringue, and marshmallows (7). Mallow is also good fodder for your livestock. As a medicinal, mallow is useful as an antibacterial, an anti-inflammatory, and astringent, a diuretic, an expectorant, and a laxative (8).

Purslane

As a groundcover, no edible is better suited to the intense heat of southwestern summers than purslane. This small succulent grows throughout the US as an annual, but some species can overwinter in warmer climates.

Purslane packs high levels of vitamin C, enzymes, and omega-3 fatty acids, and it can be stored for months after harvesting by fermentation. One cup of purslane can contain 400 milligrams of omega-3 fatty acids, more than fish and far safer to eat. A study at the University of Texas at San Antonio

found purslane to contain 10 to 20 times more of the antioxidant melatonin than any other fruit or vegetable their lab tested (8). Add to this the fact that purslane will grow on its own in dry climates in full sun to part shade, with no special care, and you have the perfect edible groundcover. In addition to providing a zesty addition in your fresh salads, purslane makes great fodder for chickens and larger livestock.

Choose Your Own Adventure

These plants are a framework for a perennial food guild in the arid Southwest. Be creative, and look around your area for other useful and edible plants that can thrive in hot, dry conditions. You might consider using mullein, yuccas, and grapevines to diversify the guild and to add beauty to its appearance.

Even these tough native and well-adapted plants require a little care to get through the punishing summer season, especially during extended periods of drought. You can keep additional watering to a minimum by harvesting as much rainwater as possible, using effective earthworks like berms and swales, mulching well, and making use of household greywater. Methods like hugelkultur and sunken beds can also help you to stretch your water budget.

Just keep an eye on your plants, especially when they're young, and give them a little extra water if they're suffering. Depending on your conditions, you might be able to work in some thirstier plants that require more water than those listed above. And, as you build your soil, more and more plants will be likely to thrive underneath the mesquite tree that you used to anchor this desert guild. With some time, you just might build a desert food forest to rival any that you've seen in Florida or Oregon. △

Michael Ford is the Managing Editor for The [Grow] Network at www.growyourowngroceries.org.

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The Case for Buckwheat

Grow Your Own Phosphorus

Robert Kourik

PHOSPHORUS IS THE MASTER KEY to agriculture. In fact, low crop production is due more often to a lack of phosphorus than to the lack of any other element (1). So, let's grow some phosphorus.

To grow your own phosphorus, use common grain buckwheat (*Fagopyrum esculentum*) as a green manure. [Buckwheat is] “a scavenger of phosphorus and calcium. Grows better on low-fertility soils than cereal grains. Not drought-tolerant. (2).”

Another source says:

“Buckwheat is known as a ‘phosphorus pump’ because it is assumed the roots solubilize phosphorus from phosphate precipitates in the soil profile and subsoil. The following characteristics make it outstanding for its phosphorus efficiency: 1) a finely divided root system with a high ratio of root surface to root or shoot length; 2) a high storage capacity for inorganic phosphorus; 3) an increased release of protons and solubilizing substances by phosphorus-deficient plants; 4) a favorable ratio of phosphorus uptake to root mass growth, especially at a low phosphorus supply; 5) a high activity of acid phosphates in the rhizosphere and the capability to use phosphorus from organic sources (3).”

Also, “Buckwheat takes up phosphorus and some minor nutrients (possibly including calcium) that are otherwise unavailable to crops, then releasing these nutrients to later crops as the residue breaks down. The roots of the plants produce mild acids that release nutrients from the soil. These acids also activate slow-releasing organic fertilizers, such as rock phosphate. Buckwheat’s dense, fibrous roots cluster in the top 10 inches [25 cm] of soil, providing an extensive root surface area for nutrient uptake (4).

Jean English, Maine Organic Farmers and Gardeners Association: “If you time it right, you can fit in a crop of weed-smothering buckwheat this summer and follow it with an overwintered green manure/cover crop of hairy vetch and rye, adding abundant organic matter and nitrogen to the soil to nourish your garden next year (5).”

Eliot Coleman suggests one possible rotation to prepare a fertile garden bed. Seed winter rye in the fall; undersow it with biennial sweet clover the following spring; mow the rye in mid-summer; let the sweet clover grow through the winter; mow the clover the second summer and follow it with buckwheat; mow the buckwheat in the fall and sow a rye-hairy vetch mix; till this in the spring and plant vegetables. The mowed cover crops can be used to make compost (6).”

Last, but certainly not least, the venerable Gene Logsdon extolls the virtues of buckwheat in field and kitchen, along with a recounting of the crop’s popularity in early America (7).

Buckwheat is an outstanding cover crop, a tasty cereal grain, and an insectary plant, plus a field of buckwheat in bloom is

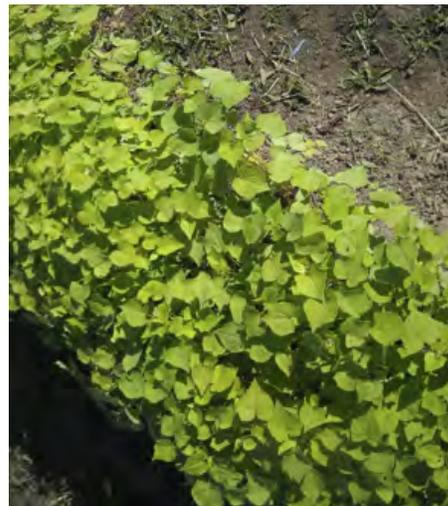
quite a sight. Let’s grow some phosphorus!

△

Robert Kourik is the author and publisher (Metamorphic Press) of nine books. Including: Designing and Maintaining Your Edible Landscape—Naturally (1986) and Understanding Roots (2015). He has over 35 years experience as a landscape designer in California.

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An excellent multifunctional annual, buckwheat is an outstanding cover crop, with many other benefits.

Reviews

Plant These Trees **Review by Peter Bane**

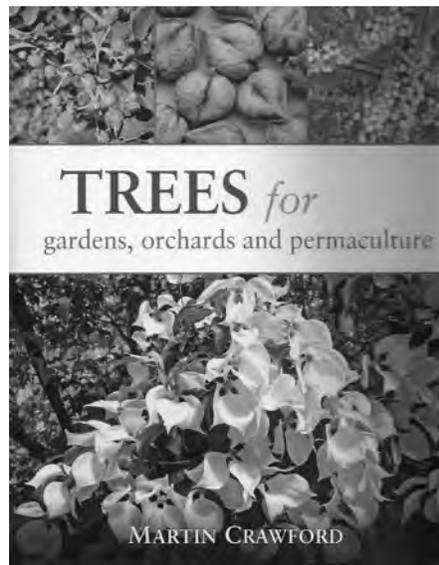
MARTIN CRAWFORD
Trees for Gardens, Orchards,
and Permaculture
Permanent Publications. East Meon.
Hamps. UK. 2015.
229 pp. full color. large format.
\$39.95.

MARTIN CRAWFORD, as other reviewers have noted, is very knowledgeable about perennial plants. As the founder and director for 25 years of Agroforestry Research Trust in Devon, he has advanced the science of perennial agriculture in practice more than almost anyone alive. A committed amateur at the beginning, he has become over a quarter century of investigation, the consummate professional, conducting scholarly research and field trials interactively on several sites in one of Britain's most favorable climates, while publishing his results with regularity.

