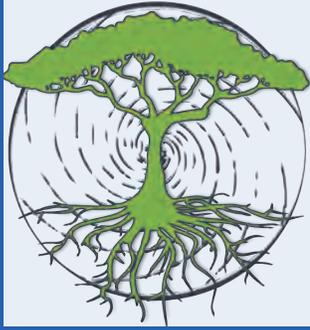


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August/Fall 2020 Issue #117

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Summer field in Belgium (Hamois). The blue flower is cornflower and the red one a corn poppy. Photo by Luc Viatour. CC BY-SA 3.0.

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Four-spotted Chaser male keeping his watch from Water Violet flowers in Kirchwerder, Hamburg. Photo by Aiwok. CC BY-SA 3.0.

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September 15
December 1
March 1, 2021

From the Publisher

John Wages

For several months, I've felt the need to re-engage with the magazine. As many of you know, Rhonda has taken on most of the editing as well as the layout work for the last several years. And so, realizing that she needed a break, and I needed to get back in touch with things, I suggested that I would edit #117 on Biodiversity. How hard could it be to fill an issue on a theme with such wide importance and recognition? Starting early in the year, I secured commitments from a number of writers and started jotting down leads and putting together an outline. Alas, the COVID19 epidemic turned the world upside down, and most of the people who had promised to write could not. I myself was inundated with responsibilities in my other life (the paying gig). And, I had elected to stay here on the farm in Tupelo all summer rather than make any trips to the West Coast so that I could focus on some long-delayed infrastructure projects and plantings. Again, the world did not comply with my plans. It rained through most of June with just enough of a break to plant, but not enough to keep the gardens weeded. Now, if you don't know how it is to live on real clay (100% clay), I can tell you. When it rains, it stays wet a long, long time. You can't really walk through a field that's undergone any recent tillage without losing your boots. Needless to say, neither manual nor mechanical cultivation is an option. And so the grass outgrew the beans, and then it outgrew most of the cowpeas (a feat, actually). The garden in Zone 1 has most of our permanently mulched beds, so they were mostly okay, fortunately. "Work outward from a controlled front." The plots further afield with row crops like peas, okra, corn, and peanuts, were lost to the mud and grass. However, Golden Bantam sweet corn did compete well enough with the grass that we grew a substantial amount of corn to eat and put away for winter in eight 100' rows. We had electric fencing at the ready. We had taken it down at the end of last season and were waiting for some signs that raccoons were going to show up again this year before installing it. Strangely, we had no visible raccoon or deer intrusions into our highly visible sweet corn patch. We never even put up the fencing.

Through all of this, everything fell behind, including my other work, installing long-overdue fencing, home repairs, and, of course, this issue of Permaculture Design. But, as you can see, the issue did arrive, finally, and as they say, "Better late than never."

A few notes are in order. As everyone knows, things have gone beyond crazy in the USA. Among many other threats to our future is the possibility of a dramatic increase in postal rates or even an end to the mail as we've known it (since 1775). We hope that this does not happen, as many small businesses depend on the USPS for cost-effective, reliable delivery. Were rates to increase significantly, we would have no choice but to increase subscription rates. We have not done this since assuming

ownership of the magazine in 2015 (and not for some time prior to that).

We've never made an effort to solicit a huge amount of advertising. That's not the kind of magazine we are. We've preferred, by and large, to let teachers come to us to advertise their PDCs and to run ads for companies with similar interests and ethical practices. Having said that, a significant chunk of our operating expenses has come from ad revenue, and this is way down. Nevertheless, we continue to offer Events listings for free and to run our website with its Resource listings as a community service, but it costs money to do all of this. So, if you've been waiting to decide whether to renew, this might be a good time to renew your subscription or to look through our book catalog.

We have a few new books in our bookstore. If there are any new titles you'd like us to carry, we'd welcome your suggestions. Unfortunately, we are still unable to get Tagari titles and have been out of stock of the Designers' Manual and Introduction to Permaculture for some time now. We distribute for Permaculture Principles, the distribution arm of Melliodora Publishing, in the US. We have a number of books of permacultural interest that are not available anywhere else: permacultureprinciples.com.

Note: we're currently dealing with a glitch in the website that tags every single order with "digital delivery." Keith has not yet been able to find the source, and even Wix has responded to a help request only to say they cannot find it either. This seems ridiculous, and I'm sure we'll solve it soon. Meanwhile, if you order something other than the digital-only version of the magazine subscription, rest assured that it will be a physical copy.

We often get questions about how to access the digital content. All print subscribers have access to the downloadable pdf of the current issue. To access, you need to sign up first. On the home page, select Digital Access Login. Select your own password. We will receive a request, which we'll approve if you're a subscriber. After that, just log in with the same e-mail you used the first time and the password you chose.

In keeping with our mission to teach people what they can do now, where they are, with the tools they have, we offer you the diverse collection of articles herein. May you draw inspiration from them. △

A personal story of learning, reflection, & permaculture design

Conserving Biodiversity as my Guiding Principle

S. Nicki Youngsma

I HAVE ALWAYS CONSIDERED MYSELF to be an environmentalist. The challenges of climate change, sea level rise, and endangered species have dominated my relationship with the natural world since I was a child. At age ten, I recall debating family elders on the urgency of saving the Amazon rainforest from clearcutting. I've been deeply aware since youth that polar bears are losing their habitat due to arctic ice melting. It has been heartbreaking to watch, year after year, as monarch butterflies teeter on the verge of collapse because their overwintering grounds are disappearing, and the wildflowers that feed adults, along with the milkweed that feeds the young, are becoming ever more sparse. The world's ecosystems have experienced such severe levels of degradation across my lifetime that many creatures face extinction.

Human activity is the proximate cause of this environmental chaos. Because of the disturbing reality that we inhabit, I have been concerned about human encroachment into wild spaces for as long as I can remember. This concern informs my efforts to be a better human in the world, and it provides motivation for me to continually evaluate my relationship with environmentalism and to change how I use my home as a tool of conservation.

Biodiversity conservation, which is about saving all life forms and their variability and keeping ecosystems functioning, is at the forefront of my personal environmentalist ethics. It always has been. I've long since subscribed to the "Care of the Earth" permaculture ethic, which calls for life systems to continue and multiply. Because of this, biodiversity conservation has always been the driving force behind designing my homesite. Over the past several years I have endeavored to turn my home into a conservation space for diversity in plant and animal life. What has surprised me during this design process, however, is how I've grown to redefine my own understanding of biodiversity conservation, what it looks like on the scale of my home landscape, and the challenges that have arisen while trying to implement it. My understanding and approach to biodiversity conservation has taken a journey all its own.

Naturescaping and restoration

The design of my homesite, a residential lot in Southeast Portland, Oregon, has been an ongoing and evolving process across the last ten years. At the beginning of it all, my understanding of how to use my land to be a better conservationist



Daikon radishes gone to seed provide pollinator habitat for winter months.

was to practice small-scale ecological restoration in my yard.

At the beginning of my journey, restoration meant first repairing the land. This came in the form of installing native plant species with the goal of helping heal the local ecosystem as well as my own relationship with the land itself. When I moved in, my house was enclosed by a big, sterile lawn. In those early years, I took to 'naturescaping', which is a landscape design approach focused on installing endemic plants to support wildlife habitat and groundwater health. I signed up for the Backyard Habitat Certification Program, a partnership between the Portland Audubon Society and the Columbia Land Trust, which provided me with information and assistance on my restoration project. My priorities at the time focused on reducing lawn area, reintroducing native

plant species, providing a habitat for pollinating insects and birds, and eradicating invasive species. I also wanted hummingbirds to visit the yard (it's easy to get excited by hummingbirds).

To invite hummingbirds and other pollinators, I planted Douglas aster (*Aster subspicatus* aka *Symphotrichum subspicatum*) and hairy honeysuckle (*Lonicera hispidula*), which are both flowering plants native to Western Oregon. While beneficial for my goals and beautiful to look at, my use of these varieties as specific pollinator plants did not go exactly as I had hoped. I waited and waited for the hummingbirds to

This early period of naturescaping taught me that the concept of ecological restoration is often ambiguous.

come. I waited one year, then another. But so infrequent were the hummingbirds' visits that I ended up giving up on caring for the flowers intended to attract them. While trying not to feel too disappointed about this seeming defeat, I carried on naturescaping towards my other goals. I disconnected downspouts, installed two rain gardens, tried my best to use only native plants, and felt like a failure when I planted rosemary (a Mediterranean herb) to stabilize one rain garden's slope near the inflow. Once someone offered me a raspberry bush and I turned it down because it would have conflicted with my goals of using native plants rather than European food crops. This period of restoration via naturescaping was, for me, as much of a learning process about local plants as it was about myself and how to coexist with my hopes and plans while also reaffirming my conservation goals. This continues to be a learning process for me, although it has taken a somewhat different path in recent years.

This early period of naturescaping taught me that the concept of ecological restoration, when inspected, is often ambiguous. To what exactly are you restoring the ecology? Following that thought, I generally used to arrive somewhere in the vicinity of "nature before humans arrived to disturb it." By installing plant species that mimicked those found "in the wild," I believed I could participate in the land and ecosystem repair I felt called to do.

That worldview came into question, however, three years ago when I went on a community nature walk led by a Na-

tive American Chinook guide at an oak savanna restoration site at Mt. Talbert Nature Park in Happy Valley, Oregon. I walked beneath tall white oaks and big leaf maples, learning about the understory plant assemblages and creatures that play roles in the local ecology. The oak savannah is a woodland type that is generally composed of oak trees among other tree species (depending on the ecoregion) and prairie. It is the product of fire-based land management practices of indigenous peoples throughout North America, many of whom have used fire to shape ecosystems for thousands of years. The practice of controlled burning removes brushy,



Solanum torvum, a member of Solanaceae, originates in the Southeastern US, but is grown across the globe.

flammable vegetation and makes nutrients available in the soil for other plant growth (namely, grasses, forbs, and wildflowers) that provide habitat for deer, elk, and bison. Oak trees can survive fire, so they remain as a dominant overstory plant in such ecosystems. Also, oak trees produce acorns, which are nutritionally dense nuts that provide nourishment to a variety of creatures, including humans.

Oak savannah stewardship is an example of an agroforestry system that predates the coining of the 20th-century term, which is defined as a land management system in which

trees and shrubs are grown with crops and pastureland. Oak savannas are endangered because Western colonization, following 19th-century overland migration, has, among other things, ushered in a replacement of the oak tree overstory with urbanized development and private land ownership. Forcibly removing indigenous people from their ancestral lands and banning their practices of controlled burns has allowed other forest types, notably the Douglas fir (*Pseudotsuga menziesii*) forests in the Pacific Northwest, to replace traditional oak savanna, whose overstory allows for the light and space, among other ecological functions, needed to create grazing grounds for large game animals.

Up until that nature walk, I hadn't thought that humans could exist and source food within a landscape without degrading it. I had believed that humans couldn't be a part of an ecosystem, living alongside other creatures, without also perpetuating a relationship of exploitation. What I learned on that hike is that oak savannas are in fact human-designed ecosystems that have been supporting a rich array of plant, animal, and human life for thousands of years. That reality sharply contrasted with the understanding I had held my entire life that implicitly set humans outside of the natural world. Such a paradigm, as illustrated in the writings of John Muir, the founder of the Sierra Club, and in the Wilderness Act of 1964, proposes that people inherently cause harm to other creatures. According to this logic, the only way to mitigate that harm is to isolate the species from everything else—or, rather, the reverse: to isolate “everything else” from the human species. Such a worldview no longer seemed to map to what I had learned on that hike through the endangered oak savannah.

A slow watering began taking place in my mind. Many assumptions I had held in previous years started to seem obsolete and counter-productive, even harmful. I began to realize how such harm impacts both land and people, such as the erasure of indigenous peoples. It was through this process that I reevaluated and redefined what environmentalism was, and what it looked like for me. There was more I needed to do to be a better human in the world.

Agrobiodiversity is biodiversity

The wealth of biodiversity that exists in the world is profound. That is a generally accepted fact. What is lesser known in the world-at-large is the profound biodiversity that exists in human agricultural systems—also called agricultural biodiversity or agrobiodiversity. Agrobiodiversity is a niche subset of biodiversity that, for the majority of the environmental movement, has not been given much attention in nature protectionist circles. As Franziska Wolff writes in “Legal Factors Driving Agrobiodiversity Loss” for *elmi Review*, “While ‘general’ biodiversity was made a central theme by nature protectionists, agrobiodiversity or plant and animal genetic resources were embraced as a topic by agriculturalists and breeders” (1).

Since the Agricultural Revolution, human beings through-

out the globe have worked within various bioregions to coax and refine creatures that provide nutrition and sustenance. Thousands of years of plant tending and breeding resulted in the multitude of edible plants and food crops in use today. Consider maize (commonly known as corn), for example—its ancient ancestor is teosinte, a modest grass plant. Teosinte is not edible, but after thousands of years of tending by human hands, teosinte became maize which is a staple food across the Americas and now the globe.

The subject of agrobiodiversity captivated me once I began learning about it. My learning started with a class that took place a few months after the nature walk at the oak savannah restoration site. I was eager to know more about food cultivation; at that time, the subject of food and nutrition was particularly important to me as I had a toddler and was pregnant with my second child. Meeting the needs of growing bodies encouraged my hyper-awareness and longer-term investment in the subject of food cultivation.

One of the most awe-inspiring takeaways I had while learning about this topic was that the great diversity of plants that make up human food systems is, for many people, completely hidden. It was for me, anyways. I had lived my life up to that point never knowing there existed so many kinds of broccoli, radishes, wheat, rice, or carrots that a grocery store cannot hold them all. I never knew there were more kinds of apples beyond the dozen or so that can be found in supermarket produce aisles. It turns out that there are, in fact, thousands of varieties of *Malus domestica*. The concept of thousands of varieties of apples still sends my head spinning. The Temperate Orchard Conservancy, an Oregon-based nonprofit

Agrobiodiversity is in serious trouble today.

organization founded by members from the Home Orchard Society, an educational nonprofit, completed grafting of at least 5,000 distinct apple varieties as of December 2018.

Not all is rosy across this incredible diversity of food-bearing plants, though. Agrobiodiversity is in serious trouble today. Agricultural practices and farm policy have changed dramatically since the end of World War II and the unfolding of the Green Revolution, which has had monumental impacts on both agrobiodiversity and biodiversity. It's estimated that, in the USA, over 90% of heirloom varieties of crops have become lost or extinct (2). Currently and worldwide, it's estimated that only 30 crops feed the world's population (3) which, when compared to what humans have been eating throughout time, is anomalous. One estimate is that 5,000-70,000 plant species have fed human beings worldwide since time immemorial (4).

That means that in today's world, deteriorating environmental conditions endanger not only the polar bear and monarch butterfly, but ourselves as well. Our food security is in jeopardy because biodiversity is fading away in our regional and global food systems. Humans, too, are facing the threat of running out of food, not necessarily because there are too many mouths to feed—a common framing for food security discourse—but because there has been an in-progress extinction of the very things that nourish our bodies.

Since the onset of the Green Revolution, human food systems have seen dramatic, sweeping changes that have profound impacts on earth, water, livelihoods, and agrobiodiversity itself. We have been losing diversity in fruits and vegetables. We've been losing diversity in livestock and fisheries. We've been losing microorganisms in the soil that make all life on Earth's landmasses possible. In addition to all of this, we've also been losing knowledge and skills about these very things, which are critical because maintenance of agrobiodiversity relies on human interaction (5).

Revising and reinterpreting my idea of environmentalism translated to the redesign of my homesite.

The biodiversity loss happening in human food systems is being exacerbated by legal and corporate institutions. The genetic resources and healthy, fertile land that remain are falling victim to various forms of corporate enclosure. As large agribusiness firms increase their dominance in agricultural systems, genetic resources become more endangered because they become privatized through aggressive acquisition of seed companies, thereby taking seeds out of the larger market circulation, and filing intellectual property protections, like patents, on genetically engineered and genetically modified crops. This threatens human food security, now and in the future. Methods of enclosure aren't limited to patents on seeds but also include surveillance, biotechnologies, and strict licensing agreements (6). And these enclosures are allowed to extend over national borders as a condition of membership in the World Trade Organization. The rationale propelling such action is put most simply by grain farmer Bob Quinn: "Big agribusiness is all about trade secrets. Their idea of success is developing a valuable product and then controlling it as

tightly as possible" (7).

Ultimately, revisiting and reinterpreting my idea of environmentalism translated to the redesign of my homesite. I still have the goal of hosting native plants and supporting the local ecosystem, but now I also want to increasingly incorporate edible plants into my yard, integrating permaculture practices and ethics as much as possible.

Creating an edible landscape

I learned quickly that growing fruits and vegetables isn't as simple as I thought. I assembled a raised garden bed out of reclaimed wood, only to watch the frame wither and rot. I planted squash and found it took forever to grow—so much that I wondered if it was worth planting. And I didn't know how to harvest lettuce: does one simply tear off leaves, or is it practice to cut off the whole head? Nobody ever showed me how to harvest lettuce, and it seemed like a dumb question to ask. After all, it's lettuce. How complicated can it be? And what about the aphids that snuggle up in between the buds of broccoli crowns? Soap spray, fish oil, and cayenne pepper are proposed remedies for such problems but didn't seem to help much. And of course, there are commercial insecticides.

The land of do-it-yourself garden books and Pinterest searches left me in a state of overwhelm. So much time spent on weeding maintenance and memorizing companion planting rules for so little reward. Broccoli and cabbage can cross and produce offspring if you don't isolate them. The same goes for squashes. I wondered, What else needs to be isolated, and what exactly does that mean? Is it true that tomato seeds can't be planted in the ground before summer? Everyone seemed to know that but me. I was in over my head.

The payouts for gardening weren't going well. For the energy I put in, I could save time and still make some kind of impact by installing additional native species like snowberry bushes (*Symphoricarpos albus*) and sword ferns (*Polystichum munitum*), intrinsically easy-keepers that require no upkeep. Here I was, however, toiling away with brassicas. Should I keep trying despite the grocery store always having better broccoli? I've wondered so many times.

My food gardening commitment received an emergency bailout when a neighbor who worked for Growing Gardens, a local nonprofit, stopped by after noticing my depressed, sagging garden box and offered me help. The support I received through that organization was instrumental to maintaining my motivation. A group of volunteers came out to help me prepare the soil for a garden bed. The workshops, seeds, plant starts, and home visits from my garden mentor helped me stay connected to the garden as well as connect with community. One of the single most valuable things I received from Growing Gardens was the encouragement to experiment. After all, experiments are learning opportunities, and it's okay when things don't go according to plan. "You can put the seed in the ground and see what happens," a workshop instructor said while demonstrating how to sow

seeds into soil. The permission to try as well as the permission to fail has been the lifeline of my gardening practice.

Unsurprisingly, several failures befell my vegetable garden in following years. I transplanted radishes only to find out that's a no-no with root crops. I sowed carrots in too-compacted soil. I couldn't coordinate my planting organizer with what actually happened in the garden. Once I planted a vegetable start that I thought was lettuce but turned out to be chicory. I didn't know that at the time, and I was confused by the bitter flavor of the leafy clump. Perhaps I did something wrong, I thought, not giving it enough water despite its body growing thick and full of beautiful maroon-speckled lime green leaves.

Successes did happen in my vegetable garden though. Cucumbers, tomatillos, and strawberries came up one summer. So too did visits from slugs, grasshoppers, ants, paper wasps, and cabbage moths. Hosting the snack bar for unpopular invertebrates, however, didn't feel glamorous or impactful. Not back then, at least. I still longed for butterflies and hummingbirds. But it was a good season. I noted the food production zone was the convening place for a wide array of creatures, including plants I placed there and those who invited themselves, such as insects and fungi.

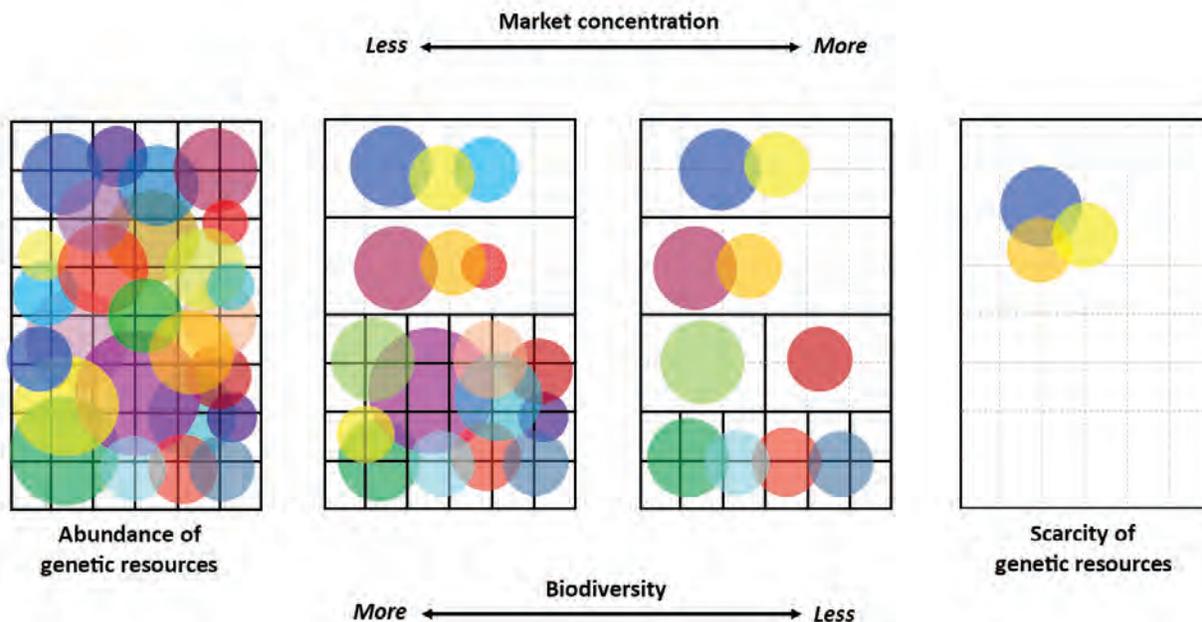
One winter my food scraps didn't make it through my

composting system, both due to frequently holding a baby and failing to prevent my toddler from knocking over the compost bucket before it arrived at the compost pile. Weeks upon weeks of seedy squash pulp, kale stems, and paper towels lay strewn about my front yard. I waved it off—it will decompose, I told myself, but admittedly I was at a loss of staying faithful to my homesite zone map. My garden clogs were never within 20' of each other, which ultimately determined proper composting as an unachievable dream.

To my surprise, however, the following summer provided some of the richest, albeit accidental, plantings of all. Runaway pumpkin patches and mystery squashes covered the yard, growing up and through chain link fencing and tangling with patches of Douglas asters. Also, seeds from dried sundakkai—also known as turkey berries or, in botanical Latin, *Solanum torvum*—germinated in my castaway food scraps. Several plants sprouted up, producing pea-sized light green fruits that turned black as they ripened.

S. torvum is a plant within the Solanaceae family that originates in present-day Southeastern US, but is grown throughout the world today. It's used as rootstock for grafting eggplant, and its berry-like fruit is used in Thai, Indian, and Caribbean cuisines. When rehydrated and sautéed for dishes like sundaikkai vatthal, the berries have a metallic, bitter

Biodiversity Loss and Enclosure of Living Organisms



As large agribusiness corporations increase their dominance in the food system, genetic resources become more endangered as biodiversity decreases and proprietary claims of the corporations are enforced through patents, licensing, and biotechnologies. Image by S. Nicki Youngsma, available on Wikimedia Commons.

flavor, as they contain a lot of iron. The friend who originally gifted me the bag of *S. torvum* from which the volunteers arose was surprised that I liked the flavor. So was I, in fact. I'd never had anything like it.

When fall was approaching, I broadcast seeds of daikon radish throughout the yard. I let them grow to serve as a living mulch on open, undecided swaths of former lawn space. Some radishes were harvested for food, while many I let go past the point of eating. They became enormous, twisted ogres of the sleek, meek white tubers found in Asian food stores. Daikon radishes are great friends for guiding succession: they're edible, easy to remove, and prolific. I've watched them flower and reseed. The thinned plants I use as temporary mulch to protect uncovered ground. Neighbors and couriers delivering packages stop to comment on my garden, often asking about the daikon radishes.

That's what conservation is, after all: it is keeping something going.