Not content merely to talk about trees (and shrubs and roots and bulbs and more) Martin has weighed in repeatedly on the subject of climate change and its impact on horticulture. He has trialed hundreds and hundreds of perennial plants suited to the temperate zone, and most importantly, has explored in very practical terms the interactions of these promising species under cultivation and with each other. His publications and writings, in the quarterly *Agroforestry News*, and in his books on forest gardening, perennial vegetables, and other subjects, are legion.

This collection of 75 trees, ranging from toon to cornelian cherry to monkey puzzle, leaves little to be wanted. All of the familiar nuts and fruits are well represented, and many lesser known but worthy species are introduced. The book takes the form of an extended catalog with commentaries. Each entry, or short chapter, describes the tree, its origin and history briefly, and covers uses, cultivars, related species, pests and diseases, cultivation requirements and cautions,

and provides a list of suppliers in the UK and in North America. Of course there are excellent photographs of trees, fruits, nuts, and flowers. Many of the entries are multiple, as for example Asian Pears, which includes both *Pyrus pyrifolia* and *P. ussuriensis*, or alders, which covers five species. The chapter on eucalyptus (hardy) reviews 12 spp; a tabular listing of oaks references more than 70.



hint at the reflective scientist behind the workaday descriptions: Hardy eucalyptus is a rather esoteric group of plants, of potential value for oil, and little explored. Many tree books take the easy route, this one does not. For serious students of permanent agriculture, this text will prove indispensable—it is both broad-ranging and highly detailed, and thus is likely to become a favorite and well-thumbed reference for tree planters everywhere.

While covering the familiar well, this work is certain to introduce even knowledgeable readers to new opportunities. Paper mulberry (*Broussonetia papyrifera*, a plant I knew in a cursory way from Hawaii, but hardy to USDA zone 7, is back-to-back with a listing of a dozen improved pawpaw cultivars (*Asimina triloba*), perhaps North America's very finest native edible, and one fruiting in my southern Indiana yard (yum!). The entries attend to essential details: stratification of seed, environmental conditions, age of bearing, size of fruits or nuts, quality, flowering times, caliber of timber, and the character of current research—everything a serious grower would need to know.

In a very unassuming manner Martin

**...it is both broad-ranging and highly detailed,
and thus is likely to become a favorite
and well-thumbed reference....**

Without a doubt, British readers will appreciate the book's careful attention to UK conditions. It offers both USDA zone hardiness ratings and RHA (Royal Horticultural Assn.) zones, which apparently better represent the subtleties of Britain's maritime climate. North American readers, however, should not feel slighted, as some of our best species are well profiled herein: pecan, persimmon, pawpaw, chinkapin, buffaloberry, and honeylocust among them. Truly a global survey, this compendium offers would-be orchardists, forest gardeners, and arborists the best of planet Earth for cooler climates.

With lush photography and careful research to back it, the quotidian descriptions focus attention on the trees themselves. Some choices are completely obvious: apple, walnut, mulberry. Others

Crawford sets a high bar for research. Given that trees are one of the most powerful means humanity has at its disposal to address the climate crisis, this book and the work behind it assume extraordinary importance. That the author's efforts have taken place entirely outside the academy gives us pause in considering the relevance of much university-based work today. *Trees for Gardens, Orchards, and Permaculture* might as well have been titled "Trees for saving humanity," but Martin would never have deigned to inflate his deep love and regard for our woody friends in this manner. Let his friends say so instead. For those who know how necessary trees are for the life of the world, this book is a poem. Δ

EVENTS

Advanced Training: Social Permaculture Northern California

Earth Activist Training British Columbia

Dates: April 29-May 15

Location: OUR Ecovillage,
Shawnigan Lake, BC

Description: Start with permaculture as the foundation. Permaculture works with nature, or rather, teaches us to “work as nature working.” This is Earth Activist Training, a rich array of solutions, tools, and strategies to redesign our world

Instructors: Starhawk, Charles Williams

Cost: \$1,970 Cdn.

Contact: www.earthactivisttraining.org

Permaculture Design Course Washington

Dates: July 16-30

Location: Bullock’s Homestead,
Orcas Island, WA

Description: A two-week design course on the Bullock’s 30+ year-old permaculture homestead. Over 72 hours of classroom and hands-on education including design methodologies, observation skill-building, whole systems design, annual and perennial foods, water/energy/waste management, appropriate construction, plant propagation and culture, outdoor mushroom cultivation, herbs, and natural fiber use.

Instructors: Douglas & Samuel Bullock,
John Valenzuela,
Dave Boehnlein & more.

Cost: \$1,500 (\$1,400 paid-in-full by May 1st). A \$250 non-refundable deposit is required for registration)

Contact: Dave Boehnlein
360-840-8483
info@permacultureportal.com
<http://permacultureportal.com>

Dates: March 30-April 3

Location: Cazadero, CA

Description: When we come together to co-create, to empower one another or to challenge the structures of unjust power, we face unique challenges. All groups struggle with issues of power, conflicts, and the need to make decisions. Collaborative groups may be healing, nurturing, and inspirational—or they may founder on the rocks of conflict and poor communication.

Instructors: Starhawk, Charles Williams

Cost: \$650-\$850 sliding scale

Contact:
earthactivisttraining@gmail.com
www.earthactivisttraining.org

Seed Saving Workshop and Permaculture Design Course Oregon

Dates: July 24-August 6

Location: Ashland, OR

Description: Two Week Intensive giving you hands-on permaculture experience plus harvesting, threshing, winnowing wet and dry seeds at a Restoration Seeds farm. Plus medicinal herb walk, greenhouse propagation, garden to farm-scale design and even bread making. Hosted on a working permaculture farm, you will learn more about plants than anywhere else. You will gain real-world design experience with your group design project. Bring your work clothes and get ready to learn by doing. Includes camping and three vegetarian meals per day. Discount for couples \$50 each. Course photographer, assisted cook or student \$100 discounts.

Cost: Super Early \$1,150 ends 5/24, Early \$1,250 ends 6/24, Regular \$1,450.

Contact: Chuck Burr
541 201-2688
courses@sopermaculture.org
www.sopermaculture.org

Sustainable Living Skills Immersion Permaculture Design Course Western Oregon

Dates: June 5-July 16

Location: Aprovecho, OR

Description: Aprovecho’s Sustainable Living course is the oldest program of its kind in the Northwest and includes hands on training in appropriate technology, sustainable forestry, natural building, and sustainable agriculture. The 72 hour Permaculture Design curriculum is woven throughout the program, leaving students with a framework for integrating strategies and techniques into cohesive designs for sustainable human settlement.

Instructors: Jude Hobbs, Marisha Auerbach, Rick Valley, Andrew Millison, Tao Orion, Abel Kloster and Friends

Cost: Sliding scale of \$2,200-\$2,800 for six weeks

Contact: Abel Kloster
541-556-1426
abelkloster@gmail.com
www.aprovecho.net

Advanced Design Course Washington

Dates: August 21-27

Location: Bullock’s Homestead,
Orcas Island, WA

Description: Join Terra Phoenix Design and the Bullock’s Permaculture Homestead for this week long deep-dive into permaculture design. We will focus on gaining both greater depth and breadth of experience in design. Participants will immerse themselves in practical details on a wide variety of topics relevant to designers: advanced siting considerations, designing for different climatic and cultural contexts, advanced implementation planning, species selection criteria, logistics and administration for running a design consultancy, etc. Throughout the course you will do a variety of mini-designs to get your mind thinking outside the box as well as a bigger design experience. We’re still planning out all the details, but we guarantee it will be an excellent educational experience! Keep an eye on our website for the latest info. Note: A Permaculture Design Course certificate is a prerequisite for this course as we will not be reviewing the basics.