To my surprise, the daikon radishes provided one other benefit: a hummingbird habitat. Their long-lasting blooms fed hummingbirds throughout the winter. My kids would point to them through the window, admiring their grace and emerald green bodies and ruby red throats.

Seed-saving

Once, about 15 years ago, the mom of a friend gifted me a bottle of seeds she saved from her flower bed. I accepted the seeds but distinctly remember wondering to myself, Why save seeds when you can buy them at the store? The concept of saving seeds from plants in your yard was novel to me. I didn't know anyone who saved seeds. Seeds were always something that came in small paper envelopes that one got from a home and garden supply store. Reflecting on that now, all these years later, makes me laugh and wince at the same time.

The term seed-saving kept coming up in my journey into vegetable gardening and biodiversity conservation. It sounded important and something I could manage to do at home. How hard could it be?

Quickly, I found there was a lot more to seed-saving than I thought, and I had no idea what I was doing. When I looked through the seed catalog from Adaptive Seeds, a sustainable seed company in Oregon, I grimaced at the many species-specific instructions for saving their open-pollinated (OP) seeds. The practice seemed like a lot of work and

required tools and forethought. Sometime later, I attended a seed-saving workshop at my local library hosted by Grow Portland, another nonprofit, to learn more. The encouragement helped, so I started saving seeds from the easier things: squash, herbs, and daikon radishes. I even saved seeds from the non-edibles, like Douglas aster and marigold. I saved seeds from seeded grapes, paw paws, dried beans from the pantry, and *S. torvum*. I didn't know anything then about crossing, self-pollination, vegetative reproduction, or how to properly prepare seeds for storage. If I could glean a seed from something, I saved it.

I put dried seeds, most of them with labels, into empty prescription medicine bottles and stored them in a clear plastic tub. After amassing a small stock of seeds, I felt overwhelmed about what to do with the inventory. What should I plant first? Does it matter if you direct sow or transplant certain seeds? What should I start indoors? Do I really need a garden plan? I felt like I was asking the same beginner questions all over again.

A critical inflexion point happened in the spring of 2020 when the novel coronavirus arrived in the US and shelter-in-place orders were established nationwide. The unfolding



Sunflowers are a wonderful start to seed saving in the garden. Photo Rhonda Baird.

tumult ignited a deep urgency within me to do more. I leaned into gardening and sharing food with neighbors, but I wanted to delve deeper into means of resilience. When I came across an online seed-saving course through Sierra Seeds, a seed company that provides various mentorship and community offerings, I enrolled without hesitation. If I really wanted to know how to save seeds, I needed to dedicate some time to learning how to do it.

Seed-saving is, in my experience, a complex practice. Extracting seeds from food debris is not what seed-saving is; rather, seed-saving is about growing seeds. It is hardcore gardening: you have to be more committed than just growing plants for the food. One must steward a cohort of plants throughout their entire life cycle, understanding intimately the inner and outer workings of the plants themselves, in order to procure seeds—and then the cycle repeats. By engaging in this process, a seed saver fills the active management role of keeping a plant variety and its genetic resources extant, if even in a far-flung corner of the world that is a home garden. That's what conservation is, after all: it is keeping something going. Carrying out a seed-saving practice means that guidebooks and reference materials are indispensable, recordkeeping is critical, and, yes, you do need a garden plan.

I've had several eye-opening realizations during my seed-saving journey. One of the most relevant is my renewed understanding of the term heirloom variety. Previously, I didn't really understand the reason for the term: why, exactly, was space reserved in the gardening lexicon for a term that describes crop varieties that are passed down from generation to generation, usually within a community? For a long time, my understanding of their value was limited to being novelties and caches of unique traits.

It wasn't until my foray into seed-saving that I began to understand other values of heirloom varieties. My ah-ha moment came when, through the course's instruction, I realized that seeds are an extension of a people's cultural heritage. Growing treasured plants for food and medicine year after year gives form and shape to the stories, songs, food, lifestyle, and language of a people. Seeds are foundational. That is why, for instance, when disruptive forces such as colonialism, displacement, and biopiracy (the subterfuge of agribusiness corporations claiming patents on traits acquired from indigenous food crops and wild gene pools) impacts a people's food source, it is devastating. The disruption produces a ripple effect that assaults cultural identity, biodiversity, and agrobiodiversity. In my mind, the fact I've had to work this hard to conceptualize what is really meant by heirloom variety is but one testament to the pain and ecological degradation that is the legacy of colonization.

Learning about seed-saving in context to culture has added a new dimension of my understanding of biodiversity. Conserving agrobiodiversity allows for conservation of human cultures, as the two are inextricably linked. That connection supports the food sovereignty and seed sovereignty that keep communities intact and alive. Likewise, conservation of

the various world cultures associated with these foods allows for dignity, health, and maintenance of place-based knowledge, which in turn holds the key for stewarding land and maintaining regenerative ecosystems. Conserving agricultural biodiversity is "Care of People" as much as it is "Care of the Earth." It starts with saving seeds.

Looking ahead

It has taken me years to realize that gardening is, in many ways, the most impactful biodiversity conservation work one can do. The scale is small, but the impact is great. Being part of, as the ethnobotanist and activist Gary Paul Nabhan writes, the "tremendous momentum that has been made at the grassroots level in North America and elsewhere in not only conserving but also revitalizing the uses of rare food plant and animal varieties" (8) provides me with purpose, direction, and relevance.

As a gardener, I grow food for me. I can introduce new flavors into my dinner table and to those of others with plants like *S. torvum*. I'm also learning to save seeds, which helps more generations of plants survive and step into the future. Perhaps I'll create a future heirloom variety of daikon radish. Wildlife like crows, finches, bumblebees, wasps, and hummingbirds have a place to forage on the land I tend. Even the slugs and aphids come to visit because I'm engaging in an ancient practice of stewarding plants that otherwise wouldn't exist to feed anyone, human or not.

I hope for tools to navigate repair with the colonized land on which I live.

Looking ahead at the next ten years, I hope for more revelations, surprises, opportunities to put into practice the permaculture ethics of "Care of the Earth," "Care of People," and "Return of Surplus." I hope that my small acts of gardening can help my family and community survive the COVID-19 pandemic and help shape a healthier, regenerative future. I hope that the many organizations who have been part of supporting me in my journey are able to continue fulfilling their missions, helping others as they have helped me. I hope for tools to navigate repair with the colonized land on which I live, with my own ancestral histories, and with the indigenous communities, especially the Multnomah and Clackamas Chinook, whose ancestral land I call home. And I hope for success someday with growing broccoli, because I like the taste of it, but, more importantly, my kids like it too.



There was something of critical conservational importance I had been missing in all my early years of growing food. I had to invite myself into the landscape, allowing it to feed me too, before the hummingbirds were ready to come.

△

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Notes

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7. Bob Quinn & Liz Carlisle, *Grain by Grain: A Quest to Revive Ancient Wheat, Rural Jobs, and Healthy Food*, (Washington, DC: Island Press, 2019), 83.

8. Gary Paul Nabhan, "Why Biodiversity Matters," in *Conservation You Can Taste: Best Practices in Heritage Food Recovery and Successes in Restoring Agricultural Biodiversity over the Last Quarter Century* (Tucson: University of Arizona Southwest Center, 2013), 13.

IPC 14 IN ARGENTINA, planned from 28th November till December 4th in 2020 will be postponed to November 2021.

Dear friends of the Permaculture World, Children and Youth Groups, Indigenous- and Rural—and all Communities Everywhere!

The IPC-14 Argentina will be postponed to November-December 2021 due to the consequences of the COVID-19 Global Pandemic.

This new date for 2021 is a first step, a guide for the coming months during which we will continue to observe the development of the pandemic to be able to make the best decisions.

Our wish is that the 14th IPC sees representatives attending from many different places in the world and for that to happen we need to regain our health, the possibility to travel and our economy, among other factors. And—looking further into the future—we will use the time to explore additional online participation opportunities in many different ways.

We acknowledge the importance of permaculture and the need to share this way of life with all world inhabitants. What better opportunity to do that than at an international gathering such as this one?

Very soon there will be a cycle of online activities organized by a team of permaculture members and collaborators of IPC-14, in order to weave and strengthen the network, maximizing this time of change that we are in.

Firstly, the facilitators of the IPC-14 courses will offer some talks, presenting permaculture as a solution to what is happening in the world now. At the same time there will be videos shown of different inspiring projects in the world that are facing the crisis in an incredible way.

All updates regarding these events will continue to be shared on the official webpage 14ipc-argentina2020.org and on social media.

Sending you light, blessings, and warm regards from the place each one of us is located now.

*14th IPC Argentina Organizing Committee
International Permaculture Convergence Council
Friends of IPC*

A Citrus Fruit for USDA Zones 8, 7, 6, & even 5B

Locavores Rejoice!

Adam Turtle, FLS & Susanne Turtle

WHEN I WAS A KID, a long time ago, oranges and grapefruit were expensive and a special treat for the holidays. Even lemons were not yet household staples, and unless you lived on the Gulf Coast or in Florida, semi-hardy citrus fruit like satsumas, calamondins, and kumquats were almost unknown. Now with seemingly cheap transportation (since we are not paying full cost) dozens of kinds of citrus are available all year, almost everywhere, courtesy of the corporate fruit industry which, to maximize in-house short-term profits, uses chemically-assisted monocultures complete with accompanying residues and prettied up with dyes and coatings.

And we buy into this because it is convenient and tasty, and as everybody knows, citrus is “good” for you. But I can’t help wondering just how “good,” in terms of consequences, our insistence on out-of-season or exotic food is, especially long term. Hopefully, the pluses at least partially offset the negatives of the environmental disruptions from monocultures and poisonous chemicals used and petroleum burned for transport. It does seem we act selfishly and shortsightedly in putting our whims and indulgences ahead of our (and more importantly our children’s) security and well-being. Of course, we could grow at least some of our own citrus and other fruits in backyards or even as a local farm crop.

What I am proposing is that we begin to focus more on local or regional production for food security. And there is a delicious citrus fruit that we can produce here in middle America with little trouble and no pests. This most cold hardy of all citrus is



Harvested fruit.



Flying Dragon in late summer with fruit almost ripe.

suitable for growing in climates where the extreme winter low temperature stays above -15°F . outdoors. Most winters here in middle Tennessee, we can expect temperatures to go down briefly to around 0°F . In 1994, when we experienced a brief -11°F , our citrus didn’t even blink.

The botanical name of this citrus with temperate climate potential is *Poncirus trifoliata*. It belongs to a genus with only one species. This unusual citrus is native to central China and naturalizes well here. There are two heritable forms—the typical, larger (to 20’) type with straight two-inch thorns and ‘Flying Dragon’, a dwarf (to 8’) with ornamental contorted branches and hooked thorns which appear dragonesque in winter when they are leafless. Both forms have 2” fragrant, white, self-fertile flowers in early spring. There is no real common name although they are sometimes referred to as the trifoliolate orange.

The ‘Flying Dragon’ form, if set out on two-foot centers, can be used as a “fedge” (a food-producing hedge) and is effective as a living *boma*, an impenetrable barrier suitable to fence livestock or even deer... or people. Either form makes a unique and productive specimen in the landscape.

Even though some books say it is inedible, the fruit is similar to a seedy lemon but with a unique flavor that pleasantly combines lemon and grapefruit and mango. This fresh citrus, if allowed to after-ripen on the counter, then rolled and squeezed makes a great “ade”—no sugar needed! The flavor of this Dragon Juice Ade, while a bit sharp at first, sweetens and mel-



Typical, fragrant citrus flower. If you look closely, the embryonic fruit is seen at the center.

lows nicely after a few hours and is very pleasant even at room temperature. The juice can also be frozen for winter use—we substitute it in Key Lime Pie recipes (it never fools anyone, but when Sue takes one to a potluck, there is never any left). The peel can be candied or made into marmalade or used as zest. The seeds, dried and ground, are a nutraceutical similar in phytomedicinal benefits to grapefruit seed meal. In Korea, the young leaves are parboiled and used as a green vegetable.

On the downside, the fruit is small ($\pm 2''$), seedy, resinous, and only available in the fall (beginning in Sept.). On the plus side, this citrus is drought-tolerant, although if the dry spell lasts too long, it will affect fruit size. Then there are the thorns—yes, I get stuck working with them, but I’ve never had an infection. Anyway, I don’t reach into the thorns. Instead I use my walking stick to shake the branches and any ripe fruit falls to the grass-covered ground where they are easy to collect. I do this once or twice a week in season. A plus here, the uninjured fruit will stay good for up to three months unrefrigerated on the kitchen counter. Any injured fruit should be used as soon as possible or juiced and frozen. We typically use the last of them around New Year’s when we must go back to using the long-distance trucks if we want fresh citrus... or we could return to eating locally and seasonally, which long-term is healthier for us

as well as the planet and certainly more sustainable. By spring, we start missing and pleasantly anticipating our own local citrus. The one with the very small “environmental footprint”... and unique flavor!

In the fall from our Earth Advocates Research Farm booth at the Franklin Farmer’s Market, we offer fresh citrus fruit as well as other unusual produce on Saturday mornings. In the appropriate seasons for planting, we also offer several sizes of potted hardy citrus, along with a variety of other useful plants for edible landscaping ala permaculture—all proven to do well in middle Tennessee—year ‘round. Seeds of this hardy citrus and other useful plants are available from the ethnobotanical catalog of J.L. Hudson Seedsman in California (www.JLHudson-Seeds.net). See also article “Consider a Living Fence” in Acres U.S.A. magazine, Issue #537, March, 2016.

Most of us can see that things in general are not going well, and most of whatever is going on over the horizon with food or any other aspect of our lives, we only “know” about through our sensation-oriented media. And apparently “food” is not sufficiently exciting to warrant much coverage... that will change when we are hungry. With food, at least we have choices, and we can “reselect” for local or regional production, lessening food insecurity by taking back some of our autonomy. A hundred years ago according to the book *Kitchen Literacy* by Ann Vileisis, almost every household kept a vegetable garden. And while I’m not yet that old, I do remember that during the war (WWII) when Mama, my sibs, and I stayed with this relative and then that one around the country, there were always what were called “Victory Gardens” and maybe a few rabbits and/or chickens to feed the family and “do our part”. I remember that our little bit of help was always welcome. Now we are facing a far greater threat from diminishing resources (water, topsoil, pollinators, variety extinctions, etc.) and an increasingly erratic climate. Then we saw the benefits of multiple local food sources. I believe it was Bernard Baruch who said, “In times of peril, apathy is the unforgiveable sin and the irredeemable error.” Now almost no one keeps a garden at all. Ostensibly because we’re busy and food is cheap... unless you factor in the true cost to our health and environment.

Seems we might benefit from some timely reevaluation of our situation. Maybe beginning with food. By growing some of our own, we become coparticipants/coproducers rather than “consumers”. This will also get our hands in the dirt, the original probiotic, and help heal our estrangement.

This tough, tasty, attractive hardy citrus is a good addition or a place to begin rejoicing as a Locavore and responsible citizen of my favorite planet. Δ

Adam and Sue Turtle are Co-Directors of Earth Advocates Research Farm in Summertown, TN. Visit their website (www.earthadvocatesresearchfarm.com) for a wealth of information on growing bamboo and many other topics of permacultural interest. Contact them at bambooconsultant@aol.com

A permaculture perspective on global ecosystem collapse

Silent Night

John Wages

The frog pool was square — fifty feet wide and seventy feet long and four feet deep. Lush soft grass grew about its edge and a little ditch brought the water from the river to it and from it little ditches went out to the orchards. There were frogs there all right, thousands of them. Their voices beat the night, they boomed and barked and croaked and rattled. They sang to the stars, to the waning moon, to the waving grasses. They bellowed love songs and challenges. John Steinbeck, *Cannery Row*

I HEAR STEINBECK'S FROGS every night of spring, summer, and fall, and even on warm winter days. The booming of bullfrogs that I remember as a kid is accompanied by various tree frogs, including a species of barking frog. To the unwary, it sounds very much like a small dog in distress. One of my tenants heard it for the first time and was convinced that a puppy had crawled underneath the house. We assured him that if he opened the door to the crawlspace, the animal would find its way out. It's not that big of a house. But, he was concerned, so he crawled under the house to rescue the "dog"—only to find a small green frog with an outsized bark. We're lucky to have so many frogs, not only for amusing episodes like that, but even more so for the warm days of early spring (I'm talking February here). These days, that's when the pond warms enough that the frogs come out in glorious multitudes to sing their various songs. The world as a whole is not so fortunate. Globally, amphibian populations have been on the decline for some time—and not only amphibians, but even insects.

Declines in pollinator populations reached the public consciousness in the mid-2000s with Colony Collapse Disorder in apiaries. Even before that, a steady stream of reports of declines in various populations from amphibians to monarch butterflies appeared. Then, a profoundly disturbing report (1) in 2017 documented an astonishing 75% decline over 27 years in insect populations in western Europe. What made the report even more notable was its focus on protected areas. These were not cities, suburban areas, or farmlands, but parklands designated as nature protection areas in Germany. In these nature parks, one might naively expect insect populations to remain stable. Malaise traps, which are standard, funnel-shaped traps that intercept flying insects and drop them into 80% alcohol, were used with periodic emptying and measurement of total biomass in the traps from 1989-2016. Analysis of climate-related variables—precipitation, mean temperatures, and wind speed—did not show any correlation with the decline in insect biomass. Similarly, the influence of changes in habitat or landscape were evaluated in terms of changes in plant species surrounding the sites and surface changes evident from aerial photographs, but did not correlate with observed biomass

declines. Authors of the paper suggested in-place agricultural intensification, as distinct from expanded farming areas, as a plausible cause. They noted that 94% of sampled locations were in preserves enclosed by agricultural fields. They postulated that the reserves may have served as sources of insects that then migrated out into the ecological death traps of the agricultural zones.

Normally, a flying insect would end its life as the prey of some other animal. Death by pesticide cuts short that yield and severs the link between predator and prey. With three-quarters of flying insects gone in 27 years, how many will be left after another 27 years? Imagine the effects of such a reduction in food supply on bats, birds, and dragonflies. At what point will ecosystems collapse?

With gorilla gone, will there be hope for man? Ishmael by Daniel Quinn

With insects gone, will there be hope for man? This author

Appreciating connection

My freshman year in high school was the year every student had to assemble an insect collection as part of Biology class. A dream assignment for me—I already had a prize-winning 4-H insect collection that had won ribbons at the Mississippi-Alabama Fair & Dairy Show in my hometown, the State Fair in Jackson, and the Mid-South Fair in Memphis—it was a long and tedious, somewhat mysterious undertaking for most of my classmates. I saw



Grasshopper nymph on zinnia. "Flowers aren't just for butterflies and bees. Grasshoppers gotta eat too."

opportunity in my classmate's struggles, raking in \$314 in sales of mounted, labeled specimens—this was in 1975 dollars. Sadly, I don't remember anyone being interested in learning about the insect world, and our collections were confined to the adults of the species. The grubs, larvae, and nymphs were excluded—the magic of metamorphosis being the hook that could have drawn out some insect-appreciation in perhaps a few of my classmates. Generally in freshman year, “bugs” were not cool. Needless to say, even people who learned to identify a few common species didn't often get the big picture of the relatedness of all things. Images of individuals and mounted specimens in a box obscure the web of relationships that underpins life on the planet.

In fact, I was often surprised at how little most of my classmates knew about the world around them. Most of them seemed to spend their after-school time engaged in competitive sports or watching TV. As for me, I'd been exploring the 23 acres of our small farm and a couple hours radius by bicycle for almost as long as I could ride a bike. Summer days involved packing a lunch and heading out. I'd look for deserted fields, follow fence lines that had hedgerows, and see what I could find. I liked fence lines because if an ornery bull or property owner happened by, I could quickly switch to the other side of the fence. Once, I caught an owlfly (Ascalaphidae) in a field. They're weak flyers, so it wasn't hard to catch. I'd never seen or heard of owlflies before. It was pretty obvious it belonged to the same order as lacewings, but I had to look it up. My guidebook said it was not rare—something like “moderately uncommon” was the term I think. Whether moderately or extremely uncommon, it was a rare and exciting find for me. In all those trips exploring, I ran into somebody only one time—exactly when I was chasing that owlfly into the middle of the pasture. Along came the farmer across the pasture in his pickup to see what the hell I was doing. I told him I was collecting insects for my biology class, and he said, “take as many as you want!”



This hardworking bee is loaded with pollen and no doubt contemplating a triumphant return to the hive. Bon voyage, happy bee!

Some days, I went down the Natchez Trace Parkway a few miles to Chiwapa Creek for a day of exploring in and along the creek. Chiwapa has a sandy bottom, unlike many other creeks around here that have been dredged down to the hard chalk layer, and some interesting mineral deposits that I later learned were iron-manganese nodules that precipitated long ago out of the shallow sea that covered this region. Rounded by the constant action of sand and running water, many of them resembled bullets or some type of shot, maybe from Civil War days—in my imagination. Once, I stepped onto a sand bar with thousands upon thousands of tiger beetles. When I approached, they took off in a cloud, only to relight a few feet ahead. I'd seen plenty of tiger beetles, but just one at a time and only the iridescent green ones that live under rocks and pieces of wood. These sandbar beetles were a more plain brown. But, their mandibles made up the difference and could deliver a solid bite—perhaps why they're called “tiger” beetles? The creek runs through bottomlands that are completely given over to soybeans, so all the extra fertilizer runoff plus pesticides and herbicides end up in the creek. This was the case in the 70s as well, and I knew the problems with chemical biocides, having read *Silent Spring* and being an early subscriber to what was then fairly revolutionary: Rodale's *Organic Gardening & Farming* magazine. I probably got my lifetime dose of atrazine wading in Chiwapa Creek.

From an early age, I had this image of the connectedness of things that just seemed obvious to me. All living things shared the same basic biology, so the “safety” of insecticides was relative. All insecticides were really biocides with just somewhat more selectivity for insect pests than for mammals. Imagine my grief when I learned that the “only practical use” for an entomology degree was to work for the pesticide companies! Of course, the conventional wisdom in my family and my 4-H club was wrong, but I'd never heard of E.O. Wilson (2) back then or appreciated just what you could do in any field if you were the best.

There are some major differences in insect, bird, and mammal populations today compared with my childhood. Back then, black swallowtails (*Papilio polyxenes*) were ultra-common, but tiger swallowtails (*P. glaucus*) and giant swallowtails (*P. cresphontes*) were a rare and special sight—maybe 2 or 3 a summer. Nowadays, there are lots of tigers and fewer black swallowtails, with giants still being rare. Why the shift? Does it have something to do with larval host species? Toads are also quite a bit less common today. I've seen only two toads in the last five years. I would ascribe it to a global decline in amphibians, except we have tons of frogs, especially green and brown tree frogs, and barking frogs, plus of course bullfrogs on the pond. We rarely saw a frog, and I never heard a barking frog in the 70s. Our property has more tree cover than it did 50 years ago. Does this have something to do with the shift from toads to frogs? Or maybe toads are easier prey for snakes. We have more snakes of various kinds and many lizards, of several species, which were rarities back then. My parents and grandparents hated all snakes and lizards and killed every one they found. Removing this pressure may be why we have more reptiles and fewer toads these days, and changes in the way humans interact with the

environment may explain most of the rest, albeit in ways that aren't immediately clear.

Humans are remarkably adaptable. We evolved in African tropical forests, migrated out into the savanna, and then left our African homeland altogether. Groups of humans entered and adapted to the Arctic, the Sahara, Ice Age Europe, and every other habitable zone on Earth. Adaptability is good, but inherent in the concept is the fact that *Homo sapiens* isn't cognitively tied to any one geography or biome. Taken to its extreme—say, adaptation to urban or suburban life—alienation from life-sustaining processes can result.

Kicking the atrazine habit

Although I can't find the reference now, I remember reading in the 70s about a study that found atrazine residues in virtually 100% of American males. That seemed pretty shocking to me. When a study reported that children born in 1963 had 50 times higher levels of strontium-90 in their baby teeth than children born in 1950 before atmospheric nuclear testing, President Kennedy was persuaded to sign the Partial Nuclear Test Ban Treaty to end atmospheric testing. Surely this would happen with atrazine, I thought—but it didn't. Although not formally banned in the EU, it is not used there because of the inability to assure non-contamination of drinking water. Sure, some minor changes happened in the way atrazine was used, and riparian buffer zones came into widespread use, but today some 40 years after I first read about it, atrazine (sold under various brand names) remains the second most used herbicide in the US after glyphosate (Roundup™). From time to time, reports appear of atrazine's negative effects. Atrazine is carcinogenic in rats, and studies have suggested links to human cancer in California farm workers. A 2002 study reported that atrazine disrupted normal sexual development of frogs at 30 times lower concentrations than EPA limits. The study immediately became controversial, and the manufacturer of atrazine funded several studies that not surprisingly failed to replicate the findings. Other studies continue to suggest that atrazine is an endocrine disrupter, and one might reasonably expect more pronounced effects on amphibians in near-constant contact with water containing runoff from fields where atrazine has been used. Still, nothing really changes, and atrazine is still there being sprayed on corn and other crops around the world on a massive scale. It seems we have a lot of information suggesting problems with it, but atrazine is a big moneymaker for the chemical companies. It's the same story with glyphosate. Massive jury-awarded payouts to people claiming cancer from Roundup® have failed to slow glyphosate sales, at least in this part of the USA. It's sprayed everywhere. Along roadsides and in ditches, it can reduce costly mowing. The power company uses it around power poles, which makes no difference to them if the power pole is in or very close to your garden. I lost muscadines a few years back for my poor planning to situate them underneath the power line in the front yard! This year, part of a plum tree just beginning to fruit significantly for the first year, was damaged, and a whole bed of Maximilian sunflowers was killed. Again, the only crime was being underneath



Solitary wasp on flowering Lagos spinach (Celosia argentea). This edible Celosia, known as quailgrass or soko in West Africa, performs well as a hot weather green. If allowed to grow tall (7' or more) and bloom, you'll be amazed at the bees, wasps, flies, butterflies, and skippers that will play among the flowers, for the gardener's enjoyment.

an overhead power line. Believe it or not, some cemeteries have begun to spray alongside tombstones to avoid time-consuming edging. Lots of farmers spray along their fences. Instead of hedgerows, you now see ugly brown lines everywhere there's a fence. The situation may be different elsewhere, but this is what I see around here. Between making money for the chemical companies and saving time and money for the end users, it seems herbicides like atrazine and glyphosate are here to stay, lymphoma and amphibian losses be damned!

Don't break it if you can't fix it

Insect populations crash. Amphibian populations crash. Insectivorous birds disappear. The night becomes quiet, and the day too. Slowly populations ebb, relationships fray, as ecosystems collapse. What of it? What good is an owlfly?

The Gaia model of planetary systems says life on Earth maintains the planet in a homeostatic balance conducive to life. Earth's ecosystems collectively maintain global temperatures, humidity, and oxygen levels within a range where life is possible. Those ecosystems are dying. This is serious business. Rip out the thread called owlfly, and maybe nothing happens. Strip out a dozen or more species of moths and beetles, and still all looks fine. No problem yet. But at some point, the strength of the fabric gives way, and we're in deep trouble. The body can function without an appendix, without a gall bladder, but not without a liver or pancreas. Declines in the health of the microbiota and blood vessels lead to systemic problems—homeostasis becomes problematic and health less stable.

"Don't break what you can't fix" could be a permaculture principle were it not expressed negatively—"Thou shalt not destroy ecosystems." But I digress.

Permaculture is all about complexity. Like making a scientific hypothesis, we make an educated guess about which species will do best where and in what relation to each other. We put together this designed ecosystem. The pollinators, the fungi, and the microbial lifeforms all show up, and if the design is a good one, it all “works” and yields result. Ultimately, as anyone who takes a PDC or reads a good introduction to permaculture knows, it’s all about relationships, not individual species. To humankind’s detriment, this focus on complexity and holistic thinking puts us at odds with prevailing global civilization. There, the focus is maximizing short-term returns, which necessitates externalizing costs as much as possible.

What is to be done?

We can and should advocate and vote for policies that preserve wild lands and address ecosystems collapse. Admittedly, the realm of national and regional policy is out of our hands for most of us. In our profoundly corrupt, pay-to-play system, those with the money call the shots. So what can we do? We can start by creating examples of the changes we’d like to see. We can manage our own spaces in ways that maximize biodiversity. If we have a woodlot, don’t clear-cut it. Evaluate how best to manage it. Depending on the age of the woodland, it might involve some thinning, for example. It might involve re-introduction of understory plants. If we have a field, either put some grazers on it or mow it less frequently. The more specific strategies below come under the broad heading of farmscaping (3), which permaculture

design process can enhance to better achieve productive biodiversity—that is, to create a highly productive site that is also highly biodiverse.

Hedgerows

American hedgerows tend to be a freestyle version of the traditional managed hedgerows of England and Wales. A fence around a cultivated field is colonized by a succession of plants, many from seed carried by birds. Over time, a narrow miniature forest appears. In the Southeast, it might include wild Chickasaw plums, black cherries, Eastern red cedar (*Juniperus virginiana*), osage orange (*Maclura pomifera*), persimmon (*Diospyros virginiana*), and various oaks (*Quercus* spp), with plenty of vining species: trumpet vine (*Campsis radicans*), blackberries (*Rubus* spp), and unfortunately poison ivy (*Toxicodendron radicans*). The latter is a main reason why hedgerows should be planned and managed. Otherwise, surely useful plants will appear, but after a year or two, you can’t access half of them for the poison ivy.

Back to the 60s and 70s—there was a 10-acre cotton field behind my grandparents’ house next door. Ringing the field was a freestyle hedgerow. The rewards of exploration were different, depending on the season. In spring, first to arrive were the wild dewberries (*Rubus trivialis*) and mulberry (*Morus rubra*), and later on the naturalized boysenberries (*R. ursinus* × *R. idaeus*), and the Chickasaw plum (*Prunus angustifolia*). In the late summer, you could usually manage to find some maypops (*Passiflora incarnata*). Come fall, there would be persimmons, honeylocust (*Gleditsia triacanthos*) pods, and

acorns. The neighbor across the road had guineas, and once, I found a nest with 20 eggs—of unknown age...

Also an apple tree, no doubt planted by the industrious neighbor who kept the guineas. Sadly, the directive from Washington in the Earl Butz era was to plow up the hedgerows and plant fence to fence. And so they did.

The fence lines inside our property still have their hedges, which have never been managed. Hence, they have grown wider over the years, from a minimal ~5-10’ in the 70s to as much as 25’ or even 50’ in places. Much bigger trees have crowded out most of the berries, and where there are berries, there is an equal amount of poison ivy. This overgrowth around what was once my parents’ main garden shades the garden and limits productivity for many things.

Lesson: don’t let nature manage your hedgerows! At least, not in the Southeast. If you want to enjoy the fruits of an edge ecosystem, it will have to be mindfully maintained in that state. Some careful design, long observation, and trial-and-error is in



Left: Black swallowtail (*Papilio polyxenes*) adult on zinnia. Old-fashioned zinnias—this is a mix that is mostly State Fair mixed colors—attract all kinds of pollinators. **Right:** Caterpillar of the same species on carrot, mid-August. This fellow will pupate soon, emerging as an adult around three weeks later. To encourage more black swallowtails, leave a few carrots or plant Queen Anne’s lace.

order to ensure long productivity.

But the ones along the road are gone. Now the County road crews go along the road and spray the fence row (yes, it's "my" fence row, but that doesn't appear to matter) to keep the hedgerow from ever growing back. When we moved back in 2001, I naively planted a few trees right along the fence to jump-start the hedgerow, but to no avail. Hedgerows are decidedly not in fashion in these parts. I suppose I could retreat 10 or 20 feet inside the property boundary, put a fence there, and start my hedgerow. Turn the outer border area into a sidewalk or something. It's crossed my mind.

The Web has many resources on building a hedgerow (4). See the resource list at the end of this article.

Pollinator plantings

Everybody has to eat. Bees need pollen—plant flowers. Butterflies need nectar, but their larvae need food sources too. If you want to encourage monarch butterflies, plant milkweed. For black swallowtail, let some carrot family plants like Queen Anne's lace remain in the garden. Many predatory insects need consideration here as well. For example, the larvae of syrphid flies eat aphids and other soft-bodied insects, but adult flies are called "flower flies" because they spend a lot of time on flowers, where their food source is nectar and pollen.

It's a common misconception that pollinator plantings need to be "in" or immediately adjacent to the garden. No doubt, they shouldn't be too far, but the garden edge is just fine.

Online sources offer many wildflower mixes optimal for various regions of the country. Plain old zinnias and sunflowers are also excellent choices. I've found that Lagos spinach (an edible strain of *Celosia argentea* from West Africa) allowed to grow tall and flower attracts innumerable solitary wasps, butterflies, and various species of skippers. Perennials are better choices in many respects. Old varieties of crepe myrtle (*Lagerstroemia* spp.) attract many bees, although I'm not sure if some of the newer varieties may have been bred not to do so. My grandmother's crepe myrtle was covered in bees whenever it bloomed. Butterfly bush (*Buddleia davidii*) and butterfly weed (*Asclepias tuberosa*) earned their names for a reason. Vitex (*Vitex agnus-castus*) is well known for being attractive to bees and other pollinators. A web search will identify many more possibilities.

Habitat: piles, ponds, and bat houses

Everybody needs a home. Generally, snakes, lizards, and turtles benefit from having a sand pile where they can lay their eggs. Snakes and lizards like brush piles and rock piles for shelter and for overwintering. Opossums and raccoons love to browse hedgerows as much as I do. Many birds like owls need standing dead timber for nesting. Bluebirds will readily occupy nest boxes of suitable design, as will purple martins and many other birds. Bats are more finicky, but bat houses are worth a try for these mosquito vacuum cleaners. See my review of *The Garden Jungle* in this issue (and the



A surprise among the cucumber vines. Snakes need brush piles to hide from predators like cats, and rock piles where they can overwinter. Many species prefer sandy areas to lay their eggs.

book, of course) for much more information on adding insect and wildlife habitat to your garden. As explained in that book, ponds are the best way to quickly diversify a backyard. The Xerxes Society for Invertebrate Conservation has a wealth of information, including a downloadable guide to making nesting blocks for solitary bees and wasps (5). The Migratory Dragonfly Partnership has useful guidelines for building a pond whose primary goal is to attract dragonflies and damselflies (6).

Whatever your goal, no matter how much space you have, you can do your part to regenerate lost biodiversity in your corner of the world. △

John Wages is Publisher of this magazine.

Endnotes

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The root of the problem

Paradise Gardening

Joe Hollis

THE QUESTION IS ASKED “what should we do when we stop pretending?” Meaning, I take it, “stop pretending that our global problem is not as bad as climate scientists say it is, or will go away, or that someone (government?) will fix it.” I think the answer is obvious: we should go back to doing what we should have been doing all along: living in Gaia as part of Gaia, rather than living, as most of us do, as part of the cancerous pseudo-superorganism ‘civilization’. In other words, meeting our needs directly from our surrounding environment rather than from money.

There is a little more to it: we need to find a way to live in place which benefits, or at least does not diminish, the fertility and diversity of our immediate ecosystem and, in the interest of peace and justice does not steal from others (now or future generations), in other words, living on our ‘share’ of earth’s renewable and non-renewable resources (a small piece of land, for starters); and finally, a way to live which maximizes our personal health and happiness (otherwise, no one will do it). Planet, society, and self make up a tripod which can be used as a tool to locate Paradise. We need to do this not just for ourselves (to be healthier and happier and

We are trading off a way of life that is easy, but ultimately at the deepest level unsatisfying, for one that is both challenging and deeply rewarding.

assuage our conscience), but because it is the single best (I would suggest *only*) thing we can do to address the problem. There is such a lack of people living in this way that most people are unaware that there is any alternative to getting a job and meeting our needs with money (i.e., being part of the problem). And yet, in my area (the southern Appalachian Mountains) many people lived very much the way I’m proposing as recently as a hundred years ago; and of course many ‘primitive’ societies still do. I’m fond of saying that



Tools on the wall. Photo by Melanie Risch.

if everyone would be content with what our grandparents would have been thrilled to have, we could have peace, justice, and sustainability in short order.

It all comes down to values, the rudder that steers this enormous ship. If our values change, everything could change, and rather quickly; if our values don’t change, I think the situation is hopeless. But how can we hope to change values by just writing about it? And exactly what values are we talking about? I use the word Paradise because we need a very powerful image to put up against the present pervasive materialist way of living. We live in a world where every day numerous labor-saving devices come on the market; whatever we might want is out there or soon will be. But not what we *need*. The way of life I’m proposing is *better* for the planet, for society and for ourselves, but most people reflexively start thinking of all the wonderful stuff they would be giving up. It needs to be made clear, and no amount of writing will accomplish this, that we are trading off a way of life that is easy, but ultimately at the deepest level unsatisfying, for one that is both challenging and deeply rewarding.

Talk is cheap. Who am I to be telling you how to live, especially when I am proposing that you change your life in such a dramatic fashion? The only thing that gives me the nerve to talk like this is that I have been living in the way I am proposing for almost 50 years, most of my adult life. How I came to this is, briefly, after graduating college I joined the US Peace Corps and spent three years among a fairly intact tribal society in Sarawak (Borneo). Returning to America, seeing the first mall and the glut of stuff put me into culture shock. The biggest takeaway of that experience was the realization that those people were certainly not less

happy and healthy than Americans, probably more so, but with way, way less impact on the earth. I spent about a year not getting around to applying to grad school to become an anthropologist and finally realized that I didn't want to study them, I wanted to live like them. So I went looking for land (although I had neither a vehicle nor money).

My prayers were answered in the form of about a hectare (three acres) of woodland, a small valley at the base of a mountain (actually the tallest mountain in eastern North America). The land was very rocky and sloping and had never been farmed. I had no experience at what I intended to and still do, nor any money to speak of (my initial capital was \$500 from a season of apple picking), but since one aspect of my project was to live on as little money as possible, I didn't perceive this as a problem. I bought into a group-owned (with several neighbors) chainsaw and learned to use it—quite a challenge for a confirmed Luddite—at this time I didn't have a driver's license, much less a vehicle. The chainsaw is about the biggest machine that has ever been utilized here. I bought a book about how to make a log cabin and cleared the trees in the center of the property, both for building material and to make a clearing for a garden, and so began my lifetime adventure. The first winter I built a small wooden yurt and lived in that while working on the cabin. Not really knowing what I was doing, building the cabin took several years. It was only when I was finally ready to begin making my garden that I discovered that the designated area was about 80% rocks (no doubt typical of small valleys at the foot of mountains!). But they were nice rocks, mostly flat on two sides and easy to work with to make terrace walls (the ground was sloping), and the 20% soil was excellent, humus rich woodland soil (never farmed). And so for about ten years I just worked on the land; gradually the brush piles and rock piles turned into terraced beds. Not having money or a vehicle I just stayed home, got up every morning, and started in again. These were, in retrospect, some of the happiest times of my life; before, against the advice of Zhuangzi (Chuang-tzu) (whose student I aspire to be), I let everything get too complicated.

I only knew that I wanted to spend my life making a



Terraced beds in winter. Photo by Melanie Risch.

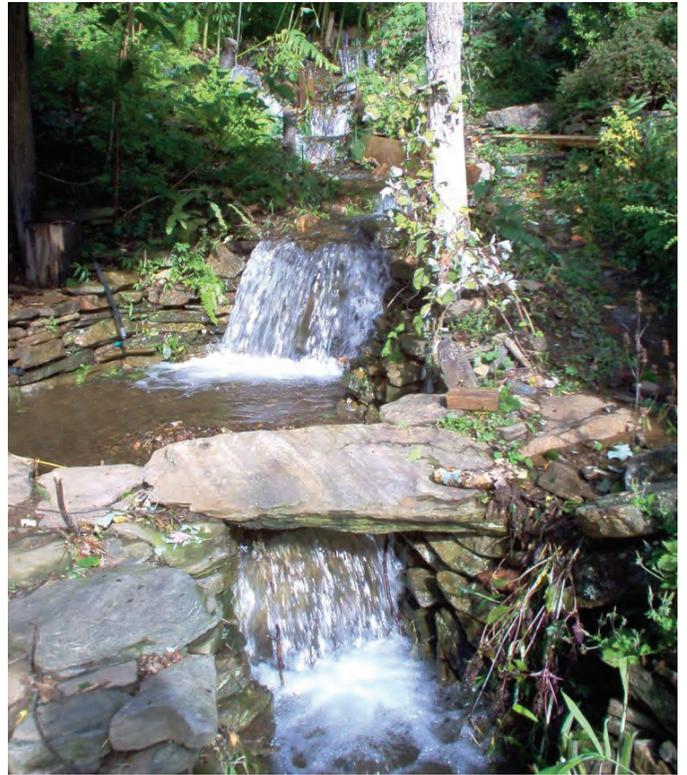
garden, but I didn't know what kind of garden. I spent a few months every winter immersed in a good university library reading ecology, anthropology, botany, evolutionary history, garden aesthetics, and many other topics, I still have files full of photocopied material from that time (couldn't afford to buy the books). I was blessed (one of so many) to have as mentor a neighbor who had written his dissertation on the vegetation of the Black Mountains (my back yard) so was enabled to become knowledgeable about the surprisingly high diversity of this little piece of land. I wanted to develop and demonstrate a way of life that would address the crisis of our time (at that time nuclear war, presently climate change, etc.) and more fundamentally the question of why our highly endowed species living on this beautiful plant can't seem to help destroying it and making each other miserable. I read a lot about the evolutionary history of our species and eventually came up a viewpoint which informs all my actions: that we lost our niche. At some point, following the invention of agriculture, we began to develop and live in 'civilization' (the State, the 'Economy'), a superorganism that mimics Gaia in its hierarchical structure (peasants, managers, and governors instead of plants, herbivores, and carnivores) but is in fact cancerous within Gaia. Civilization increases in size and diversity precisely by diminishing the size and diversity of Gaia. This seemed like news 30 years ago, not so much now; but it clarified my life goal—to live as part of Gaia—and my objectives for the garden: to transfer my needs from money back to the garden.

So, my goal has been a garden that can satisfy all my needs (not necessarily all my wants). I wish to avoid, as much as possible, money, the 'blood' of civilization (and a pretty good indicator of the extent to which we are part of the problem); but of course this is not entirely possible. I need to pay my county taxes (about \$1,000)—I avoid state and federal taxes by being 'poor'—and then I want to communicate so pay \$100/month for phone/internet/website. If I totally gave up all efforts at outreach, it would be that much more energy that could go to the garden, but I do hope to have some impact on a larger scale than just my neighborhood. And finally, I have a pickup truck that costs about \$100/month in taxes and insurance plus whatever gas I burn; I can't really justify this but at present seem to be stuck with it, ultimately I hope my property will evolve into a small community with everyone sharing one vehicle, which would come closer to being justifiable. Anyway, those are my fixed expenses. All of my other needs can be met from the land. I pay for no 'utilities' (we are off the grid and heat with wood and have gravity-fed water). Any money earned above those requirements (and, almost in spite of myself, I do earn more money every year) is discretionary income which I am happy to spend on plants, books, and tools and unhappy to spend on anything else (consumables).

I call my place a Paradise Garden, more prosaically 'a botanic garden of useful plants grown ecologically and arranged ornamentally'. The big problem with being a hunter-gatherer (the last niche in Gaia which we occupied),

aside from the fact that most moderns would not like such a primitive lifestyle (I call the way I live 'neo-primitive') is that the carrying capacity of Earth would no longer allow it for our vastly increased population. I propose to address this by increasing the carrying capacity of my land, which I propose to do by packing the environment with useful (food, medicine, crafts) species. To this end, I looked for areas of similar bioclimate to mine and then what plants people living in those places built their lives around. Eventually, after much research, I came up with a list of approximately 1,000 of the most useful plants that potentially could be naturalized here, and set about acquiring them. This led me into a small seed business and a network of trading partners and botanic gardens worldwide. At one point (pre-internet) I started a 'permaculture seed & plant exchange' and ran it for a few years. I was collecting medicinal herb species as 'useful plants', although I was not actually much using them, then I learned (by way of a book on Chinese tonic herbs) about 'adaptogens'—herbs used not to cure sickness but to promote health. Of course, I wanted to add them to the garden. This led to growing the full spectrum of Chinese herbs. I already had on the property or had acquired all of the important native medicinal herbs, so was, somewhat against my intention, drawn into making a specialty of medicinal herbs; not just growing them and selling seeds and plants but also making a variety of preparations from them. Another area of interest has been wild food plants and perennial vegetables in general. This is a very important subject, and I hope that 'perennial' will be the next big thing in food production (following 'organic' and 'local'). Perennials not only offer resilience to the vagaries of climate change but can address the root of the problem by sequestering carbon. A third and by some estimates half of greenhouse gas emissions are due to food production and a shift to perennial foods could reduce this dramatically. In everything we do here, we exploit the East-West connection, the similarity of not just bioclimate but actually genetic floristic relationship between eastern Asia and eastern North America. So we grow not only Chinese and native medicinal herbs, but also 'sansai', the 'wild mountain vegetables' of Japan, almost all of which have closely related species here.

I have made the most beautiful, inviting garden I can, given my self-imposed limitations: working by hand using primarily the materials available on site. My inspirations are English informal gardens and, especially, Chinese garden design principles. At the highest level, the Chinese concept of *jing* refers to the creation of scenes which can directly impact the heart/spirit. Furthermore, Chinese Daoist or scholar gardens are places specifically designed to have optimal *qi* (energy) to facilitate self-cultivation in the various forms of meditation, tai chi exercises, composing poetry and painting (sister arts to gardening), playing the lute, reading the classics, etc. They achieve this purpose by balancing the yin and yang of the five elements, the seasons, the weather, and all the varied elements of the environment, much in the way that Chinese medicine seeks health as a balance of the yin and yang of our organs. *Qi* (energy) flows through the landscape



Garden water flow after the 2004 hurricane.

just as through the meridians of the body (the study of this is *fengshui*, a profound science (though reduced to interior design basics in most Western adaptations). The contemporary practice of 'forest bathing', now very popular in the East and coming soon to your neighborhood, is a validation of what the Chinese were after in their garden designs—brain waves are measurably different in natural vs. urban settings. How do we capture that difference for our gardens? Paradise Gardening needs to explore and improve every aspect of human life. Our opponent is the vast enterprise of getting and spending, manufacturing, selling, and discarding thousands of tons of stuff per day if not per minute. However, as I have said before, it is a 'paper tiger' because it can't deliver the goods, any more than modern medicine, increasingly, can effect real healing as opposed to treating symptoms.

A primary goal of this project has been that it be relevant to as many lives as possible. I started with very little money and zero skill, training, or experience at anything I do now: gardening or any form of land use, carpentry, or any form of construction or medicine-making—all learned from neighbors, research, and on the job. All you need is a few acres of land (and access to water).

More about Paradise Gardening, and pictures and videos are at the website: www.mountaingardensherbs.com △

Joe Hollis has tended Mountain Gardens in western North Carolina since 1972. He is known and respected for his knowledge of Chinese and Appalachian herbs—both medicinal and food uses.

Turning lawns into meadows

Owen Wormser

I'M CHECKING IN ON A MEADOW PROJECT OF MINE. It's late September in western Massachusetts. The sunlight pours through a clear sky with all the vigor of a summer day as I watch a monarch butterfly land on a spike of bluish-purple anise hyssop, and drink from it. For monarchs, which can travel thousands of miles to reach their winter homes, this meadow is like a gas station that lets them refuel on their journey south.

Only a year ago, this one-acre meadow was an empty field filled with old grass and ancient apple trees. Now it feeds a kingdom of pollinators, along with goldfinches, bluebirds, cedar waxwings, chickadees, and many other birds. Mice, voles, deer, and woodchucks forage here. The once-lifeless soil teems with microbial and fungal life that helps it store carbon and makes nutrients available to the plants. That same microscopic world produces sustenance for insects, worms, and other invertebrates, which in turn feed animals like toads and salamanders.



One of the joys of meadow-making is converting a dead-scape, like chemically treated lawn, into a wild habitat that supports pollinators, like bees, butterflies, and birds. A meadow is low-maintenance, giving much more than it takes, and the ideal landscape for the climate age, thanks to built-in resilience. It's also beautiful all year long.

You are offering something that only a few folks know they need.