Cost: TBA (see website for details)

Contact: Dave Boehnlein
360-840-8483
info@permacultureportal.com
<http://permacultureportal.com>

*Send Event and Calendar Listings for Issue #100
(May 2016)*

Water Extremes: Drought and Flood

by the March 1st deadline

to (NOTE: new address!):

events@permaculturedesignmagazine.com

Permaculture Design Course California

Dates: Mar. 19-Apr. 1; Jul. 16-29;
Sep. 17-30

Location: Occidental, CA

Description: Our three seasonal Permaculture Design Certification courses will empower you to DIY and TIY—“Think It Yourself.” Immerse yourself in information, ideas and inspiration on how to design sustainable, regenerative systems in balance with your home ecosystem.

This high-level intensive will strengthen your capacity to lead your community towards regional resilience through a collaborative process to re-envision local human systems that mimic natural patterns.

OAEC, an ecological demonstration site and intentional community for over 20 years, offers the longest consistently running Permaculture Design Certification course in the West.

Instructors: Brock Dolman, Kendall Dunnigan and many guests

Cost: \$1,650. \$1,550 if registered three weeks in advance.

Contact: www.oaec.org

Permaculture Design Course Arizona

Dates: Feb. 6-7, 13-14, 27-28,
Mar. 12-13, 19-20

Location: Tuscon, AZ

Description: This Permaculture certification course covers all aspects of sustainable design with a Southwest dry lands flavor, including a balance of hands on experience, classroom time, and design practicum. Dynamic exercises encourage pattern recognition, noticing the links between plants and animals, climate, and landforms that make up natural ecosystems. The course focuses on dry land communities with a strong urban and semi-rural emphasis, addressing individual site and neighborhood “problems”, such as storm water flooding. Students learn to read the landscape, to map and analyze energies flowing through a site, and to develop integrated designs for sustainable systems. Our course closely follows the standard 72 hour format developed by Bill Mollison and others.

Instructors: Dan Dorsey, Leona Davis, Kendall Kroesen, Brad Lancaster, Barbara Rose

Cost: \$725, does not include books

Contact:

www.sonoranpermaculture.org

30th Annual! Permaculture Design Course Colorado

Dates: August 8-19, 2016

Location: Basalt, CO

Description: Not only are you gaining the concepts and tools to design and engineer sustainable systems, such as forest gardens, renewable energy systems, water conservation systems, and other eco-technologies... But you're putting your learning to use, hands-on, in an environment that's benefited from decades of comprehensive permaculture practice: state of the art, passive and active solar greenhouses...mature indoor and outdoor forest gardens, tropical and Mediterranean... rain water catchment and greywater systems... functioning aquaponic systems...composting toilets...not to mention small animal husbandry! You'll not only be learning the theories...you'll be learning the skills needed to implement them...and seeing the fertility and abundance that result from decades of applied permaculture. When you participate in this year's Permaculture Design Certification program – our 30th annual PDC! – you gain the tools, the hands-on experience, and the long-range vision to make that potential a reality. Whether you're doing it here in our vigorous and healthy poly-culture systems at 7200' elevation, or in the Midwestern plains, in the coastal flats, or in desert environments.

Instructors: Adam Brock, Creighton Hofeditz, Isabel Sanchez

Cost: \$1,875, includes meals, camping, materials; a non-refundable \$600 deposit.

Contact: crmpi.org

Children's Permaculture Course On-line

Dates: on-going

Location: on-line

Description: This is a course for kids! The content itself is divided into twelve blocks with each block containing four parts. Each part covers a different theme (e.g. community, patterns). This roughly correlates as one month (block) and four weeks (themes). However, because each child is unique, students are encouraged to move at their own pace.

Instructors: Roman Shapla

Cost: \$32.95/month

Contact: Roman Shapla
childrenspermaculture.com

Design & Advanced Courses Fountain City, Wisconsin

Contact: info@kinstonecircle.com
www.kinstonecircle.com

608-687-3332

Instructor: Wayne Weiseman

Permaculture Design Course

Dates: August 13-22

Description: This course provides a comprehensive introduction to Permaculture principles, applications and design practices as first set out by Permaculture founder, Bill Mollison. It fulfills and exceeds the 72-hour international standard as a foundational course for Permaculture practitioners and teachers. Special attention in our Permaculture training is given to climatic zones represented by course participants.

Cost: \$1,295; before 7/2: \$1,165

Permaculture Teacher Training

Dates: April 11–16 OR October 11–16

Description: If you want to develop and practice a curriculum of your own to teach Permaculture to others, this course focuses on just that. This is an immersion course based on practice and independent work with guidance and input from other students and the instructor. Prerequisite: PDC certificate

Cost: \$995; early bird, \$895

Advanced Permaculture Design

Dates: April 18–24, OR October 3–9

Description: So, you have your PDC, now what? This program teaches the use of ecological landscape design language and technique using the Permaculture design process to create an ecologically balanced residence and abundant lifestyle. Forest gardening, landscape design techniques, and other topics covered in this course will insure a life-changing experience and provide enhanced skills for ecological design. Basic drafting and technical drawing are included. Students taking this course must have their PDC certificate.

Cost: \$995; early bird \$895

Plants in Permaculture

Dates: June 22-26 OR July 20-24

Description: This in-depth course is about all things “plant”. It is one of our most popular classes! You will learn to identify trees and plants, come to an understanding of their significance in the landscape, and delineate how to use plants for food, medicine and utility. The curriculum includes plant guilds, food forests, basic biology, basic botany, effects of weather on vegetation, interactions with animals, and the processes of various habitats and ecosystems (including farm ecosystems).

Cost: \$500; early bird: \$450

Ask your public library to subscribe — more than 50 already do.
See Library Service, pg. 63.

Permaculture Design Course New England

Dates: 3 weekends: March-May 2016

Location: Sirius Ecovillage, Western MA

Description: Gain hands-on ecological design experience alongside leading permaculture designers & educators at a renowned permaculture course in the northeastern US! Visit numerous permaculture demonstration sites (Permaculture homesteads and homes, Sirius Ecovillage, etc)

Instructors: Kay Cafasso, Keith Zaltzberg, Ryan Harb, Walker Korby, Llani Davidson & guests

Cost: \$1,350-\$1,500 sliding scale tuition includes organic meals

Contact: www.PermacultureSeries.org

Permaculture Design Course New England

Dates: June 18-28

Location: Williamsburg, MA

Description: Sowing Solutions Course at Snow Farm New England Craft Program. Permaculture Design Certification Course with Sowing Solutions : Join us for a guided ecological design training; Visit numerous demonstration sites; Learn community resilience skills; Meet our staff of leading permaculture designers & educators from the northeast;

Instructors: Kay Cafasso, Keith Zaltzberg, Ryan Harb, Walker Korby, Llani Davidson & guests

Cost: \$1,350-\$1,500 sliding scale tuition includes organic meals

Contact: www.PermacultureSeries.org

Permaculture Design Course, Midwest

Dates: June 5-19

Location: Paoli, IN

Description: Gain practical skills, gather truly helpful insights, and create actionable plans in this university-based permaculture design course. Lead by an experienced and ever-evolving teaching team you will ground your understanding in permaculture design and balance it with play in a beautiful 200 acre forested farm. The course moves beyond the standard curriculum and prepares you for practical next steps in your own learning and practice.