The power of seeds and plants to set in motion and support so much life in so little time is one reason I started my regenerative landscaping practice. I also credit a childhood spent largely out of doors. My parents, inspired by the back-to-the-land movement in the 70s, raised me and my sister in the woods of rural Maine. By choice, our house lacked most modern conveniences, and our nearest, and only, neighbors lived almost a half mile away. Apart from my sister, I grew up without many playmates, since I had to ride my bike for several miles to see friends, unless my parents could find time to drive me.

Our daily rhythms revolved around the changing seasons, weather patterns, and the rise and fall of the sun. We used only kerosene lamps, so when the day ended, the night moved into and took over every corner of our house. The only source of heat was the wood my father chopped, so cold days outside meant freezing mornings inside before the woodstoves were fired up again. During the winter months, if you weren't close to one of the stoves or forgot to refill them,

the sharp cold was a biting reminder. Trips to the outhouse, always quick, were even speedier.

I got used to the cold, and rarely felt deprived as a boy. I think fondly of the times I sat next to one of those woodstoves at our kitchen table doing homework or reading a book. I liked getting to spend lots of time in the wilderness right outside our door, snowshoeing in winter, tapping maple sugar trees, and helping plant our large vegetable garden in spring, and studying the plant and animal life around me all year long.

My parents chose to use as little fossil fuel and plastic as possible both to help the planet, and to become more self-reliant. They weren't purists—we had a car. I went to public school and later boarding school. We used dentists and doctors, and we bought clothes rather than making them. Still, they made many sacrifices in pursuit of a simpler life and a stronger connection to the earth.

Traveling in the winter wasn't an option because someone had to be at home to keep the stoves going. And in the summer, my parents were generally too busy preparing for winter, by growing our food and chopping wood, to do much of anything else.

I'm grateful I had the chance to grow up living simply and close to nature. But as an adult, I really appreciate not having to heat up water before taking a shower or drive to a laundromat to wash my clothes. I'm very glad I don't have to get up in the middle of a freezing cold night to use the outhouse.

And I relish every time I get to watch a good movie or television show well after the sun goes down.

You don't have to live off the grid to help the environment. There is a reasonable middle road to lightening your burden on this planet. Among the many options easier than giving up everything to live in a cabin in the north woods of Maine: Consume less. Buy locally. Cut back on meat and dairy. Compost your food waste. Grow some of your own food. Use public transportation whenever possible. Fly less. You can also grow a meadow instead of a lawn.

Lawns have become something of a national obsession. We waste an enormous amount of resources every year maintaining a closely cropped area of turf that totals more than 63,000 square miles, about the size of Washington State. By another measure, over 40 million acres of land in the continental USA were found to have some form of lawn on it. This massive footprint makes lawns the biggest irrigated crop grown in the country, and it sucks up an outsized amount of fossil fuels, fertilizer, chemicals, and water. Landscape irrigation is estimated to account for nearly one-third of all residential water use, totaling nearly nine billion gallons per day or almost 13,500 Olympic-sized swimming pools worth of water.

To be fair, lawns serve a purpose. They offer places to play, which is something I was glad for as a kid. My parents may have grown much of our food, but they also made sure we had enough lawn to kick a soccer ball around on. And lawns have other uses beyond sports: As a designer, I sometimes use strips of turf as pathways in gardens or to frame



This is a view of a garden meadow in Northampton, Massachusetts, about 18 months after planting. It very quickly grew in enough to support pollinators and attract insect and bird life. Since this space was intended to be educational, organizers put up a sign explaining the garden and its value ecologically. Its beauty won over many skeptical residents, who supported additional plans for expansion.



A view of the meadow at the Robert Frost Place in Franconia, New Hampshire. This picture was taken just one year after I put down meadow seed on uncleared lawn. The lupine was not only the first species to bloom, it was the happiest, and spread very quickly.

a perennial meadow. But the vast majority of mowed lawns offer none of these advantages. Instead, they're a danger to the planet and to many living things, including your children and pets.

A meadow is what can happen when you give the earth a chance to heal itself. When planted properly, it fills out easily and grows almost entirely on its own. With every year in the ground, meadow plants support more life and build healthier soil. This makes them quite efficient at parking carbon—just the opposite of a resource-guzzling lawn. Lawns are among the ways we burden nature. Meadows are far more generous, giving back to the earth much more than they take.

I decided to write *Lawns Into Meadows* because, along with so many people, I'm alarmed by how quickly our planet is overheating. Farmers are on the frontlines of global warming and forced to deal with a longer growing season, and more flooding, drought, and extreme storms, as well as new batches of pests swarming northward as the country warms.

Meadow builders have it much easier. While I've noticed more pests, and more weeds too, a meadow is so resilient it can put up with just about anything. The wide variety of plants in a meadow offers some protection. But the plants themselves are strong, too.

Many native plants across the country are struggling to survive climate-induced weather extremes. Native meadow plants? Not so much. And yet too few of us know that planting a meadow is even an option.

In my book, I outline steps you can take to create your own regenerative landscape, one that improves the environ-



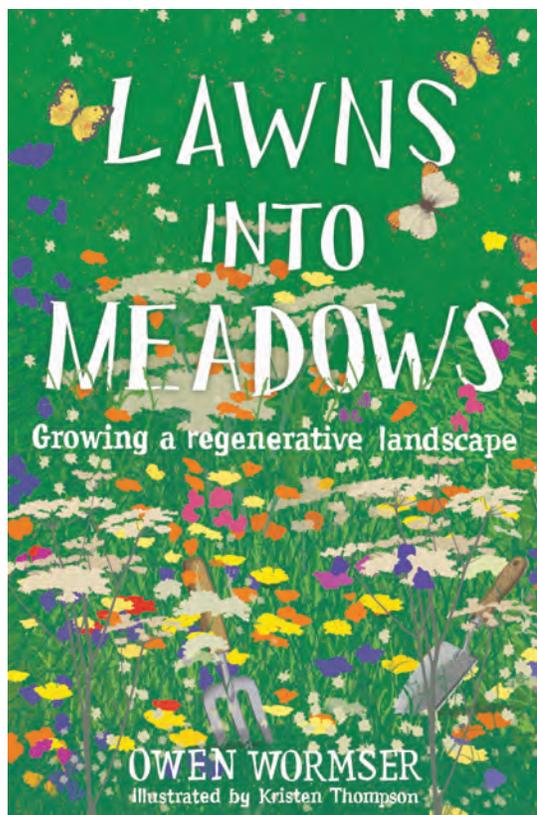
I designed a meadow garden for a retirement community in the center of its campus in Easthampton, MA. The goal from the beginning was to have residents do the actual planting. Everyone there used trowels and digging knives to plant the meadow grasses and flowers—900 plugs in all. By 2pm the project was installed and completed. Over my two decades as a designer, I've worked with hundreds of volunteers to plant regenerative landscapes. What I've observed is that where there's enthusiasm, there's a way to get almost any project done.

ment by increasing biodiversity, enriching soil health, and removing carbon dioxide from the atmosphere. I help you evaluate the lot, yard, or community space you want to turn into a meadow to see if it's suitable. (If it gets enough sun, it probably is.) I also offer guidance on how to design your meadow, and a list of 21 easy-to-grow perennials you can use as a starting point. The book also includes tips for introducing a meadow into your neighborhood when everyone else has a well-groomed lawn.

Recently, a friend of mine did something very simple. She allowed common milkweed to grow in one of her garden beds instead of pulling it out. Milkweed attracts monarch butterflies and their caterpillars—in this case, lots of them. Later that season we counted no fewer than 50 monarch chrysalises that had hatched. When I visited my one-acre meadow one last time before winter, I got to see a few more of these beautiful creatures sipping their last drink of nectar before flying off to Mexico. If more of us go ahead and plant meadows, they'll have a much easier time finding their way back. △

*Excerpted from the book **Lawns into Meadows: Growing a Regenerative Landscape** by Owen Wormser (Stone Pier Press, 2020), available for sale now at Stone Pier Press, and elsewhere. Wormser earned a degree in landscape architecture and quickly adopted regenerative, low-maintenance practices in designing and building*

*landscapes. Based in Western Massachusetts, his company, **Around Design**, provides design, consulting, and installation services. He also runs a nonprofit that provides educational resources and hosts workshops on regenerative growing.*



Cemeteries provide wildlife with needed safe space

Cemeteries as Refugia

Greg Gerritt

I STARTED HANGING OUT in cemeteries when I was in graduate school, sort of a reasonable place for an anthropology major, but also a reasonable destination for someone who needs to be around trees. I returned to spending much time in cemeteries when I moved to Providence more than 20 years ago, walking in Swan Point Cemetery within four days of moving here.

I still walk in Swan Point at least weekly, the magnificence of the 170-year-old forest along the river matching any of the famous people buried there, and demonstrating greater diversity. But much more of my time is spent in the North Burial Ground, which is on my side of the hills and ridges that make up the spine of the East Side.

Shortly after I convened a delegation to visit the city's Parks Department to unlock the walk-in gates of the North Burial Ground and let the community in, I found a thriving toad population breeding in a small wetland. The Fowler's toad tadpoles were rather photogenic and within a couple of years I found myself in the middle of a long-term project to



Coyotes are among the wildlife in Providence's North Burial Ground that Greg Gerritt has photographed and videotaped.

urban cemeteries have a few trees, some squirrels, small birds, insects, and who knows what else. But larger urban cemeteries, especially if they have trees and water, can support nearly everything that lives in the bioregion.

Some of the extraordinary features of larger cemeteries are the easy digging soils — sometimes they smartly locate cemeteries in areas of easy digging and good drainage — which encourage all sorts of burrowing creatures; lack of street lighting, allowing darkness to reign at night; and lack of automobile traffic after dark, allowing all of the wild animals to move around much more safely at night. This is especially important for amphibians — one of the most endangered group of animals on the planet — as they mostly breed at night in places where breeders congregate from all over the area.

Many places where they have to cross roads to get to the breeding sites can become kill zones. Many a night I have watched Fowler's toads and gray treefrogs safely hop across a cemetery road to get to the breeding pool and hop back to the surrounding hills after the frolic.

I also want to put in a plug for thinking about stormwater management in cemeteries — in a new way, more in keeping with cemeteries and refugia for both people and wild things. Standard stormwater management techniques want to whisk water away as soon as possible. But wildlife needs pools of water for drinking, breeding, and feeding, and open waters, moving or ponded, are critical habitat.

We can shape the content of the ecosystem so that it works for us.

document the lives of the wild animals that live in the North Burial Ground.

The Moshassuckcritters YouTube Channel is a project of the Friends of the Moshassuck, the local watershed group. Eventually, this work became connected to other people working to bring notice to other aspects of the North Burial Ground, and we jointly founded the Friends of the North Burial Ground and Randall Park.

While this journey has been interesting, what I want to focus on here is the need for all of us to better understand cemeteries as critical ecological habitat for wild things and to recognize that as an important part of what cemeteries do in a community.

I think of it as cemeteries as refugia. Even the tiniest of

Cemeteries have less need to get rid of water fast, water providing a relaxing and calming vista for those visiting the deceased, and with few nighttime visitors, less of an urgency to remove any place mosquitos might breed, especially as this also provides habitat for mosquito predators, which will keep mosquito populations in check most years.

I have looked around for partners to further the discussion and practice of cemeteries as refugia, but other than Friends of the North Burial Ground and Randall Park I have found few enthusiasts. If this interests you, please contact me and hopefully we build the movement. △

Providence, Rhode Island, resident Greg Gerritt won an Environmental Protection Agency Merit Award in 2012 for his work raising awareness about the importance of composting. He is the founder of Friends of the Moshassuck, and runs the blog Prosperity For RI. He can be reached at gerritt@mindspring.com. This article first appeared in ecoRI News, January 2020 (<https://www.ecori.org/green-opinions/2020/1/22/cemeteries-being-underutilized-for-wildlife-habitat-and-stormwater-management>) and is reprinted here by permission of the author and ecoRI News.

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Agroforestry News



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Agroforestry News

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1

Backyard Herbal Immune Tonics

Gloria Flora

PERMACULTURE PRINCIPLES LEAD US to creating gardens and food forests that are abundant with diverse nutrient-dense foods. The happier we make our soils with clean minerals, microbes, and organic amendments, the more nutrition they give us through our plants. And, if we're planting the right trees, shrubs, vines and roots, we can feed and give our bodies the nutrients needed to keep us healthy with a strong immune system.

With the coronavirus on everyone's mind, now's a perfect time to take a look at your on-site and local native and domestic plants, and figure out what kinds of herbal and nutritional support they can offer you. Since we here at TerraFlora Permaculture Learning Center have been focused on nutrient-dense foods and medicinals, and are situated in a diverse native forest, we enjoy a sumptuous palette of raw materials for supporting our health and healing imbalances. We have catalogued over 125 native and domestic medicinal and nutritious perennials and self-seeding annuals here on our property. What a blessing!

This article is not so much about what to grow or recipes to follow. For that, I encourage you to explore the plethora of excellent books, guides, and teachings by leading herbalists and expert natural medicine-makers. I am not a certified herbalist or health professional, rather more of a long-time herbalist-experimenter and a kitchen-craft tool lover.

A climate for coughs

After a couple of summers of intense wildfires, with blankets of smoke laying in for weeks at a time, I developed a low-grade, but persistent cough. Finally, checking in with a doctor, she diagnosed asthma. Despite my mini-rant about how that wasn't possible, I listened to her advice to treat it and pay attention to airborne irritants. I eschew prescription drugs, so I balked at her first recommendation of an inhaler and pushed her for other options. She allowed that she had read studies that buckwheat honey outperformed all prescription and herbal cough remedies. I tried it, and oh-my-God it worked beautifully. After a few days of 2-3 teaspoons a day, my cough was gone.

What I have discovered in the ensuing years is that local buckwheat honey seems to work better for me than out-of-state brands. Anecdotal but it makes sense to me. So I'll keep buying local.

Here on the farm, I've experimented with a wide range of medicinals for immunity, lung support, and cough soothers. Some of my favorites are fruits, roots, mushrooms, and berries



high in antioxidants and vitamins (aronia, *Aronia melanocarpa*; black elderberry, *Sambucus nigra*; honeyberry, *Lonicera caerulea*), and high in vitamin A, C, E, and essential fatty acids (sea-berry, *Hippophae rhamnoides*; goumi, *Eleagneus multiflora*). Turkey tail mushrooms abound here and are easily identified, so tincturing those for enhanced immunity is quick and easy.

Some of my favorites for lung support are elecampane root

(*Inula helenium*), hyssop leaf (*Hyssopus officinalis*), horsetail aerial parts with silica to heal inflamed mucosa (*Equisetum arvense*) and mullein leaves and flowers (*Verbascum thapsus*). Picking those little flowers is tedious but so worth it!

Tools and hacks

Let's talk about that other favorite subject of mine... tools. This time, kitchen tools. Creating simple immunity-building and lung-support syrups and tinctures needs just a few basic implements and matching the right tool for the job.

Syrups require extracting a liquid from a soft fruit or herb and typically, sweetening it. Adding additional flavorings and boosters are optional and fun. Heating (not boiling) the ingredients softens materials, releases liquid, and dissolves the honey or sugar used to thicken and flavor the juice. Honey adds extra nutrition and immune-response benefits. Using only organic materials makes good sense, especially for medicinals.

So what equipment do you need to make syrups?

1. A stainless steel stockpot, at least 12 quart capacity, with a lid and heavy bottom plate, is a great all-around cooking tool. Acids in fruits and long, slow heating won't react with stainless steel like other materials, for instance aluminum or coated cookware. These stockpots can be found for under \$50 but keeping an eye out for sales, you can get a real deal. Over the years, I've picked up a whole set of stockpots up to 60 quart, all at least 50% off.

2. Large pots don't always come with lids, but you can improvise using a flat cookie sheet, aluminum foil, or the lid from some other container like an enamel canner. The material of a lid is not critical, since it doesn't come in direct contact with your product. But be careful with the cookie sheet method as condensed steam can migrate and drip well beyond the perimeter of the pot.

3. Big long-handled stirring spoons are a joy to use, as well as essential. I like wood or stainless steel. Ladles are handy as well. I lucked out recently by finding a wood-handled stainless ladle at a restaurant supply store, which typically carry high quality, reasonably priced lifetime kitchen tools—well worth the investment. Wood and bamboo utensils have the advantage of being widely available, sustainable, relatively inexpensive, and compostable. Please don't resort to plastic.

Whether to use a single fruit or a *mélange* for your syrup base is up to you, but there are some important considerations, primarily how are you going to extract the juice—that is, separate it from the parts you don't want. And do you want a perfectly clear liquid or do you want or are willing to accept more pulp?

4. A clear liquid suggests using cheesecloth, muslin sack, old cotton pillowcase, or the leg of a pair of pantyhose to put the warm fruit in and hang to drain. Then, with very clean hands, twist and wring until your hands are tired

or the liquid oozing out becomes cloudy. This technique works well for small amounts, but not so much for large amounts or tough materials. Your yield is somewhat reduced, but the resultant liquid will be beautiful.

5. Alternately, or used in combination with straining cloths, an herb press is a wonderful tool. Even a small one is an investment. I found one on etsy.com. Handmade and clever, so even though I'm a spendthrift, having seen the press in action, I was happy to support the artisan. And add a very cool tool to my collection. These are better for pressing materials out of alcohol bases for tinctures than large quantities for a syrup base.

6. Miscellaneous helpers—best if stainless steel or non-reactive material like glass—funnels, strainers, cutting board, and trays to catch spills and drips.



Indispensable herb press and stainless steel kettle.

The extraction team

The next consideration for expressing juice is seed size, even more so than texture. This is particularly important if you're mixing fruits, say seaberry, aronia, goumi, and elderberry (black)—which I recently experimented with (and aptly named it S.A.G.E. Immunity).

I tried multiple methods to extract the juice, managing to strew dye-rich berries all over the kitchen and floor, not to mention my hands and shirt. So learn from my mistake—put fruits of the same seed size together so you can use one effective extraction method for each type!

Aronia and black elderberry have very small seeds that have a mouth-feel like fine grit. Seaberries have a firm ellipsoid single seed with an exfoliating hull, definitely not something you want to chew. Goumi have a single large, soft, woody seed. You can chew them and get some good nutrients but hey, we're making syrup here.

I thought the Squeeze would work, a hand-cranked juice/pulp extractor of a design that's been around for over 110 years. Very pricey brand new, but eBay always seems to have a few; I got one in the original box! A spring-loaded corkscrew driver forces material from a hopper through a stainless steel cone, the puree going through perforations and the seeds coming out the small open end. Three different cones/perforation sizes allow you choices based on seed size. The Squeeze makes exquisite seedless tomato puree. And after defrosting two gallons of raspberries from last year's harvest, I ran them through the Squeeze with the raspberry screen and created a lovely gallon of raspberry juice without one seed.

Then I brought forth my super immunity fruit mix, cooked and drained, and ready to have the final juice extracted. The Squeeze raspberry screen would have been fine for the aronia and elderberries, but promptly jammed with the larger goumi seeds. So I switched to another favorite tool, an unusual looking contraption called a food mill. It's a pan with a crank that turns a tilted paddle forcing food through the bottom perforations. There are cone-shaped varieties that you use with heavy wooden rod, rotated around the interior to produce the same result. Food mills are amazing for separating rough matter from the desired pulp. For example, you can cook cut-up apples without coring or peeling. Then, when soft, run them through the food mill, and end up with smooth, pristine applesauce. Thrift stores and end-of-canning season sales can yield real bargains on food mills.

A food mill excels in separating harder materials from soft except where you have a wide range of material sizes, like my immunity fruit mix. In landscape construction, when you want a smooth, hard gravel road, you order what's called a "well-graded mix." That means it contains a spectrum of gravel sizes from very fine to big. That in turn means, when packed down, all the pore spaces will get filled, resulting in a very hard, semi-impervious substrate. My immune combo had a "well-graded mix" of seeds which firmed up quite compactly in the food mill, refusing to release the precious last liquid I was trying to extract. So on to the next tool.

Mr. Juiceman is the brand name of the mid-range juicer I've had for decades. It's quite serviceable and more affordable, but not as outstanding as say a VitaMix or Champion brand. A juicer essentially grinds material at a high rate of speed just long enough to release the juice before expelling the pulp out the back, while the juice runs out of a spout on the front. An exceptionally fine screen separates all seeds, roughage, and most pulp from the juice.

Here again, my well-graded mix of seeds stymied my efforts, but not enough to stop the project. The fine seeds of the aronia and elderberry quickly clogged the screen which allowed too much juice to head to the waste end, necessitating frequent screen cleaning. But it worked well enough.

My chickens were cackling with delight when I brought them the cast-off seeds and pulp. If you don't have poultry, please give the pulp to someone who does. Or put it outside for the wild birds. There's great nutritional value for those with the

digestive system to extract it.

My extractor tests reminded me of two important hacks. When prepping large quantities of potentially messy foods, always dampen a rag and toss it on the floor near your workspace. That way, you can immediately clean up floor spills with just your foot, keeping your hands clean and the work flowing. And do wear a shirt that's darker than the fruit you're working with! Just in case.

Spicing things up

In making a syrup, following a logical sequence makes for a smoother, faster process and a superior end result. As described above, if you're mixing ingredients, process fruits with like textures and seed sizes in separate batches and then blend the processed juice together. To include herbs, steep the herbs according to their properties: Leaves—in boiled water for a few minutes if high in tannins, or up to 30 minutes. Roots, bark, and twigs simmer gently for an hour or so. Press or strain. Then add to the liquid.

Next, gently reheat the combined juice and add some pizzazz like slices of organic oranges, whole cloves, and cinnamon sticks. You pick up some vitamin C from the orange and an impressive range of antioxidants, anti-viral, and anti-inflammatory benefits from the spices. If you don't want to depend on imported spices, grow a beautiful Carolina spice bush (*Calycanthus floridus*) and enjoy the local allspice flavor of the dried bark.

Simmer your spiced-up syrup on low until the taste is just right. Strain, add sugar or honey to taste, and stir to dissolve. Bottle and refrigerate, freezing any extra to maintain nutrient value.

Salud!

△

Gloria Flora is a frequent contributor to this publication.



Handy tools for making herbal remedies.

Envisioning the Convivial Economy

Nothingness, Kumquats, and Walter Scott

Patrick Noble

SO, IT COMES DOWN TO THIS. The answer to these crazy times, is to evacuate and de-spend the enclosures and to inhabit and re-spend the skill, ingenuity, sensuality (intelligence gathering), and moral probity of the commons.

Enclosure desensitizes intelligence of our terrains and replaces it with the teachings of enclosed status. There, we will never find the truth. What's more that status has no skills, it is inextricable from discretion, wage, rent, institutional loyalties, schools of thought, and peer/career review. It is set apart from what people do and resides in a sphere of what people say, pay, and have become in regards to hierarchy. It has no sense of the climate changing, though it bends to the consensus that climate is changing. The senses (urgency of action) are secondary to the "professed" idea.

Meanwhile, cultures are what people do to make them. A culture is not a state of things. It is a living process—an organism. If you like, it is a gathering of verbs—not nouns. Sensual intelligence of a changing world is harvested by the "actuality of being." Enclosure—that is property—intellectual, land, money and status—resides in a place we may truly call nothingness. (Sorry Heidegger.)

Currently, we ask nothingness to solve the problems of being. That is crazy.

In a wonderful poem about Walter Scott ("Green Breeks"), Douglas Dunn explores how "professional" people



Hong Kong kumquats (Fortunella hindsii)

Source: <https://en.wikipedia.org/wiki/Kumquat#/media/File:Fort-hindsii.jpg>

(law, medicine, bank, and so on) reside (in their residencies), whereas working people inhabit their slums and cottages. We don't do much in a residence. We do a lot, when we inhabit. Do we want to give further credence to those who reside? Let's inhabit. We inhabit the common; we reside in an enclosure.

Come on, the new middle-class is killing us. There's work to do, which they cannot.

By inhabiting, we touch what we inhabit—our gardens, crops, materials, foraging grounds, dew on the grass... They react to us and we to them. Actions and reactions demand both personal morality and communal morality. They also evoke a story, so that we come to inhabit both a mythic sense of how life is and could/should be, and also a wonder at the sensual truth revealed as we tread.

Here is Tony Harrison, from "A Kumquat for John Keats:" "It is the kumquat's fruit expresses best, how days have darkness round them like a rind—life a skin of death, which keeps its zest."

Come on, the new middle-class is killing us. There's work to do, which they cannot. Of course, some may say, Bugger my career, I'm human—and join us.