Instructors: Rhonda Baird, Peter Bane, Keith Johnson and guests

Contact: Andy Mahler,
andy@lazyblackbear.org

Permaculture Design Course Midwest

Dates: Feb. 5-7, 19-20; Mar. 4-6, 25-27; Apr. 8-9, 30-May 1

Location: Bloomington, IN

Description: Study permaculture design over six weekends with a wonderful team of experienced and apprentice teachers bringing together their experiences around village building, homesteading, farming, business development, and much more based on permaculture practices in the region. Lectures, engaged discussion, field trips, films, and practical, collaborative play-time all combine to provide a solid foundation the practice of permaculture to create a more resilient future.

Instructors: Rhonda Baird, Peter Bane, Keith Johnson, and guests

Cost: \$1,250 after; lodging not included. Saturday lunches provided. Limited work-trade.

Contact: Rhonda Baird
Center for Sustainable Living
csloffice@gmail.com
www.simplycsl.org/pdc

Check out
our new website for
Permaculture Design!
www.permaculturedesignmagazine.com

LETTERBOX



Dear *Permaculture Design*,

I feel compelled to write you a quick note to express my feelings about the latest issue of *Permaculture Design* (Decolonizing Permaculture) By far my favorite issue. I found it both honest and completely engaging. Congratulations on addressing these thought provoking ideas. I look forward to seeing this kind of diversity in future issues.

Keri Fox
Moose Jaw, Saskatchewan, Canada

Permaculture Design Course Western North Carolina

Dates: Apr. 2-3, May 6-8,
Jun. 6-7, Jul. 9-10,
Aug. 19-22, Sept. 24-25
and Oct. 1-2

Location: Asheville, NC

Description: Let the knowledge sink deep; learn Permaculture through the changing seasons here in western North Carolina. Wild Abundance is excited to be teaming up with the region's premier instructors to offer a bioregional Permaculture Design Course with a schedule that works for busy people! This class will empower students to become effective ecological designers, giving them the tools and knowledge to integrate Permaculture into their lives and landscapes throughout the seasons. What makes this class special is the depth into which the classes go. Rather than the overviews that many PDC's have of all subjects, the nature of this class will allow students to go deeper into many aspects of permaculture through direct experience rather than classroom learning.

Instructors: Laura Ruby, Natalie Bogwalker, Luke Cannon and guests

Cost: \$1,400

Contact:
<http://www.wildabundance.net/>

Dear *Permaculture Design*,

Really enjoyed the latest issue (Winter 2015). I did a PDC back in 1995, and you have stimulated a few memories for me. No doubt about it, it was a sexist process—the men did the teaching, and the women did the cooking and cleaning, and it struck me at that time that that was not really what I expected from a progressive program! As a bloke married to a woman with two daughters, I fully support the sentiments in the magazine. Hopefully, things have and will change enough for my girls to see permaculture as a really inclusive process (already heard “Dad, that stuff is for old guys, not girls!”).

While I'm at it, just a few comments about the concept of the immersion PDC: I did my PDC over two weeks solid—liked the content but hated the process. It was way too much information to take in in that time. Since doing the course, I now understand my learning style (after 28 years of teaching) and how perma-

Letters continued, page 62

Permaculture Design Course Ontario

Dates: Apr. 30-May 1; Aug. 6-7; Sep. 17-18; Oct. 22-23; Nov. 5-6

Location: Ottawa & Perth, Ontario

Description: Are you seeking an engaging learning experience and practical knowledge to apply to your land, work, community and life? Are you interested in growing food, taking care of the water and soil, sustaining your livelihood, building community, and deepening your relationship with Mother Earth?

This PDC emphasizes design skills, with participatory and collaborative learning, group and individual design work, as well as several site visits.

This course covers the standard PDC topics. Special topics include: an Integral approach to Permaculture design; observation and deep listening, nature connection, and lessons we've learned from local Anishnabek (indigenous) people; designing edible forest gardens for home and commercial scale; how to start a garden and a homestead; sustainable small businesses; capitalism and climate change; Transition initiatives; Nonviolent Communication and group facilitation; and much more!

Instructors: Bonita Ford, Sébastien Bacharach, Douglas Barnes

Contact: info@eonpermaculture.ca; www.eonpermaculture.ca

Permaculture Design Course Chicago

Dates: Apr. 23-24, May 21-22,
Jun. 25-26, Jul. 23-24,
Aug. 20-21, Sep. 17-18

Description: The course serves as an introduction to permaculture design. This PDC is designed for greater impact through active, peer-based learning using liberating structures and other learning approaches. This course dives deeper than traditional lecture-based courses into the design process through case studies, hands-on activities, games and stories to build a quality foundational experience

Instructors: William Faith, Rhonda Baird, Milton Dixon and guests

Cost: \$900 early bird

Contact: William Faith; 213-344-7149
william@geniuslocipermaculture.com
www.glpdc.info