Bio-mass, bio-speed, and bio-acceleration

Yes, pursuit of career kills pursuit of truth. To pursue truth, we must step into wind, sunshine, and rain—to which I may add, into famine, flood, and storm.

Even so, a walk in the woods, across fields, to the hill-top, along the shore... is a good beginning. To continue the verb metaphor, we will be walking, climbing, descending, listening, scenting, touching... Only by that broken twig underfoot, the scent of bluebells, do we find truth. As a farmer, I can see the deepening or paling of my crops—which indicates accelerating or decelerating life—that is the mass, energy, and velocity of life. Some of those deepening or palings will follow the weather. Often, they may be reactions

to my actions—to my appropriate or inappropriate behaviors. Listen to those reactions. Nobody—no expert opinion—can change that truth. No one is closer to the cycling of life than the farmer. It is tragic that most farmers concede to utterly shallow, career-led academic advice, when true answers are revealed in crop yield (present, past, and planned-future) and in messages from the wider ecology, with which they are entwined.

As I step, the Earth responds. Am I a functioning, or at least semi-functioning part of my ecology? Am I appropriate to it, or not? Legends of the Fall keep hubris at bay. I step along the edge of the Garden and long to be part of a lost terrain. Here's a lesson we can take from our own missteps—never trust a school of thought entirely, when we cannot even trust ourselves. Also, never, ever trust an institutional consensus. Sometimes we concede to it, to keep our social bonds, but we must know that truth is not involved. We compromise for our companions. Weigh the effects of compromise against the weight of sensual truth. We will have lived that truth, and we will have loved our friends. Ridicule brings renegades back to the fold of friendship. As a farmer standing in my guardianship of soil, I can see a whole community of renegades. I am losing friends but cannot return to a renegade fold. I confess, my head is in my hands.

What does zero carbon mean? Truly, zero carbon means extinguishing every man-made fire. Net zero means the gathering of pardons and indulgences from a fanciful reading of life cycles and then subtracting them from our bad behavior, to suggest that it is good. People call life cycles, carbon cycles. They are deluded. Life cycles have mass, energy, and velocity—the energy being embodied in the mysterious thing we call life. Carbon is simply mass. Nobody, absolutely nobody, understands what life is. For our purpose, we must call it acceleration due to life—the energy that can transform mass at a variety of speeds. We have energy due to gravity, energy due to sunlight, energy due to sun-heat, energy due to fire, energy due to human labour—which, of course is a very small part of acceleration due to life.

Everyone is measuring mass. Mass is good for pillage. It is good for property. It is (we think) also good to store, like money in a bank. It is dispensation-mass for life's bargaining. We sequester carbon—we think, in quietude—enclosed like a dead idea—a book in a library, which no one needs to bring to life, by their own life—that is, by reading it.

But soil life has constantly changing and exchanging velocity, energy, and mass. It cannot be sequestered for our peace of mind. It is one and the same with the plants and animals who tread separately to carbon-deluded eyes and with the atmospheric gases, which that whole regulates. Gravity, heat, and light make rigid energetic contribution, but living energy and mass cycle at a near infinite varieties of speeds, maintaining and healing the whole.

However, oil, coal, and gas were truly sequestered. The word is appropriate. It is not appropriate for soil. The ignition of many millions of fossilized and quietly sequestered years has out-done life's balancing—bringing into the equa-



This farm is a community unto itself.

tion both the mass-destructive power of human endeavor—aviation, the family car, centralized distribution, pillage of natural systems, and a surfeit of atmospheric CO₂—heating ecosystems to beyond their evolutionary range.

We must leave the fossils where they lie, quietly sequestered—also the anaerobic stillness of peat and we must extinguish our bio-fires—timber, oil seeds, sugarcane, miscanthus.

Earth is heating so fast (yes, consider time, consider velocity) that we must shrug off our careers and urgently find ways to live as small parts of the biomass and biodiversity of the whole.

We need, not the negative of zero-carbon cultures, but the positive of maximum biomass cultures. As we've seen in previous chapters, an ancient rainforest is a system in balance with an optimum biomass and complexity, which can constantly adjust and heal. It can provide no pardons, or dispensations for destructive human behavior outside its borders. It can provide no license to misbehave, stamped with the title—sequestration. But if we attempt to become a part of natural law, so that we also become a part of that optimum biomass—adjusting and healing, then that mass may expand to become more resilient in energy and velocity—which may outweigh (in mass, energy, velocity) the contrary forces, which we call energy due to lifelessness—combustion gases, heat, and ashes.

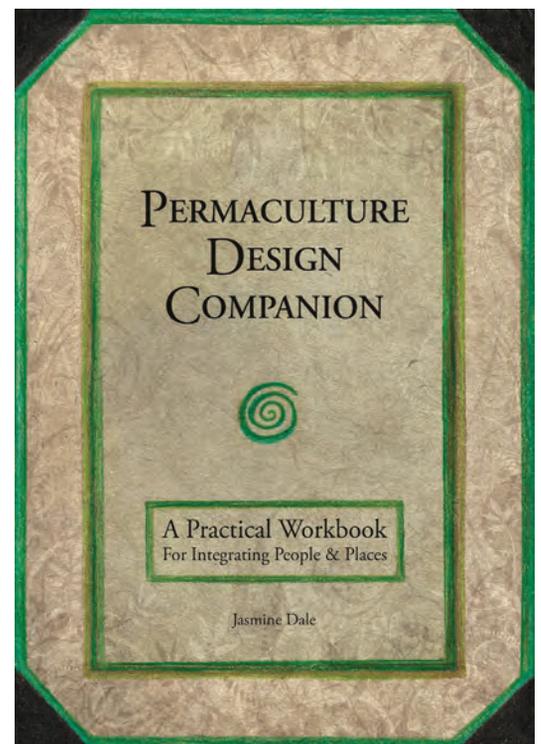
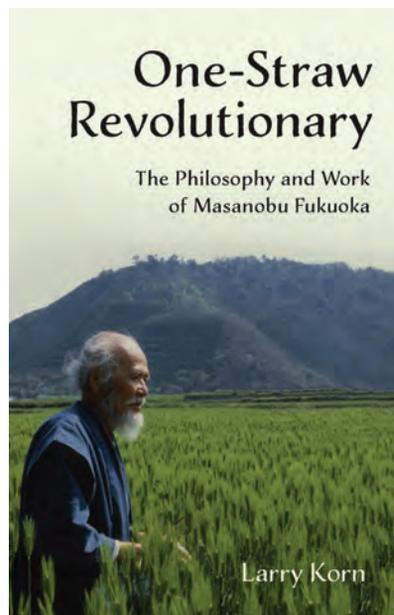
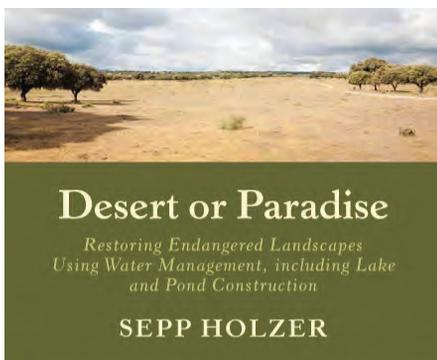
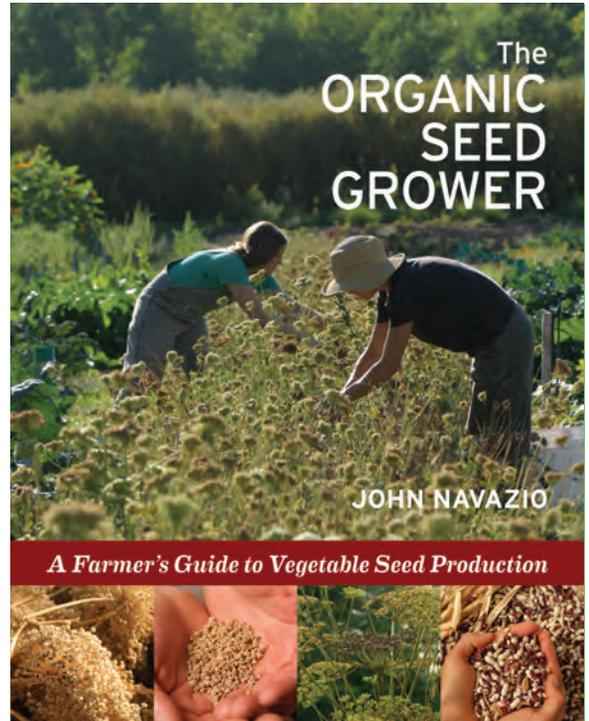
A farm is an organism connected to the organisms of towns. They are one. We call it an agriculture. The farmer, standing in her crops is also a part of universal natural law—in her mind are temperature, wind, rain—the deepening and paling of crops (energy and velocity), networks of roads, rivers, and canals to market and from the market (she hopes) “wastes” in return. Differing speeds are everywhere. Time is massive, dangerous, imperative...

We are accelerating towards a lifeless planet. Shouldn't the remedy be obvious?

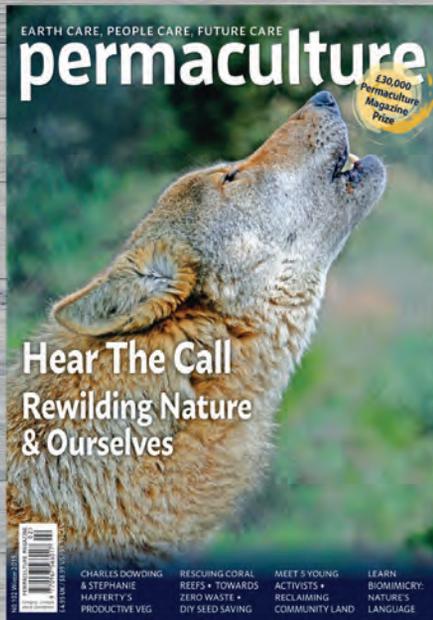
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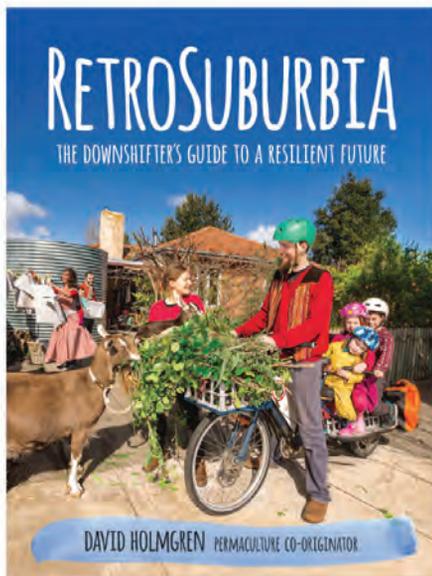
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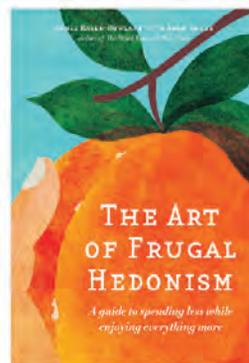
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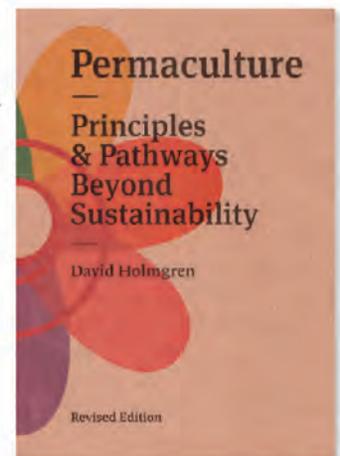


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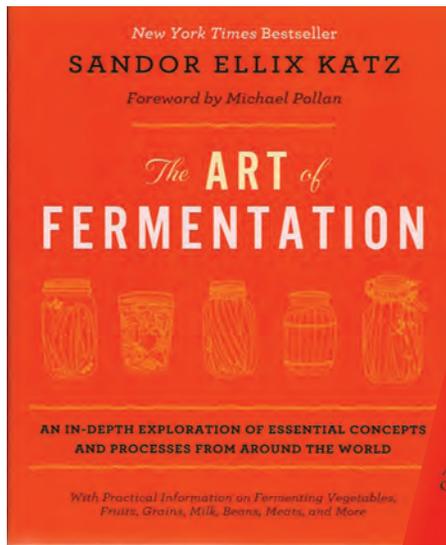
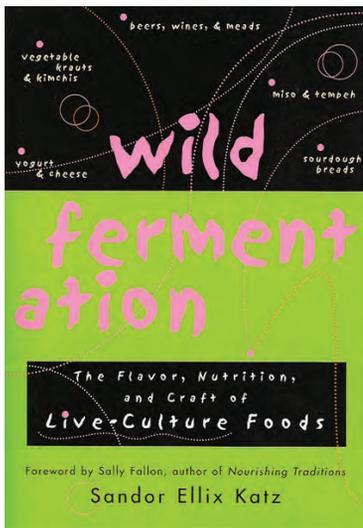
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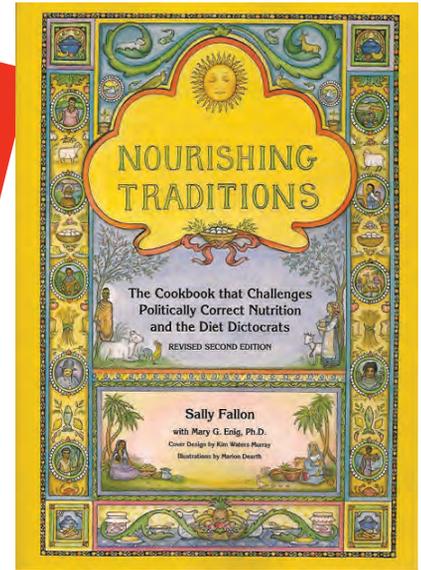


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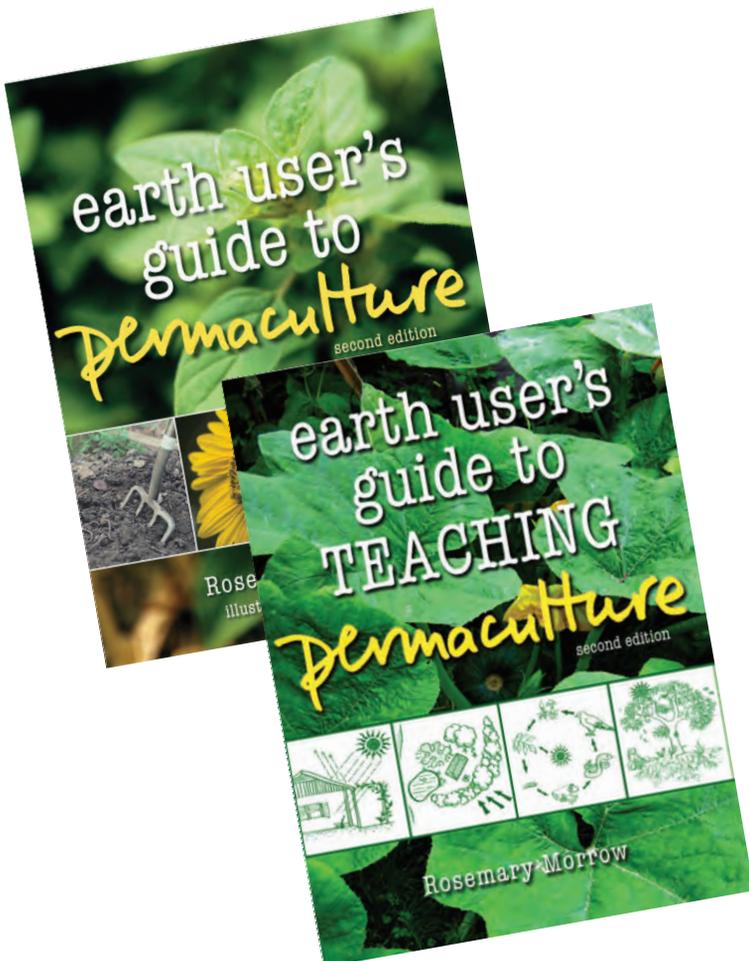


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Economy? Ecology? One and indivisible

The biomass of Earth is shrinking. It is also weakening. Its immune responses are more and more often overwhelmed by lifeless energy—heat, flood, fire, chainsaw... Lifelessness replaces life—accelerating at tipping points for species after species—the intricate web of those dependent interconnections crumpling before human eyes into memory.

We fully understand what is happening—and why, yet we treat it as part of the “knowledge” we have and do not connect it to our own lives. We devise sophisticated—we think “educated” excuses—sequestration (a convenient untruth) and also humility—it’s nice to be humble in the face of the power of time and nature—what can one bloke do?

Yet it is the sum of singular people who make up the whole of the species. The species can only mutate its behavior by the adaptation of individuals. One bloke can mutate. Every bloke (sexless term) can mutate the species.

There is no other way, because the sensual intelligence of the species, always—I mean always—must pass through the senses of individuals. There are commons of good behavior, which bind us, but human sensuality is mine and mine alone.

Anyway, we face The Great Sickening on two fronts—of nature and of society.

All “developed” economies will now collapse—the weight and energy of applied ideas (lifelessness), outweighs the weight and energy of what people do to grow food and distribute it, to build and maintain houses, and so on. The energy; the vitality of the verb to do is outweighed and out-forced by the contrary power of status, that is, of the noun, enclosure. The effects of enclosure include rent for the abstract properties of status, land, ideas, and money (interest is rent). The abstract outweighs the real and bleeds it.

We also have debt-created money—that is debt-created abstract property.

Economic collapse is inevitable.

A balance of ecology also requires the equity of social systems.

Then, to massively add to the power of lifelessness and the sickening of life, we have a second front—the sudden release of millions of years of sequestered photosynthesis, which both thickens the blanket of atmospheric CO₂ and magnifies the destructive powers of human hubris. Great forests fall before it, and human ego is so puffed up by that prowess, that it devises poisons—pesticides, fungicides, her-

bicides to remove every form of life apart from a few selected crop species and a few pretty garden trees and flowers.

The collapse—the imploding of life on Earth, is inevitable. How do we restore sickening economies back to health?

How do we restrain ourselves from poisoning, felling, and suffocating our living Earth? We cannot say, how do we restore the health, mass and vitality of natural systems. Natural systems themselves must achieve that. We can only say, how do we return health to human economies, so that they and their wider ecologies become one—vital, regenerating, healthy?

How do we undo what we have done? Of course, we cannot. It was done yesterday. We are not time travelers. We ride the present and cannot jump off. No future ingenuity will save us. In truth, the future will bear our present effect.

Plainly, we must descend from those abstract, yet destructive ideas of property and so on and inhabit sensual reality of the present. The present is the unknown. Who’s for the ride?

That simple idea is heresy to most. It embodies what should be self-evident—economy and ecology are one and indivisible. Even so we walk along the edge of the Garden, looking in dreamily from our fields and towns. We cannot enter. All agriculture disrupts what it has replaced.

So, how do we minimize disruption so that at least we maintain the freedom to dreamily gaze? The Garden must massively expand, and human effects must massively shrink. Then, the health of the whole may be enough to begin the healing.

One lesson is that human economies must collapse. We cannot “green” their current form, because they currently have no form—they have anti-form, like anti-matter. The abstract bleeds the real, sucking it into the hands of property (an idea), leaving the living, breathing species on the edge (it cannot be denied) of oblivion.

“The health of soil, plant, animal, man (and the planet) is one and indivisible.” That has been the central principle for organic methods since the days of the early pioneers in the 40s. I think that instruction is also much older. Incidentally, organic does not define a state—a noun. It lives in a world of verbs, of what we do. It describes a method.

Here is Lawrence Woodward, who has been a rock in the storm of market opportunists, who shipwrecked the true organic movement 30 years ago. It needs revival.

At the moment, we cannot be definitive on how to farm for health or how to make health infectious. We do not know what the important transmission factors are or how the “mutuality of actions” work—whether through microorganisms, bacteria, energy, vitality, self-organization, or something else?

However, we do know there are some things which are likely to be important and which farmers should pay attention to; these revolve around managing the soil and above- and below-ground livestock through biological systems management and not through inputs, whether these are synthetic or organic.

“Whether these are synthetic or organic”—yes, if we con-

sider the organism of farm or town, those organic imports diminish the organic mass and vitality of the terrain from which they are imported. How do we maintain the health—the metabolism, of our own farm, village, town... without that social injustice? You see, where ecology and economy become one is our goal. A balance of ecology also requires the equity of social systems. They are one and indivisible.

Once again, we return—enclosure (property) defines a state. States do nothing. We lie in state by bleeding the commons. The commons is dynamic. It defines good behavior—rations what we can do and what we can have, and it guides what we do both together and in our terrains.



Lifeboats and landfall

Developed economies are intrinsically destructive, and because of their size, they cannot be greened. They embody a destructive way of life. Our only choice is to evacuate that economy and to live a different way of life.

De-growing what is destructive is no remedy—it remains destructive.

A green New Deal for what is destructive may shrink its ill-effects, but it will also remain destructive. But anyway, de-growth will fail as a strategy, even towards that limited end because as we've seen, de-growth of monetarist economies will not only diminish their ill effects, it will destroy them. Growth is essential to developed economies. Money-flow must accelerate, but the physical economy of labour and resources is shrinking.

Sooner or later, the rope will break. Collapse is inevitable.

If collapse is inevitable, we must choose it as necessary—as an essential step. If (Brian Davey's metaphor) shipwreck is inevitable tomorrow, we'd be wise to launch the lifeboats today.

So, my chosen first step is not of collapse and retreat to my bunker, it is to launch the lifeboats and to colonize what we find at landfall, leaving as small a footprint as we can manage. Collapse will loom darkly over us like a prophesy, but a little delay will give us time to settle. As we've seen in

our chapter “Being, Nothingness, Cumquats, and Walter Scott,” we must inhabit rather than reside. Our habits must mingle with those of the other species we find. In the past, the word colonial has meant bloody invasion, pillage, and the construction of over-seeing residencies. Now it must be different.

We shall inhabit, which will prove a delight. How do we know the habits of other species, without study and without the physical trial and error of our own habits? Every individual must be involved. We shall receive no instruction from the residencies.

When collapse comes—sooner is best for the planet—later is best for our infant plans—we can hope that our colonies are resilient enough to welcome refugees aboard and so expand into new terrain—becoming stronger.

The farm is the perfect place for learning that habitation. It is also the perfect place (where better?) for moral philosophy. Farmers are currently the luckiest people on Earth. The farm is the core of agricultural economies (towns, roads, cities...). It is the primary source. If we can properly inhabit our farms and also properly inhabit those roads to and from market (both at the farmer's fingertips), we have a glimmer of a chance for whole societies to healthily inhabit their rations of Earth.

Remember that economics is just one branch, though probably the stoutest branch, of moral philosophy.

A contagious moral philosophy which is rooted in our habitations—our families, skills, and terrains—could infuse the common course of things and shrug off the phantasies of those who pillage and reside. Remember, morality tells us what to do—how to behave well. It is a living force.

At their core (removing the cults and hierarchies), Christianity, Islam, Hinduism, Buddhism, Taoism, Confucianism... all say the same.

As just about every “Green” writer of substance says (it's a long list), a moral awakening is our final life-belt for rescue from a sea of colonial residencies tossing wildly on waves of their own making—the consumer consumed by the consumed.

Our habitation

How do we re-settle? By trial and error. But here are some thoughts. Every habitation must begin with some sort of understanding and some sort of a plan.

Potatoes contain about 80% water. Carrots contain 90%. Cereals contain 15%. A ton of potatoes contains 200 kg of nutrients. A ton of carrots contains 100 kg. A ton of cereals contains 850 kg (dried in the field by sunshine). That is why cereals have founded towns and cities. They are very light for transport. A ship's hold can carry 4.25 times more of cereals than potatoes. Differing types of bread have been the staple of most cultures.

Cereals and potatoes contain very similar nutrients.

We would not be very well if we consumed a diet entirely of cereals. That has created a chronic (sometimes acute)

sickness of the poor in many parts of the world. So, most fruit, roots, and leaves are best grown close to home. Without engine oil, that thought is essential.

There is much demonization of cereals, but not much sign that people can resist a hot loaf, straight from the oven, a flat bread straight from the griddle, or hold back their pride in the local pasta. “A loaf of bread, a jug of wine, and thou....”

Cereals can be traded between regions (<https://ecoclipper.org/>), as scarcity and surplus demand. In my dreams (reality is very close), small sailing vessels of 500 tons (they are coming to fruition as we speak) will prove ideal (along with river/canal boats and barges) for that trade—or indeed, sometimes for that rescue mission. Vessels of 2,000 tons will soon follow. That’s a lot of grain—bearing in mind our primary aim will be to localize.

Cereals are useful both in time and space (tonnage). They can be transported not only through scarcity and surplus of regions and neighbors, but also between scarcity and surplus of hard or abundant times. They can be stored for years. They will remain central to our harvest festivals!

Most work done today is not only futile; it is destructive.

I begin with a defense of cereals, because they give emergency leeway to otherwise localized food systems—of course, the bulk of our cereal crops will also be consumed locally—or within a town/mill/terrain relationship.

Cuba successfully rode the oil blockade by diminishing the contribution of large collective farms and by encouraging citizens to both “grow their own” and to form small grower co-operatives—the *organiponicos*. At landfall, we can do the same—vegetable and fruit growing can weave into town—into private gardens and public spaces—derelict car parks for instance, or roadside avenues of fruit trees. Quite literally, hope can sprout from beneath paving stones. Meanwhile, market gardens, orchards, and dairies can ring those towns, occupying, and revitalizing the oil-desolation of retail park and ring road.

The same will happen in Suburbia as it re-centralizes into villages and small towns set in a sea of biomass—what we currently separate as agriculture and horticulture.

Is the distinction any use for our new adventure? I think not. As man-power replaces oil-power, all arable farmers will be forced into a more horticultural mindset. Mixed farmers will be forced into both a more horticultural, and also a more “dog and stick” mindset.

Fields will shrink into the compass of man-power, with the additional advantage of attention to detail—the intelli-

gence of many more senses. Large collective farms have not worked well in history. In private ownership, they’d become the now familiar colonial plantation owner and his hundreds—even thousands of slaves. In public ownership, they’d become institutionalized and wooden. Our new settlers will not stand for either. They’ll want to use their own senses and their own brains.

With all this shrinking, you say, you are shrinking back in time and towards low yields and inefficiency. No, I say we are shrinking back into a world without fossil fuel and biofuels. We must put out the fires. We cannot have massive tractors and their massive machinery. We replace them with people—the ingenuity, dexterity, and sensuality of very many people. To fully utilize people, it must be an egalitarian land-fall.

I’d say that most work done today is not only futile, it is destructive—insurance, banking, advertising, market research, manufacture of useless shiny things—of cars, trucks, and aeroplanes. We scurry to destroy ourselves. Those many millions engaged in destruction can instead be engaged in useful production. Eventually, as the hard work of transition passes, people will have far, far more leisure time without oil, as they had with it. There will be work reviving canal and navigable river systems and small harbors all around the coastline. There will be work building the new sail-trading ships and smaller craft, and there will be work on the farm and with rural housing—plus new tool-makers, weavers, millers....



I say we cannot have fossil fuels or biofuels, but anaerobic digestion is different. Fermentation is everywhere. It is essential to the continuation of life. It happens anyway. Harvesting gas is rather like hunter-gathering. We anaerobically ferment agricultural and household “waste” and use the gas. We exchange one gas for another and use the energy. CO₂ for methane seems a good idea.

Tiny digesters may provide for the domestic stove. Farm digesters may provide for some small machinery. Neighboring farms may share that machinery, for initial cultivation perhaps, and what about a combine harvester—used for only

one month every year—traveling between farms.

I am talking low horsepower. The scything, stooking, stacking, and threshing could be done by hand. In difficult weathers, the combine harvester can dash between rainstorms. It's a pleasant thought.

Another thought—ceramics and metal working (re-purposing) need considerable heat. The digester may provide it. We shall only know if it can, by trial, error, and rationing—that is, by fair distribution. Bear in mind the end is to shrink our impact on both climate and ecology, so that we cannot grow crops for the digester, we can only place it as a part of the cycles of use and return.

How do we minimize our impact? My own remedy is to think of human cultures occupying glades in the larger forest, rather than the permaculture remedy of imitating the canopies and understories of the forest. I think we can grow a greater biomass in the glade—one that meets our needs in a smaller space, while around us, the wilds can expand. We'll only learn by doing it. Certainly, my crop of wheat needs full sun. Why do I say remedy?—because our culture is currently very sick and will not survive.

Dog and stick

How do we extract crops, while maintaining future yields? By cycles of use and return, but also by introducing generative phases in rotation. Perennial cropping of fruit and nut trees and bushes is useful, and perennial cereal prairies as dreamed by the Land Institute may be a thing of the future. Nevertheless, even perennial cereals will need regenerative phases—by either cutting and mulching, or by grazing.

A very old rule of thumb is one year of cropping to two years of pasture (once called fallow). Many organic growers practice two years of cropping to four years of green manure or pasture.

I don't see how we can escape that simple rule. I think a vegan rotation could work very well, but I think the introduction of animals would work better. Meat, eggs, and dairy add to the diversity of both biomass in the field and to the quality of diet.

Used as part of rotation, animals increase the final yield. Pasture and green manure work equally well, so that animals add to overall harvested biomass, rather than being (as is commonly cited) an extremely inefficient way to grow food.

If efficient growing systems do best by imitating natural cycles, then that sort of proportion of animals is surely appropriate.

Of course, we cannot have feedlots, broiler houses, battery houses, and piggeries, but also how much area can we dedicate for perennial grasslands dedicated solely to dairy, beef, and sheep production? Think of a glade in the forest, dedicated to human cultures. How big can that glade be, to avoid collapsing ecosystems and swelling atmospheric CO₂?

All agriculture disrupts the natural systems it has replaced (my mantra). How much of the natural must re-grow, and how far must human interference shrink? Whatever the grass-

land polemicists say—no (UK) grassland is as rich in life as the forest it has replaced. Yet, beautiful human cultures have evolved with grasslands. How can we deny that?

Here's something—thinking of the UK, those wide upland pastures were not created by ingenious local habits. They are not an ancient cynefin, terroir, or clan territory, they are the result of a vicious aristocratic (most of it) expulsion of people from their lands. The enclosures were a land grab for the currency of sheep's wool. A very few got rich, nearly all ended in starvation, city slums, or in voyaging Atlantic or Pacific oceans.



An oak savanna has much to offer in terms of inhabiting an open space.

Close-cropped uplands are nearly deserted—economically but for wide-scattered farmsteads, and ecologically, but for sheep, crow, buzzard, a few skylarks, curlews, and so on, and of course tourists—who may be the largest economic contributor—along with farm subsidy and the meagre lamb trade. The tourists come for the wide, desolate spaces and think it wild.

But those scattered farmsteads could surely find a better living in re-foresting and re-wilding? We certainly need timber more than we need sheep. We also need to overturn the terrible injustice of the enclosures and bring people and life back to those places. Those farmsteads can still provide lamb for local butchers and (if soil permits) milk to local dairies. People can widen their skills into forestry and woodworking and bring new meaning to the word cynefin. Eighty percent of Welsh lamb is exported.

Well, 80% of that land area can certainly be re-wilded, or re-forested without the smallest economic harm. Eighty percent is a precarious percentage.

Thinking of pastured flocks and herds, the East of the country is in desperate need of them for its tired and half-dead soils, while the West has far too many. Is that a recipe for a beautiful friendship, which also increases the species diversity of both West and East? Also, bear in mind that we'll

not need the vast acreage of cereals, previously destined for animal feed. Economies will gain some slack. Also efficient, most ecologically-integrated flocks and herds will follow, not the grain market, but the seasons. People will re-learn the true calendar (UK) of Spring, Summer, Autumn, and Winter. Communities may synchronize with the true movement of time. Each month will contain ecologic/economic meaning. That is a delight.

A very short but tangled tragi-comic plot

Each month will contain ecologic/economic meaning. For us—for developed economies—all of which are agricultures, or dependent on agricultures—that meaning will contain a large thought-stifling smog of tragedy. We think we cannot do what is right, because of the tragedies our action will cause.

The central premise of all I write is that we must embrace tragedy—that there is no other course, but to take the tragic rite of passage towards the light on the other side. Our ways of life are causing terrible tragedies.

For me, another essential mantra is that comedy and tragedy share identical plots—the one of mind—the other of heart. Of course, as we see in the best writing and hear in the best and deepest music, comedy and tragedy can weave together as one—just as heart and mind are one.

It is illogical to say that we cannot act out remedies, because of the tragedies they'd cause to our tragedy-causing ways of life. Is that not the archetype for the best stage comedies and tragedies? Of course, we could also say, it is illogical to say that we cannot act out remedies, because of the ridicule and laughter they'd draw from those still engaged in ridiculous ways of life.

That last applies to most of peer-dependent, career-dependent academia and in particular to “climate science.” It applies to me in conversation with friends and family—I am ridiculous to some and dangerously tragic to others. Usually I draw back—accepting the role of clown and resenting the role of darkness! My life is entangled with theirs. I've no wish to disentangle. How on Earth do we disentangle from our common tragedy, together? One thing I know, is that I've only partially disentangled myself.

Jongleurs de joy, or prophets of doom?

Suppressing the tragedy and enjoying the comedy seems a profitable course. Remember that reality—the plot—is the same for both. Taking the tragic road to the light on the other side is the same as taking the comic road. The roads are the same.

Comedy is of the mind—we do need the mind—we need a quick wit and quick responses. Releasing too much of the heart to public gaze aggrandizes us as heroes of noble tragedy—and apart. Comedy makes us ridiculous, but included. Truly, whole societies—indeed the species herself, are ridiculous. Laughter brings us together. Tragedy can

bring us together in laughter. As we leave the oil machinery behind—evacuate the enclosures and settle the commons—we must first pass through tragedies, which we ourselves have made—well, though tragi-comedy. Let's be jongleurs de joy; lords (and subjects) of misrule; Don Quixote as Everyman (sexless). If laughter defeats the tears, we'll have a glimmer of a chance.

Those seriously engaged in maintaining suicidal ways of life—that is, nearly everybody—will label us comic. Keep the label and keep throwing it back. Might we not eventually fall in a common heap of helpless laughter?

Never forget that seriousness is a biological catalyst—an enzyme, which extinguishes thought. It is the puffing up of authority in the face of danger—the posturing of rival animals. Many species use it to extinguish sensuality and fear. Those serious peer-reviewed articles, or newspaper editorials use posture (seriousness) as a replacement for thought—just as rival silverback gorillas swell with stupidity to achieve their status.

Seriousness proposes “realistic” responses to the ecological, economic, and climatic cliff edge—that is, it shuts off the problem and swells with stupidity. It cannot not listen to truly reasonable voices, because it has blocked its ears.

Perhaps it is true that we have but three ways of seeing—the tragic, the comic, and the serious. We can escape neither the first, nor the second, but the third—seriously? △

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Through which mask will we see the world and act?

A Multi-Use Constructed Wetland

Brook Le Van and Rose L. Le Van

Wetlands are the kidneys of the planet

And water is the lifeblood

SCIENTISTS AND LANDOWNERS have lately become aware of the vital role wetlands play in the ecological health of the planet. Wetlands act as giant sponges, soaking up rainfall and runoff, thereby retarding flooding. They recharge aquifers and release water during drought. Wetlands enhance biodiversity by offering refuge for wildlife. They also stabilize shorelines, filter out pollutants, sequester carbon, and cleanse water. Whether for ecology, ethics, or education, a wetland is a vital entity.

Loss of functioning wetlands is a sad consequence of current approaches to land development. These threatened areas play a crucial role in healthy ecosystems. Many have said that the rainforests are the earth's lungs. To extend this metaphor, wetlands are her kidneys. Although saving and restoring natural wetlands is essential, another way to offset the loss is by building constructed wetlands. These constructed systems are valuable even if just as a means of drawing attention to the loss of their crucial natural counterparts.

In 1997, we co-founded Sustainable Settings, a high-altitude semiarid research and demonstration center for sustainable livelihood in Woody Creek, Colorado, near Aspen. Our programs encompass six integral elements: "art for daily life," garden-farming, green development, experiential learning, financial independence, and community. Sustainable Settings is founded on the belief that collaboration is more powerful than singular inspiration. Our programs, facilities, and grounds demonstrate that no action stands alone. Just as our garden and building systems are interdependent, so too are the individuals in a community important to one another.

Understanding that we did not know all there is to know, we built a National Advisory Board and a Green Design Team to guide us in our efforts to create a model of sustainable living for our bioregion. After inhabiting the site for a about a year, we invited Rocky Mountain Institute's Green Development Services to facilitate an initial design charrette for Sustainable Settings. We brought community members together with professionals in architecture, community organizing, green development, organic farming,



Resting dragonfly on a backyard pond covered in duckweed. Nothing enhances garden biodiversity like a pond. Photo credit: Phil Wages.

permaculture, progressive education, renewable energy, visual arts, and biological waste treatment. During the 12-hour charrette, we walked the 208-acre site to identify the best location and zoning strategies for Sustainable Settings. We noticed that the existing run-down pond and the grass-covered, south-facing earthen dam seemed to anchor the project, allowing a wealth of possibilities for stacking functions in and around this precious source of life.

When we inherited the pond, it was leaking, holding only 40% of its potential. The exposed polypropylene liner had deteriorated due to the intense ultraviolet light we receive here near 8,000' elevation. We found tires and trash, but identified no native wetland plants. For our demonstration of sustainable living systems, we needed to design a multi-use constructed wetland and pond system hosting many elements and serving numerous functions.

The 60-by-90-foot constructed wetland was planned to stack these functions:

- a 10'-deep reservoir for nutrient-rich irrigation water;
- fire suppression;
- a wildlife corridor into the site;
- a self-regulating system of native plants and other organisms to approximate a natural wetland ecosystem;

- a sanctuary for the endangered tiger salamander and for wild ducks and a host of other native biota;
- a source of nutrient-rich aquatic plants for mulching our edible landscape;
- a source of edible aquatic plants for livestock feed and human consumption;
- a source of native wetland plants for regional restoration projects;
- an educational resource—a model for riparian studies and systems-based learning in sustainable agriculture in nearby schools as part of our ecological literacy outreach programming;
- a community swimming hole;
- a demonstration to developers, ranchers, farmers, and home owners, through its integrated design, that a water feature in a development can be an agricultural or waste-treatment system and still be friendly to its inhabitants and encourage the surrounding natural environment; and
- a way to build partnerships with neighbors, county and state environmental officials, local environmental and conservancy nonprofits, and local and national companies in the research, planning, development, and use of the wetland.

Partnerships in research and design

We began our research by finding individuals and organizations in our area that we could partner with in designing and building our wetland. This outreach to the community proved valuable. Our valley community has rallied with advice, donations of plant material, educational collaborations, hard data, excavation help, and funding.

We discussed our designs and intentions with local conservation and environmental experts and with the parks department. They helped us understand the native biota and how to form the wetland for the range of habitat we wanted. We spoke with experienced pond builders and brought the excavator operator into the conversation early on. Then we consulted Rocky Mountain Native Plants, Inc. on native species we would plant that would not be invasive. With all the design criteria in place, the limits of our site led us to scale our wetland appropriately. We had blueprints drawn up, and then approached manufacturers of pond liners for donations. Reef Industries of Houston, Texas worked with us to design a liner. They offered their engineering advice and provided the 60'-by-90' liner that now seals the wetland.

The wetland's structural elements

Our constructed wetland system has seven primary structural elements: inlet, liner, wetland, the dam between the two bodies of

water, the 10'-deep reservoir with wetland bench, the overflow, and the large earthen dam containing the whole system.

Considering each of these elements provided multiple opportunities for us to enhance the design.

Inlet: The inlet brings in flow from the Salvation Ditch, which was built in 1908 by tunnel builders and hard-rock silver miners: Czech, Slavic, and Northern Italian immigrants. The waterway is an earthen ditch system drawing flow off the Roaring Fork River above Aspen. Each year, the Salvation Ditch Company, a collection of ranchers and homeowners who maintain and use the ditch, meet to vote on flow dates and repairs. Since the ditch flows only from mid-May to mid-October, this wet and dry cycle guided our design considerations, especially affecting which plant and animal species we would incorporate and attract.

We pull flow from the Salvation Ditch through a series of earthen ditches which eventually pass under a road and emerge on the edge of our eastern pear-cherry forest garden guild. Here, we have lined and rocked the inlet and planted bareground willow (*Salix brachycarpa*) to create a wildlife corridor into the site by establishing a willow carr, or grove/guild.

Liner: We initially planned to line our porous soil with layers of clay and bentonite. But we learned from neighbors with ponds and local pond-builders that in our area, clay liners are more expensive up front, and in the long run don't hold up as well due to—among other things—muskrats and other burrowing animals.

After understanding our nonprofit status, one contractor said, "I make my money on folks like yourself. First, I lay down clay. Then, I wait for the call. In about three years, you hire me back to fix your pond, and I drop in a liner that lasts." Reef Industries donated the Permalon® Ply-X 210G high-density polyethylene membrane for our liner.

Wetland: To encourage a self-regulating system of native plant and animal life, we made most of the wetland 18" deep or less. We saved the old pond muck during excavation, reusing it to provide a foundation of microinvertebrates to feed insects, tadpoles, zooplankton, snails, and shrimp. This also supplied soil fertile enough for the vegetation we planned. Once we had back-filled over the liner, we feathered the banks and laid in tree limbs and rocks to increase edge and multiply habitats. We also kept in mind that the introduction of non-native fish to waters historically barren of fish has greatly reduced the numbers of native invertebrates and amphibians all over Colorado. This is a situation we wished to redress in our system by nudging the wetland and pond more toward support of native species, rather than creating a more typical permaculture design of exotic, food-producing aquaculture.

Once we had opened the ditch to fill the wetland and pond, the students who had been caring for the rescued tiger salamanders returned them to the wetland. But this was only one life-form. We needed to inoculate the wetland with biota

from a healthy native riparian system. For this, we partnered with the Aspen Center for Environmental Studies (ACES).

ACES has been a national example of native habitat preservation and environmental education for over 30 years. Our collaboration was simple. After some discussion, we decided to soak a bale of straw in the shallows of the lake for a month or so, assuming that biota in the lake would inhabit the bale. Then we would collect the bale and several other non-invasive deep emergent plant species and inoculate our new wetland.

Late last summer, we retrieved the saturated bale and brought it to the wetland in large tubs and buckets. We distributed the waterlogged bale flakes, harvested wetland varieties, and lake water across the shallow wetland

section. Within weeks, the young aquatic system exploded with life. This spring, after freezing solid and a winter of evapotranspiration, we watched again as the wetland came to life. This strawbale inoculation technique has been extremely successful. Our wetland is now teeming with all the signs of a very healthy system.

Interior dam: We wanted to maintain a fairly consistent water level in the wetland section, while allowing water for fire suppression and daily irrigation to be drawn off for the surrounding gardens, guilds, and other landscapes. To have this, plus regular flow through the system, we built an interior dam with a central overflow. The top of the dam is now a favorite stone path across the pond and also allows us to study closely the wetland habitat.

Back Issues of *Permaculture Design*

Note: Some early issues are out of print and are available as photocopies only.

- I,1 July '85 **Permaculture in Oz**
- II,1 Feb. '86 **Garden Design**
- II,3 Aug. '86 **2nd Int'l Pc Conference**
- II,4 Nov. '86 **Fukuoka, Keyline**, Genetic Conserv., City Farms, Oceanic Pc
- III,1 Feb. '87 **Networking**, Natural Farm'g, D-Q Univ., Children's Pc
- III,2 May '87 **Wild Land Restoration** III,3 Aug. '87 **Planting Cycle**
- III,4 Nov. '87 **Trees for Life**
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Ten-foot-deep reservoir: The larger and deeper of the two bodies of water is meant to supply irrigation water to our forest gardens, market beds, and the surrounding landscape. The pond we inherited was already supporting this function, as well as providing fire suppression for the surrounding land. Once installed, it lowered our insurance premiums substantially. When we planted sod and some trees, we were able to irrigate them from the pond. But we have enhanced this basic setup from a “pond as large hole in the ground to hold water” to this demonstration of a multi-use constructed wetland hosting numerous agricultural and social functions.

Wetland bench: Surrounding the reservoir is a 2-3'-deep trench, creating a wetland bench. We formed the pond edges to include this trench, and tucked the pond liner into the bank, which secured it well above water level. To reestablish the aquatic microbial community, we laid into the trench some of the rich pond muck saved during excavation. Native plantings are now taking hold in the bench, establishing a healthy transitional edge into the rest of the site.

Overflow: Dug into the earthen dam and sealed into the liner with a polyethylene boot is a 6"-diameter Schedule 40 pipe-the main overflow of the system. We've slipped (not glued) onto the pond end of the pipe a 90° fitting that we can swivel to adjust the level of the pond. By controlling the level of the overflow pipe, we can keep continuous flow across the wetland and the pond for the whole irrigation season.

Earthen dam: Containing the whole system is a large earthen dam hosting forest garden guilds, a swimming beach, and a pergola and harvest cable that encourage community use. This fall, we are planting a windbreak to the north and west of the dam, a mixture of coniferous and deciduous trees and shrubs that will lift our gusty prevailing winds over the wetland. This shift in microclimate will, we hope, warm us from USDA zone 3-4 to 4-5.

The pond has yet another function: it's a swimming hole. Even at 8,000' elevation, we have some hot summer days. It didn't take long before community members were stripping down and diving in during lunch breaks, and waging water wars. Maybe someday, we'll have a tree tall enough to swing from.

Planting the wetland

We have selected wetland plants appropriate to local conditions, including grasses, sedges, rushes, willows, irises, and *Carex*. Here is a sampling of some of the native species we transplanted in and around our wetland, and how we installed them:

Beaked sedge (*Carex rostrata*) were planted in the delta of the inlet and in a rough area with scrub oak on the water's

edge and into water up to 1-2" deep on 12-18" spacing.

Creeping spikerush (*Eleocharis palustris*) was used on the wetland bench around the deep-end edge of the water to 2" deep on 1' centers. It spreads well.

Hardstem bulrush (*Scirpus acutus*) is an inundated emergent that we planted on 2-3' centers throughout the wetland area. Three 1-gallon pods were wrapped together with chicken wire to protect them from geese and other wildlife until they take hold.

Arrowgrass (*Triglochin maritimum*) was planted on the island edges and rough area edges 6" above the water's edge on 12-18" centers.

Large leaf avens (*Geum macrophyllum*), which likes drier areas, was planted 6" above the water on the island and interspersed around the wetland bench.

Meadow rue (*Thalictrum fendleri*), which grow in aspen forest, was planted where taller trees would shade it.

For other species appropriate to our Central Rocky Mountain region, visit our website: www.sustainablesettings.org/constructed_wetland.html

Stacking wetland functions

An added benefit of wetlands is the vital part they play in sequestering carbon dioxide from the atmosphere. In *Constructed Wetlands in the Sustainable Landscape*, Craig Campbell and Michael Ogden state:

Wetlands are one of the principal ecosystems on the planet for recycling the essential elements of life (carbon, hydrogen, nitrogen, and phosphorus), as well as the metallic micronutrients (e.g., iron, magnesium, molybdenum). They are the planet's kidneys, purifying the waters, and they have been doing so in varying forms for probably 250 million years.

The processes involved in recycling carbon are... an essential element of the wetland ecology. The generally accepted range of carbon a wetland can accept is 112 kg/ha/year. Most of the carbon remains in the wetlands in the form of highly reduced, long chain carbon compounds or in the form of peat-like plant materials. The retention of carbon in wetlands is a significant part of the geologic cycle of carbon. In natural wetlands these forms of carbon eventually become coal and oil deposits.

(See Campbell, page 49, Figure 3.1 for a schematic of the carbon cycle in wetlands.)

The newly created wetland system is central to the Sustainable Settings site. It is a beautiful focal point, a place for children to look under rocks and search for insects, and a peaceful place for people to sit. Many community members, neighbors, and visitors have

remarked on the transformation of the site. They come up to the wetland and its surrounding forest garden for solitude and to meditate in the beauty and dynamic sense of place that our subtle shifts have encouraged.