Back Issues of *Permaculture Design*

- | | | |
|---|---|---|
| I,1 July '85 Permaculture in Oz | I,2 Nov. '85 Fruit & Nut Trees | #39 Jul. '98 Knowledge, Pattern & Design: Pc Way of Seeing, Native Conserv Sand Dunes, Language-Worldview-Gender, Patterning Process, Land-Use Planning, Teaching Pc, Vietnam, Holmgren on Pc |
| II,1 Feb. '86 Garden Design | II,2 May '86 IPC-2 & Pc Courses | #40*Dec. '98 New Forestry: Regl. Devl., Horselogging, Menominee Reservatn, Forest Investing, Restoratn, Old Growth, Homestead Tenure, Forest Soils, Forest Farmg, Woody Agric., Rainforests, Windbreaks, Coppice |
| II,3 Aug. '86 2nd Int'l Pc Conference | | #41*May '99 Natural Building: Oregon Cob, Cordwood, Bamboo, Thatch, Ethics, High Winds, Origins of Conflict, Greenhouses, Ponds, Adobe, Road Bldg, MicroHydro, Living Bldgs., Under \$20K Houses, Dreams |
| II,4 Nov. '86 Fukuoka, Keyline, Genetic Conservation, City Farms, Oceanic Pc | | #42 Dec. '99 Self-Reliance & Community Cooperation: Co-Intelligence & Self-Orgn., Archetype Dsgn, Sovereignty, Samoa, Mondragon, Natural Hous'g, Comm. Gdns., Zone 0, Solar Electric Tractor, Beekeeping |
| III,1 Feb. '87 Networking, Natural Farm'g, D-Q Univ., Children's Permaculture | III,3 Aug. '87 Annual Planting Cycle | #43*June '00 Food & Fiber: Hunger, Ferments, Seasonl Salad, Heirlooms, Fencing Self-Fertile Gdns, Rice Revolt, Cold-Climate Food, Edible Insects, Chillies, Food Origins, Garlic, Ethnobotany, Wild Food, Bamboo, Hemp |
| III,2 May '87 Wild Land Restoration | IV,1 Feb. '88 Marketing Pc Products | #44 Nov. '00 Earthworks & Energy: Spreader Drain, Horse Swales, Earth Dams, Machinery, Carpet-lined Ponds, Constr. Wetlands, Biogas, Windmills |
| III,4 Nov. '87 Trees for Life | | #45 Mar. '01 Medicine & Health: World & Self, Healthy Home, Designing Care, Ayurveda, Agents of Decay, Comm. Health Centres, Women Trad. Med. 4th World Apothecary, Healing Weeds, Medicnl Crops, Hawaiian Bot'l's |
| IV,2 May. '88 Urban-Rural Links , Economics & Community Development | | #46 July '01 Good Work & Right Livelihood: Pc Golf Course, Downsized Cost of Living, New Forest Economy, Energy Currency, Buddhist Mktg, End Wage Slavery, What's Surplus?, Urban Community, Enterprise Facil'n |
| IV,3 Aug. '88 Social Forestry , Gabions, Jap. Org. Ag., Producer/Consum. Coops | | #47 June '02 Watersheds: Water4Sale, Basins o'Relations, Watershed Devl, Gabions, Urban Runoff, Beavers, Skywater Ctr, Conserv. Investmt, Peat Bogs, Rabbits |
| IV,4 Nov. '88 Multi-Story Tree Crops , Greening Dominican Repb., Runoff Gdns | | #48*Sept '02 Making Changes: Co-Intelligent Activism, Webs of Power, Urban Food, How to Change, Teaching for Change, Global Transform'n, City Repair, Escaping Job Trap, Argentine Recovery, Costa Rica Pc |
| V,1 Feb. '89 <i>Permaculture: A Designers Manual</i> , Tree Bank, Water in Pc | | #49 Dec. '02 Where is Permaculture? Land-Rent Reform, 10 N. Amer. Sites, Cuba Ag, Rainbow Vall. NZ, Cacti/Succulents, Animal Self-Meds, Challenge2Pc |
| V,2 May. '89 Plant Guilds , Roof Gardens, Small Livestock | | #50 May '03 Ecosystems: Holmgren on Pc Mvmt, Hazelip & Syng. Ag, Chestnuts/Pigeons, Oak Savannas, Root Crop Polycultures, Alders, Fungal Ecosys. Humans & Wilderness, Indoor Ecosystems, Humid Tropics |
| V,3 Aug. '89 Rainforest Conservation in Ecuador, Gaia, Weed Gardens | | #51 Jan '04 Trad'l. Knowledge & Regeneration: Cataclysm & Collective Memory, Genome Wisdom, <i>Waru Waru</i> , Biosculpture, Inuit Medicine, Fermented Stimulants |
| V,4 Nov. '89 Earthworks & Water Conservation: Small Dams, Ponds, Keyline | | #52 May '04 Aquaculture: EcoAquac, Fish4Health, Dowsing, Pond Design, Greywater Biotreatment, N. Amer. Polyculture, Manage for Native Spp, Integrated Village Fisheries, Vietnam |
| VI,1 Feb. '90 Household Greywater Systems, Soil Imprinting (<i>\$5 each to here</i>) | | #53 Aug. '04 Education: Lifelong Learning, Edge-ucation, Albany Free Schl, Indigenous Ed. & Ecology, Ecocentric Pedagogy, School Gardens & Dances, Ecology of Learning, Brain Gym |
| VI,2 May. '90 Insectary Plants, more Greywater, Land Use for people “ | | #54 Nov. '04 Fire & Catastrophe: Design Beyond Disaster, New Opportunities Globalizatn, Invasion Biology, Street Orchards, Food Security |
| VI,3 Aug. '90 Water: Forests & Atmosphere, Catchment, Pond Design | | |
| VI,4*Nov.'90 Urban Permaculture: EcoCity Conf., Soil Detox, Suburbs & Pc | | |
| #23 May '91 Politics of Diversity , Greenhouse Market Gdn, Pc in Nepal | | |
| #24 Oct. '91 Creativity in Design: Case Studies, Index to Issues #1-23 \$5 | | |
| #25 Dec. '91 Design for Community: CSAs Restoring Forests, Garden Ecology | | |
| #26*May '92 Soil: Our Past, Our Future, Fertility, Worms, Cover Crops | | |
| #27*Aug '92 Integrating Pc: Deconstructing Utopia, Grassroots Organizing, Garden Polyculture, Pattern Learning, Living Fences | | |
| #28*Feb. '93 Structures: Comm'ty Dsgn, LETS, Industry, Strawbale/Timber-framing | | |
| #29/30* Jul.'93 Networks: Media Revw, Rural Reconstructn, Leaf Concentrate, Comm'ty Food, Palestine Pc, Do-Nothing Educ, Feng Shui, Pc Academy | | |
| #31*May '94 Forest Gdng: Energy & Pc, Mushrm Cultvn, Robt.Hart's F.G., Spp for No. Cal., Alders, Agroforestry: Belize & China, Honeylocust, N-fixers | | |
| #32*Apr. '95 Animals & Aquaculture: Animal Polyculture, Sm-scale Cattle, Goat Dairy, Keyline, Feral chickens, Bee Plants, Constructed Wetlands | | |
| #33 Dec. '95 Cities & Their Regions: Green Cities, L.A. Ecovillage, MAGIC Gdns, CoHousing, Micro-Enterprise Lending, Suburban Conversion \$5 | | |
| #34 June '96 Useful Plants: Bamboo Polyculture, Medicinals, Pest Control, Root Crops, Oaks, R. Hart's F.G., Russian Plants, Regl. Plants, Sources \$5 | | |
| #35 Nov. '96 Village Design: Pattern Language, Consensus Democracy, Conflict, Historic & New Villages, Planning for Tribe, Village Economics \$5 | | |
| #36*Mar. '97 Climate & Microclimate: Climate Change, Windbreaks, Low-Tech Sun Locator, Drylands, Cool Slopes, Straw-Clay Bldg. Round Beehive, Water Catch. | | |
| #37 Sept. '97 Tools & Appropriate Technology: Dowsing, Workbikes, Scythes, Japanese Saws, Nursery, Ferrocement, Greywater, A-frame & Bunyip Levels, Ram Pump, Solar Toilet, Log Yoke, Cookstoves | | |
| #38*Feb. '98 Economic Transformation: Speculation, No Middle Class, Coops WWOOF, Global Warm'g, Hol. Fin. Plan'g. Land Use, Adopt-a-Hive | | |

Back Issues of *Permaculture Design* (continued)