In the first year, the area's biodiversity has multiplied 100-fold, and our forest garden and market gardens are blossoming from the fertile water and mulches of chara, algae, and emergent plants they receive. In the future, we plan to harvest willow cuttings, divide irises, and collect carex seeds to propagate, sell, and share with others for restoring wetlands throughout our watershed. Finally, a pergola of standing but dead native Gambel oaks (*Quercus gambelii*) above a 12'-long table and benches is planned on the southern bank to encourage outdoor meals and community gatherings. In the end, we have succeeded in demonstrating the power of collective intelligence through careful design and remaining open to the wealth of knowledge in our valley community. △

Sustainable Settings' educational mission is to cultivate the full person, including manual competence and feeling, as well as intellect. Our curriculum is system-based and favors a symbiotic relationship between learning and locality. Brook and Rose Le Van can be contacted through their website: www.sustainablesettings.org. Also, visit our parent nonprofit COMPASS at discovercompass.org. This article previously appeared in Permaculture Activist #44 (Nov. 2000).

Resources

Matson, Tim. *Earth Ponds Sourcebook*. Countryman, 1997

(See the useful list of resources on pages 160-163).

Campbell, Craig and Michael Ogden. *Constructed Wetlands in the Sustainable Landscape*. John Wiley & Sons, 1999.

Mollison, Bill. *Permaculture: A Designer's Manual*. Tagari, 1988.

Visit Rocky Mountain Native Plants' web site for information on their work and services. www.rmnativeplants.com.

For information on your watershed, visit the EPA's website at "Surf your watershed." www.epa.gov

Also try this Web link for an exhaustive list of wetland resources. [http://rbwinston.home.mindspring.com/wetland.htm#Constructed Wetlands](http://rbwinston.home.mindspring.com/wetland.htm#Constructed%20Wetlands)

We wish to thank the many people, businesses, and organizations who through their generosity made this project possible.

Editor's note: See also the following resources.

Harty, Féidhlim. *Permaculture Guide to Reed Beds: Designing, Building and Planting Your Treatment Wetland System*. Permanent Publications (UK). Chelsea Green (US). 2018.

The Migratory Dragonfly Partnership's guide to building backyard-scale ponds for dragonflies, damselflies, and other aquatic life: www.migratorydragonflypartnership.org/uploads/ROOT/File/Pond_Habitat_Guidelines_Odonates_Final_Websec.pdf



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The Lost Forest Gardens of Europe

Max Paschall

IN THE HILLS ABOVE THE PO RIVER in northern Italy, there are a handful of farms that look almost the same today as they would have three thousand years ago.

There are rows of short pruned trees, with fruit-laden grape vines festooned between them. The trees are common natives in the area that produce fruit, firewood, basketmaking materials, and fodder for farm animals. The grapes are ancient cultivars that have been grown here for millennia. Between these rows of grapes and trees are diverse plots of cereals, hayfields, vegetables, and herbs. In a single field, one can find all of the staples needed to live and support the farmstead, and more to sell at a high premium. This is a resilient system—a farm modeled on a forest. Unlike monocultures of grapes or grain, diversity is the strength here. Disease outbreaks and unseasonable weather have a limited impact. If one crop has a bad year, there are a dozen others to pick up the slack. These are agricultural ecosystems designed to last millennia—and that is exactly what they have done.

Systems like *coltura promiscua* are the direct descendants of the indigenous forest gardens of pre-agricultural Europe.

This style of growing is called *coltura promiscua*—“mixed cultivation”—a practice with roots that run deep in these hills. It is one of a handful of truly indigenous systems of farming remaining throughout Europe, adapted and perfected over thousands of years from the earliest hunter-gatherers through to the present day. It has shrugged off extreme climate change events, countless wars and invasions, pestilence and plagues, cultural erasure, and colonization. This is the kind of farming system that is needed in the 21st century: a fully-integrated three-dimensional farm ecosystem that supports people and animals, provides staples and specialty products, increases local biodiversity, and does not require chemicals or elaborate technology.

Whereas modern industrial agriculture is descended from a distinctly imperialist Roman plantation system based on slave labor, systems like *coltura promiscua* are the



A row of field maples (Acer campestre) trellis grape vines, and are pollarded to harvest 'tree hay' fodder for livestock. Maize grows beside the row. The grapes are harvested to make wine. Source: www.venetoagricoltura.org (See Resources).

direct descendants of the indigenous forest gardens of pre-agricultural Europe. Since the Neolithic Revolution, an assortment of farming systems in Europe that relied heavily on monocultures and a handful of finicky staple crops often ended abruptly and violently. The diverse forest gardens of peasants, however, have quietly shrugged off ten thousand years of turbulent changes. This article is a look at the little-known history of these systems and their innovative strategies for survival.

As we search for ways to remake the way we garden, farm, and live in a time of climate change, extreme inequality, and political disarray, looking back at the innovations of Europe's hidden agroecological past can provide invaluable lessons on how we might collectively move forward.

People of the hazel

Our story begins with the last retreat of the glaciers from Europe around 15,000 years ago, a period known as the Mesolithic ('middle stone age') which ended with the introduction of farming from the Near East 5-10,000 years later. Mesolithic Europe, populated entirely by hunter-gatherer tribes, was an incredibly diverse place in terms of ethnicity, culture, land management, religion, and food. Societies across the continent innovated unique ways to



A very rare example, unfortunately recently eliminated, of a radial espalier in Cartura (Padua), a form of vine cultivation once widespread in the Po Valley, a typical area of the Friularo grape. It was a double row separated by a trame, with poplar supports. For each guardian, 2-4 vines were planted, the branches of which were stretched both along the row and all around, supported by willow posts renewed every two years.

Source: www.venetoagricoltura.org (See Resources).

thrive in their respective landscapes for millennia. After the glaciers retreated, the continent was a cold tundra of lichens, mugwort, dwarf willow, and sea buckthorn—populated by prehistoric megafauna and migratory bands of humans returning from their Ice Age refugia in the mountains. Around 9,600 BCE, global temperatures rose 7°C in less than a decade, allowing for temperate deciduous forests to return. Populations of Mesolithic humans expanded rapidly across Europe, bringing their most prized plant with them: hazel. Much as peaches, once introduced, were spread across North America by indigenous people in a matter of decades, the pollen record shows that hazel (*Corylus avellana*) suddenly becomes ubiquitous across Europe as soon as the climate warmed, brought to every corner of the continent by hunter-gatherers. Hazel was the original Tree of Life for Mesolithic Europeans. The nuts are about 60% fat and 20% carbohydrates, and contain a wide range of proteins, vitamins, and minerals—a few handfuls can cover most of a person's daily energy needs. Its branches, tall and flexible but slender enough to cut with a flint axe,

were used for tools and firewood. Mesolithic thatched huts were often made with hazelwood beams. From cradle to grave, the people of Mesolithic Europe relied on hazel more than any other single plant. Excavations of habitation sites from this period can turn up hundreds of thousands of roasted hazelnut shells. For over 5,000 years, this single plant was the lifegiver to nearly all of Europe's people.

The continent-wide orchard

In addition to hazel, Mesolithic people utilized up to 450 different species of edible plants—many of which were common plants of forest edge habitats. Wild vegetables (many of which are considered weeds today) like nettle, knotweed, lesser celandine, dock, lambs quarters, fruits like sloe plum, rowan, hawthorn, crabapple, pear, cherry, grape, raspberry, and tubers of aquatic plants were all part of the Mesolithic diet. These European native plants were likely utilized by Mesolithic hunter-gatherers for the same reason they are often seen as weeds today: they're extremely resilient, aggressive, and adaptive species that can be encouraged to grow with minimal effort.

These were not bands of starving cavemen constantly on the precipice of death, but rich and resilient societies that had a much more diverse diet than most present-day Europeans. Researchers found that a young girl who died 5,700 years ago in southern Denmark ate duck and hazelnuts—a far richer (and tastier) diet than most kindergarteners in Western countries have today.

And for their rich and diverse diet, Mesolithic people worked



A Mesolithic shaman's deer headdress from Star Carr in Scotland. Source: [Museum of Archaeology and Anthropology, Cambridge](#) (See Resources).

less than anyone who came after. Hunting and gathering requires just a few hours of work each day—far easier than farming, much less modern work schedules. After helping to create Europe's forests by bringing favored plants like hazel with them, they continued to manage their landscape with hand tools and fire. Europe was not a pristine wilderness, but a continent of handcrafted nut orchards and semi-wild forest gardens carefully managed for thousands of years. This tracks with common themes around the world:



*Mesolithic people constructed their houses from locally-available materials. Hazel poles often comprised the skeleton of the structure, and reeds like *Phragmites australis* (now endangered in Europe, but a common invasive in North America) were used as thatching. Mesolithic societies were experts at creating thriving societies whose only traces were stone tools and a more diverse landscape. Source: de Raaff, Yannick. 2020. (De)constructing the Mesolithic. *A History of Hut Reconstructions in the Netherlands. Exper Archaeol* 2020 (issue 1). (See also Resources)*

indigenous people in Australia, North and South America, and elsewhere have used fire and specialized hand tools to achieve unprecedented levels of environmental stewardship and management for millennia. Nor was this anything new: humans (and their Neanderthal and *Homo heidelbergensis* ancestors) have been shaping Europe's ecology for over 800,000 years. These Mesolithic forest gardens were simply the most recent and nuanced manifestation of an ancient ecological relationship.

Areas around settlements and camp sites were regularly burned to limit the encroachment of the forest, and to favor food-producing forest edge tree species. These controlled burns established open park-like habitats, which could lead to a tenfold increase in the amount of wild game animals present, creating greater opportunities for hunting red deer, wild boar, and aurochs. In some places, people created forest openings to encourage the growth of English ivy (*Hedera helix*)—a favorite food of red deer. These ivy patches essentially served as semi-wild feedlots in the wintertime, allowing people to hunt deer, or possibly even to establish semi-domesticated herds (much as the indigenous Sami people in northern Scandinavia have today with semi-domesticated herds of reindeer).

Coppicing was another important strategy for managing the Mesolithic forest garden. Certain trees and shrubs, like hazel, can be cut to the ground every few years. Instead of hurting the tree, this effectively rejuvenates it, allowing the plant to live far longer than it would if unmanaged. Hazel in a wild state generally lives around 70 or 80 years, but with regular coppicing, it can thrive and produce wood and nuts for centuries. Willow, another plant with many uses and benefits, is managed in this way as well. Coppicing lent itself perfectly to Mesolithic technology: without saws or metal tools, it was far easier to harvest small-diameter trees and

branches than large trunks. For cultivating or regenerating patches of wild vegetables or semi-domesticated grains, Mesolithic Europeans also had a wide range of hand tools at their disposal, including flint axes, wooden and antler hoes, mattocks, and digging sticks. The open forest gardens that surrounded Mesolithic camp sites and settlements could be managed this way for millennia.

A changing climate

For thousands of years, Mesolithic people across Eurasia had lived by their covenant with the web of life: a sacred pact that was defined by reciprocal relationships with their human and non-human neighbors. Unbeknownst to them, however, major events half a globe away were about to change this way of life forever.

Around 10,800 BCE the North American ice sheets collapsed, causing glacial melt waters to cool the North Atlantic and kickstarting a global drop in temperatures. Within a few centuries, conditions in Europe and the Near East were almost as cold as the previous Ice Age. This period, known as the Younger Dryas, lasted for over a thousand years. In the Near East, hunter-gatherer cultures saw their entire way of life collapse. Their Edenic landscape of fruit and nut trees withered in the cold, the large herds of wild game disappeared. They had always grown and eaten the seeds of native grasses as a supplemental part of their diet. During the Younger Dryas, however, these grasses (and some legumes) became the only crops they could reasonably rely on. A thousand years of planting and harvesting had the effect of fully domesticating these species. When the climate finally warmed again in 9,600 BCE, they had a crop that had never been seen before: grain. Wheat, barley, peas, beans, and flax had gone from wild survival foods to domesticated staples. A period of dramatic climate change had brought about a new class of food that would forever change the world. This new age, defined not by hunting and gathering, but by the cultivation of grains, is known as the Neolithic ("new stone age").



Controlled burns of the forest and savannah allowed Mesolithic Europeans to alter and diversify their environment on a large scale, creating new habitats that fed people and supported more wildlife. Source: <https://www.nationalgeographic.org/encyclopedia/controlled-burning/>



Some of the oldest landraces of grain are still grown on the fringes of Europe. This 'Bere' barley has been grown in the Hebrides islands of Scotland for around 6,000 years. It is so old that its name is from a pre-Indo-European language that is now extinct. This barley has been preserved by small crofters for millennia and, like many ancestral crop landraces, has unique adaptations and qualities that are missing in modern barley varieties. Photo by Max Paschall.

The traditional narrative states that the 'Neolithization' of Europe (the replacement of hunting-gathering with grain farming) occurred as a wave from ~6,500 BCE in Greece to ~2500 BCE in Scandinavia, with farming cultures from the Near East bringing grain and livestock, leading to the end of the inferior Mesolithic hunter-gatherer way of life. A wealth of recent archaeological evidence, however, points to a very different story.

Every dramatic change or fluctuation in climate, from the Neolithic to the present day, precipitates major changes in agriculture. As we've seen, people created productive environments by spreading hazelnuts across Europe when the climate warmed after the Younger Dryas. The Little Ice Age of the 17th century led to massive failures in Europe's grain harvest, prompting the widespread adoption of the potato and other New World crops. Similarly, the adoption of cereal farming in Europe did not happen at a continuous pace, but occurred in surges associated with severe climate fluctuations over the course of thousands of years.

Grain was a radically new type of food for Europeans. Unlike tree crops that take years to mature, cereals provide immediate food security in a pinch as they can be grown and harvested in a single season. With each period of climate-induced chaos in Europe's prehistory, cereal farming communities expanded ever deeper into Mesolithic Europe. When conditions improved, these farming communities grew in population far more quickly than the relatively stable hunter-gatherer tribes. Mesolithic people were not unaware of grain growing—they had been experimenting with it for millennia before Near Eastern farming cultures entered the scene. The spread of farming, therefore, was not due to the supposed superiority of grains, but because repeated periods of climate change and the resulting social chaos pushed Mesolithic Europeans to adopt new ways of life to survive.

Indeed, Mesolithic hunter-gatherer communities continued to live peaceably side-by-side with Neolithic farming communities for thousands of years before adopting

agriculture. As in many parts of Europe, the cultures of Mesolithic Sweden had depended on hazelnuts for millennia—with some scholars even dubbing this period the "Nut Age." When Neolithic grain-farming communities entered southern Sweden around 5,500 BCE, the native hazel-based cultures continued to practice their traditional ways for another 1,600 years. It was only when a period of dramatic cooling began that hazel populations in the region plummeted, and Mesolithic communities, now without their sacred life-giving tree, adopted grain farming by 3,900 BCE. This was a story repeated throughout Europe. And while nearly all of Europe eventually came to adopt grain farming, the resilience of these Mesolithic cultures over the course of millennia demonstrates that hazelnuts are perhaps the best option for a perennial crop that can replace grains in a



Iberian pigs forage below oak trees in a Spanish dehesa. Source: <https://www.moniberic.com/blog/en/what-is-a-dehesa/>

temperate climate.

Strength in Diversity

For the first few millennia of farming in Europe, before the advent of traction ploughing, families cultivated the land with digging sticks, hoes, mattocks, and footploughs. This was human-scale agriculture, unable to expand past the limits of a person's energy. As a result, Neolithic farming communities generally did not overexploit their environment, but instead cultivated small plots of land for vast lengths of time with hand tools, crop rotations, and fertilization from livestock manure, compost, and night soil - leaving the land they tended more fertile than when they found it. These ancient farmsteads were the original "regenerative farming" innovators, and in many ways resembled today's small organic farms and homesteads of a few acres. Monocultures did not yet exist as a concept.

Grains were not grown as fields of a single variety, but as diverse mixes of cereals and legumes called maslins (or mashlum in Scots). Ancient grains like emmer, einkorn, and barley were grown together with peas and lentils. Hemp, flax, and poppies were common supplemental crops as well. These diverse mixed fields were far more resilient than monocultures—in some parts of Europe, they've existed unchanged for 4,000 years.

In modern grain farming, a single variety of wheat is planted over hundreds of acres. If a season is unfavorable,



Cattle graze in a cork oak savannah—a classic dehesa ecosystem that produces much of the cork used in Europe’s wine industry. The cork is in the bark of the tree and is periodically removed, as can be seen here. Source: <https://en.wikipedia.org/wiki/Dehesa>

the farmer will lose the entire crop. Ancient maslins, however, protected against this. Seasonal weather differences might benefit einkorn one year, and barley the next. Whether the year was cold or hot, wet or dry, there would always be a crop to harvest. Unlike modern varieties, ancient grain landraces were bred to have a long harvest window that protected them against total crop failure in case of a freak weather event. Maslins of crop landraces were a simple but effective way for small farmers to hedge their bets against variable seasonality and climate change. Newer research into

The native forest edge ecosystem was compressed into an architectural feature of the new agrarian landscape.

growing mixes of cereals and legumes has confirmed what Neolithic farmers always knew: that these intercrop mixes of grain and legumes are superior to monocultures by nearly every metric.

Hybrid cultures

Along with grains and legumes, Neolithic farmers brought domesticated livestock like cattle, pigs, goats, and sheep. Because these Near Eastern landraces of farm animals were

not always well-adapted to Europe’s climate and conditions, farmers often intentionally cross-bred their domestic cows and pigs with native aurochs and wild boar in Europe, resulting in offspring that were domesticated but far better adapted to local conditions. Many of the oldest European landraces of cattle and pigs today are the direct descendants of these Neolithic hybrids of wild and domesticated animals. The Iberian pig, a Spanish landrace that is made into the world-famous jamón ibérico, is very similar to its Neolithic ancestors—a mix of swine and wild boar genetics.

In Spain, the Iberian pig is a central component of the dehesa system—an ancient agroecological masterpiece. The dehesas are man-made oak savannahs throughout Spain and Portugal, populated with traditional landraces of livestock on grassland, with holm oak (*Quercus ilex*) and cork oak (*Quercus suber*) dotting the landscape. Jamón ibérico, wild game, and non-meat products like truffles, mushrooms, honey, fighting bulls, and cork are valuable yields in this system.

As an agroecosystem, it has existed in its basic form for at least 4,500 years, and in essence is a domesticated form of the fire-managed Mesolithic nut tree savannahs—replacing aurochs and wild boar with cattle and pigs. Not only is the dehesa a low-input silvopasture system, it has existed for so many millennia that it is now an important ecosystem in its region, allowing it to support an enormous range of biodiversity (including endangered species like the Iberian lynx, imperial eagle, and black vulture). These systems challenge the very definition of farming, and show us what agriculture can be when people create it as a fully-fledged ecosystem, rather than simply a way to mine nutrients from the soil.

In other areas, the adaptation of the Mesolithic forest



Annually coppiced willow beds are a source of fine materials for wickerwork and other crafts. Source: Tristan Hutchinson (<https://www.telegraph.co.uk/luxury/travel/artisan-joe-hogan-irelands-master-basket-maker/>)

garden took the form of fruit-chestnut silvopastures created as semi-natural open forests. These included diverse nut and fruit assemblages (such as chestnut, carob, almond, fig, olive, hazel, cork oak) that allowed for livestock grazing beneath them. A culture of chestnut forest management in Corsica shows how the use of perennial nut crops as a staple has never left Europe.

The practice of coppicing trees did not end in the Mesolithic either. The wild willow-thick streambanks became managed willow beds that were planted with cuttings of the best plants. These willow beds were coppiced every year for crafts and toolmaking. Wicker basketry became such an elevated artform in the British Isles that fine Celtic baskets were imported by Roman aristocrats. The word 'basket' itself (originally *bascauda*) is one of the only words of Celtic origin in the deeply colonized English language. Coppice woods of chestnut, linden, hazel, and other useful species have remained an essential and ancient part of the British landscape, providing materials for housing, tools and crafts, charcoal production, mushroom cultivation, and even rich pockets of endangered biodiversity.

One of the most recognizable evolutions of Mesolithic forest gardens, however, is the hedgerow. The most common forest edge species of fruits and nuts that were cultivated by Mesolithic people—sloe plum, rowan, hawthorn, crabapple, wild cherry, brambles, etc.—also happen to be the most common hedge plants in northern Europe. During the Neolithic Revolution, new farming cultures discovered an innovative way to manage and integrate these species by planting them thickly in rows around their farms and cereal fields, and periodically rejuvenating them with strategic pruning. The native forest edge ecosystem—in essence, the plant supermarket of Mesolithic people—was compressed into an architectural feature of the new agrarian landscape as a multifunctional barrier that demarcated land, kept livestock in or out of certain areas, and provided food, fodder,



Old coppice woods are irreplaceable habitats for rare species, including these bluebells—a species associated with ancient woodlands. Photo by Max Paschall.



Hedgerows are living boundaries with enormous functionality and ecological benefit. Source: <https://www.agriland.ie/farming-news/sinn-fein-call-for-extension-to-glas-hedgerow-period/>

firewood, tool handles, medicine, and other materials.

Hedgerows were sometimes used as defensive barriers as well: the Nervii tribe of northern Gaul nearly wiped out Caesar's invading legions in 57 BCE by using their hedgerows to limit Roman maneuvering. In the present day, Europe's hedgerows provide a new benefit in serving as a repository for biodiversity. In highly deforested areas like Ireland, hedgerows are often the largest gene bank of native tree biodiversity that has otherwise been lost. They also serve as a crucial corridor for wildlife, connecting the few remaining patches of natural space that remain. The wild fruit orchards of indigenous hunter-gatherers exist to this day in the form of these living barriers that crisscross the old fields of central Europe.

The domesticated forest garden

The new creole societies that arose in Europe were fantastically diverse, mixing Mesolithic hunter-gatherer cultures and the newer farming communities. Cultures that strayed too far from their hunter-gatherer roots and relied too heavily on a handful of grain crops, like the Linear Pottery culture of central Europe, were able to expand rapidly but could not maintain a sustainable existence. As soon as the climate began to deteriorate, the Linear Pottery culture collapsed in on itself with unprecedented violence.

Other hybrid cultures that emerged from this time, however, found ways to marry the best of both worlds. These societies relied on the new cereals for their staples, but supplemented them with a broad range of indigenous foods and growing systems. Some places saw hunter-gatherers adopt domesticated livestock but eschew grain, while in



Aerial view of hedgerows criss-crossing the English countryside. Photo by Max Paschall.

others, Neolithic farmers embraced local land management techniques and native tree crops. The two radically different societies rarely came into conflict, and intermarriage between them was common throughout Europe. Many Mesolithic practices, beliefs, and systems were blended into the new European societies as a result of this peaceful intermingling.

In the Euganean hills above the Po river in northeastern Italy, a Neolithic culture combined the cereal crops of the Near East with Mesolithic forest garden management. Farmers performed controlled burns of their landscape, radically changing the local ecosystem from a linden-fir forest to a chestnut-walnut grain savannah. For 5,000 years, these farmers regularly set low-level fires that cleared out weeds and small trees, and sowed cereals, flax, and hemp in the fresh soil. They planted chestnut and walnut trees in these cereal fields, along with olives, grapes, and willows, creating a diverse multistory agrarian landscape that provided a wide range of products and crops from a single area. This type of farming is reminiscent of the famous indigenous milpas of the Americas—to this day, some of the most advanced agricultural systems in the world.

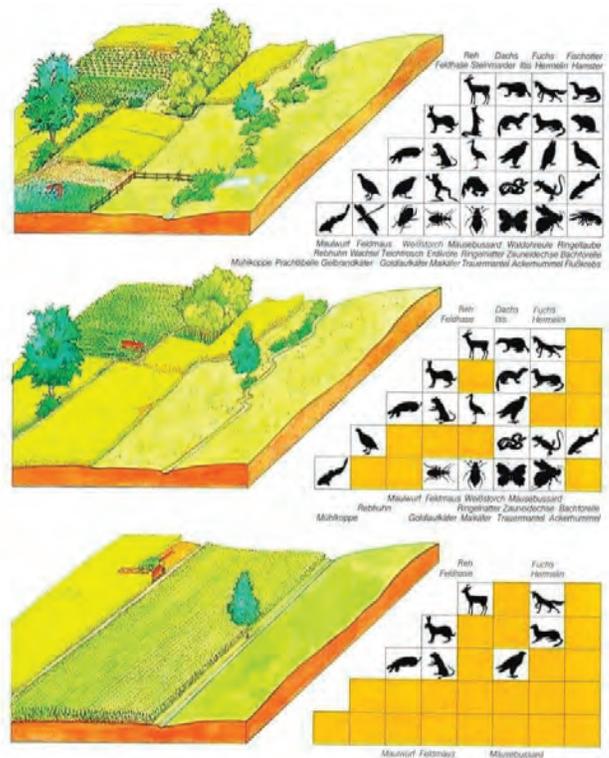
The introduction of agriculture in Tuscany also saw the managed forests of the Mesolithic reorganized into a more domesticated form on the farm. Unlike most places in Europe, Tuscany maintained a great deal of its ancestral culture, avoiding the worst of the Indo-European invasions that wiped out much of the continent's indigenous cultures during the Bronze Age. As such, the region maintained an unbroken link to its prehistoric past even up through the Etruscan civilization in the Iron Age.