- #55 Feb. '05 **Learning from Our Mistakes:** Petrol Dependency, Village Design, Australian Lessons, RTFM!, Trial&Error, Forestry Experiments, Owner-Bldr, 10 Mistaken Ideas in Pc
- #56 May '05 **Tree Crops & Guilds:** Pine Nuts, Tree Vege, Acorns, American Chestnut, Honeylocust Silvopasture, Broadscale Agroforestry, Bamboo, Willow, Social Forestry
- #57 Aug. '05 **20th Anniv.:** Challenges & Changes, USA Pc, Hawai'i Retrospect, Permaculture, Pc's Soft Edge, Gaia U, PINC, Oil Depl, IPC-7, Retrofit Suburbs
- #58 Nov. '05 **Urban Pc:** Urban/Rural Futures, City Zones & Sectors, Growing Food, Detroit Visionaries, Reblgd, New Orleans & Everywhere, Transforming a Military Base, Workers Co-op, Energy Descent.
- #59 Feb. '06 **Peak Oil:** Eco-Collapse & Trauma, Thom Hartmann, Pathways for Energy Descent, How Cuba Survived, Oil & Food, Biofuels, Algae for Fuel, Relocalize
- #60 May '06 **Land Use Past & Present:** Sust.Ag an Oxymoron?, Negev Bedouin, East. Woodlands AgroForestry, Pc Heals in India, Arocanti, Pop. Growth/Land Hunger, Mexican Reforestation
- #61 Aug. '06 **Unseen Kin-doms:** Observation as Design Tool, Soil Food Web, Bees, Mycelial Internet, D-I-Y Mycorrhizal Inoculum, Cover Crops as Bee Forage, Earth Energies, Local Currencies, Dead Zones
- #62 Nov. '06 **Art of Permaculture:** Painting, Writing & Pc, Ecoartists, Art, Activism & Cmty, Street Theatre, Art & Bioremediation, Living Willow, Body as Zone 0, Art of the Found, Water Magic
- #63 Feb. '07 **Building & Technology:** How to Dwell? Natural Bldg & the Law, Bldg Code, Strawbale in China, Cob in Armenia, Integrated Solar Heating, Cooking, Pumping, Nation-Scale Pc in Brazil
- #64 May '07 **Waste = Food:** Throwaway Econ, Strategy of Salvage, Peak Soil, Pigs & Waste Mgmt, Bikes, Soil & Garbage, Farm as Organism, Opportunistic Plants? Simple Biodigester, Vermiculture
- #65 Aug. '07 **Climate Change:** Shrinking Seas, Forests' Role in Climate, Urban Forests, Making Trees Pay, Rainwater Harvesting, Indoor Gardens, Water Filtration, De-Stabilizing Climate
- #66 Nov. '07 **Animals in Design:** Jumbo Shrimp, Pawpaw Patch, Alpaca, Insects as Food, Integrated NH Farm, Pastured Poultry & Rabbits, Urban Livestock, Predator Restorat'n, Bees, Complementary Animals, Agrichar
- #67 Feb. '08 **Kids in Pc:** School as Ecosystem, Pc Education, Gardening Kids, Pc to H.S. Students, Tlaxcalan Kids Make Seedballs, Fostering Research Skills, Bottled Water Boycotts, Feeding 8 Billion.
- #68 May '08 **Plants on the Move:** Rethinking Non-Natives, Forest Migration, Black Walnuts, Saving Seed Savers, Grow a Community Gdn, N'hood Greening, Healthy Honeybees, Biofuels & Food Prices
- #69 Aug. '08 **Permaculture at Home:** Hawai'ian Cmty, London Forest Gdn, Suburban Renaissance, Calif. Campus, Phila. Orchards, Drinking Roofwater, Floating Island Bioremed., Bike Transport, Miss. Pc
- #70 Nov. '08 **Ethics at Work:** BAU is the Enemy, 13 Princ. of People Care, Pc in Business, Ecovillages, White Man in India, Uganda Boarding School, No Waste, Qual. Control, City Farming w/Runoff, Amaranth
- #71 Feb. '09 **Earthworks:** Hopewell Mound Water Mgmt, Belize, Keyline, Road & Dam Bldg., NW AgroFor, Pc&Landscape Arch, Earthbag Bldg, Low-Watt Fridge
- #72 May '09 **The View from Abroad:** War, Oil & Snails in Nigeria, Green Tech Future, Ethiopian Water Mgmt., Shrinking Forests, Food Exploration in Caucasus, Maya Agroforestry/Biochar, Pc to Trinidad,
- #73 Aug. '09 **Bioregionalism:** New Paradigm, Rocky Mtn. Wildlands, Wild Elephants, Organizing Houston, Heirloom Seeds, L.A. Gdns, Reclaim. Commons, Transition Hohenwald, Tenn., BioCongress Saga
- #74 Nov. '09 **Energy Descent:** In the Home, Transition Communities, Pc in Mexico, Biochar, US Consumption Dropping, EcoTechnic Future, No More Throwaway Economy, Making Fuel Alcohol
- #75 Feb. '10 **Local Food:** A City & Regl. Food System, Working Family on 5Ac, CSAs & Wild Foraging, City Backyard Gdng., Food Bank Gdns & Orchards, Salt Collecting, Regional Staples, City Grains.
- #76 May '10 **Soil Fertility:** Permaculture Way of Soil, Biochar, Sheet Mulch, Hawai'ian Soil Farming w/ Worms, Demystifying Humanure, Urine Fertilizer, Crop Rotations, Mushrooms Build Soil
- #77 Aug. '10 **Eco-Nomics:** Measuring Many Forms of Capital & Quality of Life, Bob Swann & Invisible Structures, Bioshelter Market Gdn, Green Collar Economy, Pc & Finance, Pc Inst., Cert. & Diplomas
- #78 Nov. '10 **Water Wise:** Restoration Engineering, Watershed Relations, Colorado Runoff Gdns, Cisterns in Saudi Arabia, Energy Use & H₂O, Trad'l. Mexican Catchment, Rooftop Garden, Home Water
- #79 Feb. '11 **The Urban Frontier:** Indoor Denver Farm, Rooftop Food, Home town Returns, Urban Ecovillage, City Bees, Urban Pc Projects, Start Pc Farming: Mark Shephard, **Index to issues #24-40.**
- #80 May '11 **Designing for Disaster:** Collapse Mitigation, Global Storming, Responding to Major Events, Stabilizing the Climate, Self-Care, Ensuring Food Supplies, Living Through Drought
- #81 Aug. '11 **Hidden Connections in the Garden:** Neighborhood Gdn, Urban Ag on Empty Lots, Food=Land Access, Indigenous Practices, Seeds, Deep Raised Beds, Greenhouses, Urban Wild Edibles
- #82 Nov. '11 **Growing Staple Crops:** Broadscale Farming, Local Grain & Mkts, Non-Tillage Beans/Corn, Pigs and Potatoes, Rice in Vt. Perennial Staples - Pt. 1, Garden Farming, Acorns & Chestnuts.
- #83 Feb. '12 **The Economy of Wood:** Polewood, A Northwoods Economy, Basketmaker's Landscape, Ligurian Alnoculture, Wood as Fuel, Clearing Woodland, Black Locust, Perennial Staples - Pt. 2
- #84 May '12 **Home and Hearth:** Domestic Permaculture, Natural Building, Roundhouses, Hearthfire, Retrofits, Home Economy, Homeschooling, Drylands Pc, Nova Scotia Homestead
- #85 Aug. '12 **There Goes the Neighborhood:** So. American Neighborhood Projects, N'hood Pattern Language, Community Solar, Food Security, SENS House, Moving Groups, Fracking & Common Rights
- #86 Nov. '12 **Health and Nutrition:** Naturopathy Centre, Seasonal Eating, Plant Medicine, Mushrooms & Vit. D, Herbal First Aid, Campus Forest Gdns, Beer, Growing Wise Children, Fenugreek
- #87 Feb. '13 **Weeds to the Rescue:** Managing Weedy Spp, Favorite Weeds, Weed Wisdom, Paulownia, Grafting onto Weed Trees, Polycultures, Burdock, Reputation of Weeds, **General Index to PcA #41-58.**
- #88 May '13 **Earth Skills & Nature Connection:** Mentoring, Cultural Repair, Connecting Youth to Nature & Self, Living with Wild Animals, Observation Skills & Design, Oyster-tecture, Personal Forest.
- #89 Aug. '13 **Practicing Democracy:** Slow Democracy, Seed Libraries, Rhode Island Prosperity, Lessons from the Iroquois, Community Gardens, Entrepreneurship, Social Pc, Pastoralism, Sweet Cicely
- #90 Nov. '13 **Appropriate Technology:** Technology & Culture, Zone 4 Tools, Rocket Mass Htrs, Solar Pump, Solar Food Dryers, Social Sharing Software, Oil Presses, Woody Ag Trials, Scythes, PV Dbl. Cropping
- #91 Feb. '14 **Seeds:** Arizona Seed-Sheds, Seed Saving Primer, Leucaena, Volunteer Plants in the Garden, Seeds of Cheese, Seed Banks, GMOs in Uganda, **General Index to Issues #59-74.**
- #92 May '14 **Stacking Functions:** Primer; Biochar; Commty Gdn.; Pc of Oaks Nature, Culture, Self; Fodder Banking Central America; Rule of Three; Colo. Flooding; IPC-11; **Spp Index to PcA #41-74.**
- #93 Aug. '14 **Experimentation-Science in Pc:** Method & Theory; Dynamic Accumulators.; Experimentation; N-fixing Vege.; Biochar & Soil; People's Science; Malawi; Pc & Academia; Soil & Biodiversity Tests
- #94 Nov. '14 **Seasonal Cycles of Work:** Festivals & Forestry; High Desert Homestead; Market Seasons; Wisconsin Gdn. Cycles, Seeds; Energy by Seasons; Homestead Resilience; Forest Gdn. Research
- #95 Feb. '15 **Perennial Crops:** Perennial Cultures; Hybrid Swarms, Hickory-Pecans; Perennial Sugar; Haiti; Perennial Veg.; Perennial Cereals; Guild Patterning; Hardy Kiwi; Foraging; General Index
- #96 May '15 **Building the Solar Economy:** The Gross Society; Bioshelters & Greenhouses; *Passivhaus* Design; Citrus; Community Advocacy; Solar Business; Perennial Grains, Pt. II; Peer-Driven Pc Organiz.
- #97 Aug. '15 **Life on the Edge:** Culture of Healing; Hedgerows; Hellstrip Polycultures; Reaching the Masses; Humanure; Dynamic Accumulation; Design. for Children & Elders; Birth, Grief
- #98 Nov. '15 **Decolonizing Permaculture:** Pc=Relationship; A Black Woman Practicing Pc; NAPC Ppl. of Color Statement; Pc and Patrix; Charleston Shootings; Intersectionality & Pc Ethics; Women in Pc.

Back Issue Prices & Ordering

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culture has fallen into the same trap as most education providers in assuming that one process will suit all participants (the sink or swim philosophy). Everyone learns in their own way, and what suits one person will not suit another. In the education field, new theories are regularly dished out that promise to solve the current issues, whether they be literacy or numeracy or climate change, but ignore the fact that there will not be a single magic formula because you have to take individuals into account. In recent times, I have completed several courses by distance education, and this suits me well because I can pace my own learning and take time to think about and explore what I have just learned. Currently, I'm doing a refresher PDC online and enjoy it.

Thanks for the great magazine.

Russell Henry
Victoria, Australia

Dear *Permaculture Design*,

I appreciate the issue on decolonizing permaculture. I found some good ideas to follow up, and I'll return to the issue more than once and review it. I was recently at the NorCal convergence and the participation of urban permaculturists, especially the African Americans from the Bay (who had support in attending) was appreciated; it made the conference way better hearing their eloquent, experienced reports. But yeah, as an old white guy, there was some tone in the articles that made me wanna grab my cane and shake it! Roight!

I would like to recount some images I have from my experiences of the so very white world of permaculture—what we did, starting out from being rather green and just trying to do right. Yeah, Mollison is a white guy, and rather old, having been able to do pilot training late in World War II. Mollison has noted his debt to the women who raised him and the living link it gave him to the Celtic and Norse European traditions of their ancestors. Bill did grow up in a fishing village on the Bass Strait, and has credited the traditions he learned from his friends and mentors who were/are Straitsmen (1), that is, descendants of the Tasmanian aborigines (primarily in the female line/mito-

Dear Permaculture Activist,

I'm writing to express my dismay about the change of name from *Permaculture Activist* to *Permaculture Design*.

I am a lifetime subscriber, and I'd like to explain why I chose to support the magazine and the work of Permaculture Activist. I'd also like to explain why I would NOT have chosen to support the magazine and the work of Permaculture Design.

To me, being a permaculture activist has to do with changing everything about our relationship to each other, to our planet, and to everything in between. It implies paying attention and making actual changes at every level. It includes conversation about empowerment, about gender, about race, about who has access to what they need and who does not. It implies our absolute intention to create change where needed. It implies taking

chondrial DNA) and runaway convicts, sealers, and whalers who jumped ship, that sort of survivor. My understanding is that while teaching at the university, Bill was active in getting it established that some young people in Tasmania had due cause for claiming minority financial aid to attend university in Tasmania. Bill also made it clear to us that a major reason the PDC, (the common denominator and meant to establish a minimum basic level of holism in the active permaculture community) has "The Certificate" is to make it possible for participants to get their course fees covered in circumstances where government financial aid is available. In my own experience, this has been essential for some Native Canadians and Native Americans—no certificate of completion, no \$. So—it worked here on Turtle Island ,too.

At meals during the convergence on South Island, Aotearoa (NZ) before IPCIII, it seemed I most often saw Bill at a table with people from non-Empire countries (and ex-Empire countries like India)—I didn't ask him why; I assumed they were more interesting, and no doubt Bill knew attending was more difficult economically for them (so grab the chance to meet with them!). I really think Bill was interested in an equal exchange with

action, where needed, to change our very selves.

To me, permaculture "design" is a limp intention to PLAN to design for change. Sadly, it does NOT imply a dedication to the actions to create that change.

I did not sign on as a designer. I signed on as an activist.

I hope you will—PROMPTLY—consider a return to our best selves, our selves as change-makers and not just as observers and wishers and hoppers and designers.

I hope you will reconsider the name change. I acknowledge that it has NOT YET changed the sorts of articles being published; however, I believe it risks everything in future.

Rebekah Rice
Delmar, NY

them, rather than chasing dollars with the rich Europeans and Americans who were there.

I do not count myself as a first wave permie—second wave maybe. Sure, there were more men than women, but lots of the women were strong, and at least many of us men had the sense to listen when they were talking about what they needed, and respond as we were able. The corollary to this is that the women, being fewer, were valued and heard, but yeah, many had a harder time and burned out fast. Most are still in permaculture, just not in the limelight. I can relate. We were not uniformly macho, either.

One prominent example was my friend Simon Henderson, a gay man. You may have heard his vocal on "Permarap" at the end of *In Grave Danger of Falling Food* (the first permaculture documentary) or seen him (a bit toned down for international consumption) unloading strawberries at the pre-sellout Cascadian Farm stand in the Temperate Zone episode of *The Global Gardener*. Simon also convened the first English/Spanish PDC I know of at Aprovecho Institute, which had a very active scholarship contingent, and an international participant group, including probable right-wing intelligence/paramilitary representation (US and

Guatemalan). Try that on for challenging diversity: watching someone get evasive when polite questions get asked....

“Breaking trail,” a term I use as one who has lived in snow country, is bloody hard work. “Walking point” in jungle warfare terms, is dangerous. Simon died from Hep C in 2004. In the post-IPC-II, Mollison-taught PDC, where Simon and I met as participants, Ben Linder, a young U of Oregon grad, presented his work with microhydro systems (to power refrigeration for medical supplies and light to do homework at night) in rural Nicaragua. A couple of months after we met Ben, he and his crew were knocked out by grenades and finished off with AR15s at close range on the job site by American-paid and supplied colonial mercenaries, financed by drug money. Mike Maki, a first wave permaculturist, figured he could take the risk and make enough money to begin a forest-farmed super-foods business, supporting his Peruvian family and helping communities to restore and protect the Amazon ecology.

Unfortunately, he was wholesaling mushrooms to a friend who had been busted and turned to avoid a harsh sentence. Now he is managing the organic garden at a federal prison camp, and consulting with a very racially diverse group there (the “criminals” from the island territories of the US all go to federal prison), helping them plan what they will do when they each get released. You find the Buddha anywhere.

Among women in the first wave, I would count Susan Davidson, a Canadian, who convened a coven for a closing ritual at IPC-II (at Evergreen State College in Washington State) in response to the opening convocation by a Native American professor from the SW who used the word “witch” in a way offensive to the coven, whose own ritual caused a controversy, outraging some Christians present. Susan continues to be active in agriculture and ecovillage-type ventures in BC, and I was told she introduced Starhawk to permaculture.

I met Tom Ward when I was first introduced to permaculture in 1981, and got to know him in visits to Aprovecho. Tom also taught at DQ university, a short-lived Chicano college in Davis, CA, and later he brought Dennis Martinez, a

rancheria-raised native Californian, up to our second PDC in Oregon when we were teaching together. This opened up the world of ecological land management to me. Jude Hobbs convened one of the first advanced permaculture courses, one week on teaching with Lea Harrison, and one on consultation with Max Lindegger. This was the first time I heard a systematic exposition of permaculture principles, not long after Reny Slay finished *Introduction to Permaculture*, and we had a version of the principles in print for the first time. Tom and I attended these classes, and soon we three began working together teaching a yearly PDC. Tom and I signed Jude’s PDC certificate in exchange for her teaching in the class. She participated in all sessions. So here was an advanced course convened by a woman, with a woman teacher who was working with another woman formulating the first listing of permaculture principles. This was 1990; this work helped us all.

If there is any woman in permaculture who has not received enough recognition and reward it is Reny Slay. She should have been credited as author of *Introduction to Permaculture*, with Bill getting second billing. Tom Ward was invited to Tholego in South Africa to teach a PDC, co-teaching with John Wilson who was a founder of Fambidzanai permaculture training center in Zimbabwe. Tom learned a lot about teaching in a course with participants who spoke seven first languages and shared no single common language. I still teach with Jude, and she and I worked with Tom for many years. Tom introduced us to what you might call subtle minorities: the left-handed, the dyslexic, the cross-dominant. Curiously, in our early PDCs, we found that we consistently had a majority of lefties, cross-dominant, and dyslexic participants (until we tired of checking).

I soon realized that I only wanted to teach in mixed-gender teams, because it went better, and more students gave good evaluations; I have done my best to hold to that rule, and so have helped encourage some women into teaching.

I realized before long that even teaching with people with whom I had trouble communicating often meant I was teaching with someone who could be extremely effective in communicating

with participants that couldn’t fully enjoy MY teaching style. And I heard in evaluations that our working relationships could model diversity and respect in teamwork for our participants. From there it’s a short jump to participants learning to value more diversity in their design team and see that the designs get better because of it.

I have been with a permaculture class and heard a native man my age talk about hiding from the district authorities who had come to the landing to take him away from his family to boarding school to teach him how to be “white.” Now I hated school, but that’s a whole mess of horrible worse than what I had to go through. And these people had maybe the youngest chief they’d ever had, and SHE was learning permacultural perspectives and integrating it with the patterns she had already internalized growing up in her culture, learning permaculture by teaching, showing us dimensions we hadn’t seen rather than being a participant in the class. Yes, there’s a long way to go—not enough has changed. I don’t know what I’ll manage to accomplish yet, but it’s the best path I can find. It’s the work worth doing. Keep finding positive ways to make the most change possible.

Rick Valley
Eugene, OR

Notes

1. There was an article on the Straitsmen in *Natural History Magazine* in the 90s.
2. John Wilson had an extensive letter printed in the *Activist* about cultural assumptions in permaculture, especially as expressed in the principles. He introduced Tom to Participatory Rural Appraisal (PRA) methods for working in support and aid work in the Third World.
3. *Memories of Fire, a cultural history of the Americas*, by Eduardo Galeano is a fine intro for English-speaking Americans/Canadians/Belizeans/Jamaicans, etc. to how the Americas came to be as they are now, la politica, el racismo, the PAT-TERNS. And yeah, Eduardo wrote it in English, not his first language.

Calendar

Feb. 6-7, 13-14, 27-28, Mar. 12-13, 19-20. Tucson, AZ. Permaculture Design Course. www.sonoranpermaculture.org.
 Mar. 19-Apr. 1; Jul. 16-29; Sep. 17-30. Occidental, CA. Permaculture Design Course. www.oaec.org.
 March 30-April 3. Cazadero, CA Special Social Permaculture Intensive: Nurturing Effective and Creative Groups. earthactivisttraining@gmail.com.
 March-May. Western MA. Sowing Solutions Permaculture Design Certification Course and Training. www.PermacultureSeries.org.
 Apr. 2-3, May 6-8, Jun. 6-7, Jul. 9-10, Aug. 19-22, Sept. 24-25 and Oct. 1-2. Asheville, NC. Permaculture Design Course. www.wildabundance.net.

April 4-8. Cazadero, CA. Facilitator's Training. earthactivisttraining@gmail.com.
 Apr. 23-24, May 21-22, Jun. 25-26, Jul. 23-24, Aug. 20-21, Sep. 17-18. Chicago, IL. Permaculture Design Course. William Faith, 213-344-7149, william@geniuslocipermaculture.com, www.glpdc.info.
 April 29-May 15. British Columbia. Earth Activist Training. www.earthactivisttraining.org.
 Apr 30-May 1; Aug 6-7; Sep. 17-18; Oct. 22-23; Nov. 5-6. Ottawa & Perth, Ontario. Permaculture Design Course. Bonita Ford. www.eonpermaculture.ca.
 June 5-19. Paoli, IN. Permaculture Design Course. Andy Mahler, andy@lazyblackbear.org.
 June 18-28. Western MA. Sowing Solutions Permaculture Design Certification Course and Training. www.PermacultureSeries.org.
 July 16-30. Orcas Island, WA. Permaculture Design Course. info@permacultureportal.com, http://permacultureportal.com.
 July 24-August 6. Ashland, OR. Permaculture Design Course plus Seed Saving Workshop. Chuck Burr and Others, SOPI, 541 201-2688, courses@sopermaculture.org,

www.sopermaculture.org.
 August 8-19. Basalt, CO. Permaculture Design Course. www.crmipi.org.
 August 21-27. Orcas Island, WA. Advanced Design Course. info@permacultureportal.com, http://permacultureportal.com.
 November. MI. Permaculture Teacher Training. Rhonda Baird, shelteringhills@gmail.com.

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