The Etruscans enjoyed a highly diversified diet that consisted of many different annual grains and legumes, along with perennials like cultivated grapes, wild cherries, hazelnuts, acorns, olives, pears, and figs. The first wine here was made with native Cornelian cherries (*Cornus mas*), before superior grape varieties were introduced through trade. The Etruscans developed a diverse forest garden system

that has become known in Italian as *coltura promiscua*, or “mixed cultivation.” Like the extensive forest gardens of the Euganean hills, these farms were a creolization of local Mesolithic agroecology—tree crops and native perennials—with Near Eastern cereal farming. It is a system that has survived to the modern day.

The practice of trellising grapes into trees is one of the most ancient parts of this system, known as *alberata*, *vite maritata*, or *arbustum gallicum*. Roman authors wrote extensively about its use: Pliny claimed that vines grown on trees produce better wine (a claim that is also echoed in American viticulturist T.V. Munson's observation that these vines also avoid rot and mildew). The tree to which the grapevine is “married” changes based on local environmental and economic factors. In some areas of Italy, the mulberry has been used as grape trellis in order to provide fruit, livestock fodder, and silkworm rearing. In wet areas, willow or poplar was used. In the hills, cherries were often the trellis. Everything from field maple and chestnut to olive and elm can be utilized in this system.

Coltura promiscua is, at its core, a domesticated facsimile of the prehistoric forest garden. Whereas their Mesolithic ancestors had gathered wild grains, fruits and nuts, medicine, and wood from the managed forest surrounding their villages, Etruscans and their descendants created a complex polycultural system that maintained these elements in a



Diverse, well-integrated farms like *coltura promiscua* support significantly more native biodiversity than modern monocultures. Source: BUNDESAMT, F. U., & LANDSCHAFT, W. U. (1997). *Umwelt in der Schweiz* 1997. Berna, Buwal.

controlled and linear setting: domesticated grapes climbing rows of (usually native) trees that are pollarded for fodder or materials for basketry and firewood, or harvested for fruit and oil, all enclosing small fields of diverse grains, legumes, hay, and vegetables that are rotated to maintain fertility. This system allows for the production of staple crops and specialty products for market, and expands the ability to farm to a wider range of soils and conditions.

These domesticated landscapes are fully integrated into the local ecosystem, forming networks of connectivity between local woodlands. As mosaics of trees, grains, stone features, and waterways, they create oases of profound biological, hydrological, and geological diversity in the landscape. The diversity and strength of this system made it resistant to invasion by the deadly *Phylloxera* that obliterated the weaker grape monocultures of France. Crop introductions, through invasions or trade routes, are the only major change this system has seen in two millennia. Species from Asia and the Americas (citrus, maize, etc.) have seamlessly entered *coltura promiscua* and are now staple crops in these systems.

Towards a new culture

The ancient peasant farmers who fashioned this forest garden system continued to hunt wild game and harvest wild foods, just as their descendants in Tuscany do today. The culture and cuisine of Tuscany—from truffle hunting to winemaking—is part of a 30,000-year-old unbroken tradition and relationship with the land. The elegance and near-perfection of these temperate forest gardens is shown in how they have thrived for millennia on some of the most contested land in Europe, surviving climate change, war, pestilence, drought, and economic upheaval.

Only the proliferation of postwar neoliberal economic policy in the 20th century has managed to drive this peerless system to the brink of extinction. Indeed, *coltura promiscua* has nearly vanished in its native land for the same reasons that other European agroecological systems have disappeared. Urbanization and rural depopulation in the modern period have virtually eliminated traditional environmental knowledge and the labor base for maintenance and harvest. The intensification of the modern capitalist paradigm has incentivized extractive cash crop monocultures over self-sufficiency or regenerative methods. Postwar mechanization, which is built for monocultures and economies of scale, is not suited to the small, hand-tended agroecosystems that require a high degree of expertise in shaping and working with the natural world.

Medieval manorial feudalism, the American plantation system and Jim Crow, and modern industrialized farming are all descendants of the slavery-based monocrop agricultural systems that the Roman empire forced on the land in their effort to subdue and replace Europe's tribal societies. Oppressive systems like these have always flown the banner of efficiency and profit without regard for human well-

being or ecological destruction. This essential struggle between extractive imperialist systems, and indigenous land-based lifeways, is still ongoing across Europe and its former colonies—particularly the Americas. The rapid disappearance of the *dehesas*, coppice woods, willow beds, hedgerows, and Mediterranean forest gardens are all connected in this fight. What's at stake in their survival is not the preservation of a bygone relic, but the protection and expansion of relationships with the land that can feed our communities, preserve biodiversity through climate change, and create productive ecosystems that last for millennia.

Despite what we've been told, the indigenous Mesolithic societies of Europe never disappeared: they adapted, and survived in new ways. Their cultures, values, spiritual beliefs, and relationships with the land are encoded in the folk traditions and regional agroecological systems that persist throughout Europe. These are an essential piece of an antidote to the toxic empire-based culture that currently holds sway over our society.

They are an example of what we might lose if we forget too much, but also of what we can create again. Our present crises of climate change, extreme inequality, imperialism run amok, and endemic violence eerily mirror the downfalls of previous cultures that relied too heavily on a handful of finicky crops and an expansionist ethos. But this time of chaos can also be an opportunity, a chance to emulate the older cultures that replaced them: those who planted trees in the ruins of empire, who remade the Commons on abandoned plantations, and quietly continued to tend their small forest garden as their ancestors had before them. We may have inherited the most destructive systems of extraction and exploitation ever seen, but we have also inherited the seeds for a better way to live: a way that our oldest ancestors knew and cherished.

Perhaps it is time that we plant those seeds once again. Δ

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Resources

1. *Coltura promiscua*. <https://www.venetoagricoltura.org/upload/pubblicazioni/E491%20PAESAGGI%20AGRARI/Parte%20seconda%202.2%20.pdf>
2. Europe's Mesolithic cultures. <https://www.archaeology.co.uk/articles/review-a-survival-story-prehistoric-life-at-star-carr.htm>; <https://exarc.net/issue-2020-1/ea/mesolithic-hut-reconstructions-netherlands>

Holism and Reductionism

Richard Mandelbaum

I. The woods

Berberis thunbergii is a good place to start. This understory shrub, usually referred to as Japanese barberry, is common in the northeastern USA. It is characterized by bright red berries that dangle in clusters from its branches in the fall and throughout the winter, and by numerous thorns that would make it an attractive candidate for a hedgerow plant. This was most likely the reason for its initial import from Asia; the problem is that barberry does not stay put. It spreads voraciously over the landscape, and I have met botanists who scorn it as an “invasive alien”—a blight upon the land—as it spreads in thickets over sometimes huge swaths of land, in open meadows, along roadsides, and under hardwood groves.

Barberry, however, is a valuable plant. First of all, it is what is often referred to as a “warrior plant.” Along with other thorny plants such as *Rubus* spp. (brambles), and *Rosa multiflora*, it moves in rapidly onto disturbed land [replacing the very first pioneers such as *Verbascum thapsus* (mullein) and *Arctium lappa* (burdock)], to create impenetrable barriers. In this way, it can be seen as analogous to a component of the human immune system, or alternately, as scar tissue, keeping out large animals—most notably humans—from a piece of land struggling to recover through the slow process of soil accumulation and remineralization.



Barberry (*Berberis thunbergii*) in flower.

Barberry and goldenseal do share many properties.

On a more practical level, *Berberis* is also a valuable medicine (1). Similar to its cousin in the western USA, *Berberis aquifolium* (Oregon grape), barberry is an alterative, cholagogue, and bitter tonic, helping to cleanse the liver and blood, and to stimulate gastric and intestinal enzymes, thus increasing and improving digestion. It is especially useful in cases in which the body’s impaired ability to detoxify manifests itself in the skin (the body’s detoxifier of last resort). In addition, it has strong anti-bacterial, anti-fungal, and anti-viral properties, useful in preventing and treating myriad infections both topically and internally, from the throat down through the intestinal tract. Traditionally, it is the root bark, harvested in the early spring or late fall, that is

used, although the twigs are also medicinally active.

Barberry is high in berberine (naturally occurring chemicals are often named for the organism in which they are first identified), an alkaloid that imparts to its inner bark a bright golden yellow, which is also found in a native and now scarce eastern woodland herb, *Hydrastis canadensis*, or goldenseal. It is a risky business to judge plants’ medicinal activities by the activity of particular chemicals found in them; the whole concept of the “active ingredient,” followed by herbal products standardized to these chemicals, has created more misunderstandings than it has good medicine. But in this case, barberry and goldenseal do share many properties, as people familiar with the uses of goldenseal will see by the above indications.

Thus, we could take pressure off the demand for goldenseal, which should only be cultivated and not harvested from the wild due to its scarcity, by substituting barberry whenever appropriate. Doing this, we could at the same time clear the woods of this non-native plant and create income for local wildcrafters. (Another herb, *Coptis trifolia*, or goldthread, is also high in berberine, and even more similar in activity to goldenseal. It is common in many parts of the North woods, and a hundred years ago was commercially available, but its roots are so thin that it could quickly become endangered if commercial harvesting resumed.) There are no doubt plants occupying similar niches in other bioregions—so called “invasive weeds” that are in fact quite useful. The same can certainly be said of *Pueraria lobata*

(kudzu) in the southeastern USA, useful in treating disorders as diverse as inflammation of the gastrointestinal tract, muscle spasm and pain, and heart disease.

Does it make sense then to view such plants as “invasive aliens” in the landscape? On the one hand, *Berberis* does spread readily into the understory below mature hardwoods, crowding out native plants of the herbaceous and shrub layers of the forest (unlike *Rosa* and *Rubus*, which tend to thin out as succession converts a field into mature forest). But on the other hand, we know that such woods are in reality far from healthy climax forests. Would *Berberis* be anything more than a marginalized weed limited to roadsides and the like, if what it was encountering here was Eastern old growth rather than the sick land that it is, barely beginning to recover from 400 years of repeated clear-cutting and abuse?

II. The philosopher and the meaning of health

The ecological concept of invasive species parallels closely the pathogenic, or microbe model of disease. Such a view leads to the justification of drastic measures, and we can see the ecological equivalent of toxic chemotherapy in the use of chemicals to suppress “invasive species” of plants (2). PSE&G, the local utility company in southern New Jersey, has been engaging for the last few years in the most massive aerial herbicide spraying in the history of the state, sanctioned by the Department of Environmental Protection, to rid the wetlands of *Phragmites*, all in the name of “ecological restoration.” At the same time, agencies in the New York City area have reacted to the West Nile Virus by enacting widespread aerial and ground spraying of toxic chemicals, despite the fact that more people are being sickened by the pesticides than by the disease, all in the name of “public health.”

This is a reflection of the focus of modern medicine on illness, rather than on health. This approach has created real life medical miracles for those individuals suffering from acute and late stage illnesses that require high tech drastic measures. Who doesn’t marvel at the surgeon’s ability to successfully remove his patient’s heart from her body and



Barberry (Berberis thunbergii) root bark.

place it on a dish, operate on it to remove widespread tumors, then rebuild it and replace it successfully in her chest cavity? But we pay a heavy price for this set of priorities, reflected in public health statistics that make the USA resemble the poor countries of the world more than our economic counterparts. We can see how the same mentality makes our nation very efficient at waging war, but very deficient at promoting peace.

Indeed, the very concept of health is altogether lacking in conventional medicine. Even when we speak of “preventative medicine”—such as the suggestion by the National Cancer Institute to eat more brassicas because they have been shown to aid in the prevention of cancer—we are still focused on disease, not health. *Taber’s Cyclopedic Medical Dictionary* states that “the World Health Organization defines health as a state of complete physical, mental, or social well-being and not merely the absence of disease or infirmity” (3). This is not a bad definition, despite its limitations such as the omission of spiritual well-being and the importance of family and community, not to mention the greater Society, all of which are subjects too broad to delve into for this article (4).

We can see how the same mentality makes our nation very efficient at waging war, but very deficient at promoting peace.

However, the entry goes on to dismiss even this small attempt at an inclusive definition of health, by stating that “this definition is of limited usefulness when evaluating an individual.” Any holistic health practitioner knows how far this is from the truth! As its primary definition, *Taber’s* describes health as “a condition in which all functions of the body and mind are normally active.” This seems innocuous enough, but in fact reveals the deep mechanistic underpinning to current medical thinking. This mechanistic view of the human body can be traced back to Rene Descartes, the French philosopher of the 17th century, who was its earliest and perhaps greatest champion.

Descartes believed that the Universe was essentially a vast machine created by God (more than a metaphor, he believed this to be literally true). Indeed, every component of the Universe was mechanical in nature, however complicated, with only two exceptions: God and the human soul. It is easy for an holistic-minded person to see how dangerous such a world view can be. From the soul sprouts free will, and in turn, thought. This is the true meaning of his famous *Cogito*



Passionflower (*Passiflora incarnata*).

ergo sum (“I think, therefore I am”): that we humans, as the only beings besides God who think, are the only beings who can be said to truly exist.

Despite being referred to as one of the first great rational thinkers, such a mentality can only be explained by an entirely irrational allegiance to the Judeo-Christian myth of Man being created “in the image of God” (5). In this universe, Man and God stand on one side of the great divide, and the rest of Creation on the other. Descartes believed this to such an extreme that he described animals as automata, since “it is more reasonable to make earthworms, flies, caterpillars, and the rest of the animals, move as machines do, than to endow them with immortal souls” (6). A man true to his words, he was known to perform vivisection (live dissection) on dogs and other animals, since they were after all, soulless and thoughtless, and therefore did not even exist to the degree that he did.

I dwell on Descartes’ thinking only because I consider his influence to have been so profound on the culture we find ourselves in. His model of the universe still dominates mainstream culture, even if modern physics has since left him behind, and it is not difficult to see how dangerous a philosophy it is. After all, it is not so much Science or rational thinking in general, but rather the rationality of the Scientific Method coupled with the irrational arrogance of human superiority, that have led us down the destructive path we find ourselves on.

Descartes’ philosophy also unfortunately still dominates the modern medical approach. There is in fact little difference between his view of health, in which he “compares a sick man and a badly constructed clock with... a healthy man and a well-made clock” (7), and the modern definition of health as “a condition in which all functions of the body and mind are normally active.” This mechanistic view of the human body, consistent with the Cartesian view of the world at large, is a perfect example of reductionistic thinking. At the risk of over-simplifying, we can boil down the term

reductionism to mean that “understanding each part leads to understanding of the whole,” whereas holism (8) can be defined as “the whole being greater (or at least other) than the sum of its parts.”

At the same time, completely rejecting the pathogen model would be going too far. For example, I have yet to hear a good alternative explanation for the rapid spread of smallpox among Native American populations. Smallpox spread so rapidly and so virulently that it wiped out whole villages before their inhabitants had even heard the news that a strange white people had arrived from across the ocean, at a time when (it can be said without any risk of romanticizing) Native Americans were vastly more healthy than the Europeans of the time, who having become resistant also suffered from it but to a far lesser degree. It is very similar to the story of the infamous blight that all but wiped out our native chestnut, *Castanea dentata*. Another example is the influenza pandemic of the early 20th century, in which, counter-intuitively, the young and strong succumbed

Biodiversity is of supreme importance, and there is always something flowering in the garden during the growing season.

to the virus more than the old, sick, or otherwise immunocompromised. There are other examples. Perhaps *Berberis thunbergii* would invade old growth as well. We may never know the answer to that question.

What is clear is that the pathogenic model is the exception rather than the rule; a healthy organism will rarely succumb to disease (9). The terrain is far more important than the microbe. How else can we explain the fact that people who have more social interactions with friends, family, and community, are least likely to catch a cold during cold and flu season (10)? I have no doubt that we could save far more lives from West Nile virus (which incidentally has been responsible for the deaths of eight people over two years, whereas the flu kills several thousand annually) by promoting strong immune function through diet, exercise, and the use of immune tonifying plants, than we could save by poisoning ourselves and the land, along with the mosquitoes, with pesticides.

III. The garden

At Frost Hollow Farm, a medicinal market garden in

northeastern Pennsylvania, the strength of the holistic approach in building healthy land has become more clear to me over the last few years as the garden has matured into an active ecosystem.

The most striking example lies in the potato patch. Compared to the wild, semi-wild, and otherwise tough medicinal herbs making up the majority of the garden, potatoes represent needy domesticated annuals—just where you would expect to see more pest problems. But in fact in all of 1999, I saw only a handful of Colorado potato beetles, the worst pest on potatoes in our area, and this past year, I saw none at all. Only ladybugs showed themselves as I peered under leaves looking for eggs, and eventually I quit looking. I think there must be others in the area having the same success, but I have yet to find them.

Returning to the ideas discussed earlier and applying them to the land, a “preventative” approach to Colorado potato beetles would be to introduce ladybugs, or use other means to actively deter them. There’s nothing wrong with that; in fact sometimes it is the wisest thing to do, but that in itself will not build land health. For that, you must forget entirely about the pests (i.e., microbes), and focus on nurturing the land back to wholeness. At Frost Hollow, this involved the tried and true methods: copious amounts of compost, minimization of tillage, and maximization of self-seeding annuals and perennial crops.

Biodiversity is of supreme importance, and there is always something flowering in the garden during the growing season, often members of various different families at the same time. These include Apiaceae (formerly Umbelliferae), such as *Levisticum officinale* (lovage) and *Foeniculum vulgare* (fennel), Lamiaceae such as *Ocimum sanctum* (holy basil) and *Melissa officinalis* (lemon balm), and Asteraceae (formerly Compositae) such as *Echinacea purpurea* and *Inula helenium* (elecampane). At any time between April and October, the



Ganoderma tsugae, also known as *Hemlock varnish shelf*, is closely related to *reishi*, with which it shares some medicinal properties.



Hemlock (Tsuga canadensis) aspires to be our most graceful tree.

garden is buzzing with an amazing assortment of insects for such a small space (the garden spreads over less than an acre of land).

In the first two seasons, weeding was more intensive, while certain species such as *Viola sororia* (dooryard violet), *Plantago major* (broad-leaved plantain), and *Taraxacum officinale* (dandelion), were encouraged to prosper. Now they serve as living mulch over much of the garden, cutting down drastically on the need for weeding or mulching, and providing habitat for myriad insects. I liken all this in my mind to encouraging a healthy diverse bowel flora, which once established prevents the overgrowth of pathogenic organisms in the gastrointestinal tract. And now that they grow in sufficient quantities, they are also harvested as a money-making crop. The plantain and dandelion reach sizes many times over what they achieve in adjacent lawns and nearby waste places, which I believe might be due to giving them space to grow as much as the soil fertility (although I have not tested that). In other beds, I have experimented with using *Trifolium repens* (white clover) as a living mulch around perennial herbs, which has worked well enough for me to plan to expand it.

In four years, the garden has come to resemble a wild meadow, and in all that time only one pathogen has invaded with enough vigor to require some reductionist thinking. That was a rapidly growing colony of voles that seemed to enjoy nesting in the thick straw mulch and munching on seedlings of lettuce and echinacea. But that infection was resolved with the use of a fairly benign medicine: a cat, which quickly sent them packing to the neighbor’s yard!

Over the past few years, the garden and the woods have begun to teach me about the connections between land health and human health. Maybe these are obvious teachings. Indeed, it is only that Cartesian culture in which I was raised that led me to separate the two in the first place. For myself, the path toward health, or

wholeness, involves breaking free of that mentality in the search for balance: intelligence yes, but coupled with wisdom, knowledge with humility (and recognition of our fundamental ignorance), and science with mystery.

△

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Endnotes

1. *Berberis vulgaris* is most often cited as the medicinal species, but is not very common in our region, and the two species can be used interchangeably.
2. Even the Sierra Club has come out in the past in favor of the use of herbicides in certain situations to kill invasive plants.
3. *Taber's Cyclopedic Medical Dictionary*, 17th Edition, F.A. Davis & Co., Philadelphia, 1993.
4. These are of course complex and far-reaching topics. Here's something to think about from *Scientific American*, July 2000 ("The Geography of Death", p. 22), explaining research by Ichiro Kawachi on regional variations in mortality rates. He shows that mortality corresponds not only to socioeconomic status, but even more so to economic inequality:

"A better explanation [for regional variations in mortality rates] may lie in distribution of income. States with significant income inequality also tend to have high mortality rates, a relation that holds for both blacks and whites. Unequal income distribution may shorten lives because it degrades civic cohesion. Ichiro Kawachi and his colleagues at the Harvard University School of Public Health measured civic cohesion in terms of participation in community groups and by the extent to which people



Pleurisy root (Asclepias tuberosa) with friend.

trust one another, as measured by such statements as 'Most people would try to take advantage of you if they got the chance.' They found that in states with high mortality, such as those of the Southeast, trust in others is low and that in states with low mortality, such as Minnesota, North Dakota, and Utah, trust is high.

"As for public policy, Kawachi believes that reducing income inequality would help lower mortality; he suggests prescriptions that might include raising the minimum wage, expanding the earned income tax credit and increasing child care subsidies. Others... hold that the best approach is to rely on public health measures."

5. I'm purposefully using the term Man here rather than a gender neutral word, since I think that it more accurately reflects the thinking and mentality of these cultural beliefs.
6. Descartes, "Letter to Henry More, 1649", from *Descartes Selections*, ed. Ralph Eaton, Charles Scribner's Sons, 1927
7. Descartes, *Meditations on the First Philosophy in Which the Existence of God and the Distinction Between Mind and Body are Demonstrated*, Meditation VI: 'Of the existence of Material Things, and of the real distinction between the soul and body of Man', *ibid*.
8. The words health, holy, and whole all derive from the same Old English word *hal*.
9. "The failure of allopathy was that it treated disease, or a part of an organ, or tried to do so, whereas the only means of cure was to treat the whole patient." Fergie Woods, as quoted in *Yasgur's Homeopathic Dictionary*, by Jay Yasgur, Van Hoy Publishers, 1998, p.9.
10. Cohen S, Doyle WJ, Skoner DP, Rabin BS, Gwaltney JM Jr. (1997) Social ties and susceptibility to the common cold. *J Am Med Assn* 277: 1940-1944

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***September 15 is the deadline
for our February issue:***

Wild Yields

Little Leaf Linden

Tilia cordata

JUST THE FACTS

SAY: TILL-e-ah cor-DA-ta

AKA: Little Leaf Linden

description: Large attractive shade tree, 50'-70' in height, 35'-50' spread. Low-branching, dense, pyramidal to ovate form. Great low maintenance shade, street and ornamental tree or hedge. Heart-shaped leaves on attractive stems. Pale underside shimmers in the wind. June blooms are fragrant and medicinal. Fruit and flowers showy.

Hardiness: Zone 3—7

Family: Malvaceae (*mal-vay-see-a*)

ORIGIN: Europe and southwestern Asia



WHY WE LOVE THIS PLANT...

Moderately fast-growing, Little Leaf Lindens are densely leaved on gracefully arching sinuous branches. Mature leaves dark green and shiny. Vibrant green new growth is delicious eating.

Although potentially quite large, lindens likewise do well in containers or hedgerows. Coppicing produces abundant feed for livestock.

Best known for their fragrant, small yellow-green flowers used as a tea to improve the immune system, calm and detoxify the body, eliminate anxiety, and lower inflammation and blood pressure. Attracts bees and butterflies.

Its small nutlets are attached to 3" lime-green 'wings', adding interest and beauty.

Tolerant of urban conditions, lindens are adaptable and resilient.

RELATED SPECIES

With 10 species of *Tilia*, there's a lot to

choose from! The common name Linden is interchangeably used with Lime and Basswood. Although Little-Leaf Linden is best medicinally, other species provide wide geographic coverage. In the Eastern and Southern USA, growers will find Tiliias known as basswoods, (*T. americana*, *caroliniana*, *heterophylla*), and the small Zone 7 Henry's Lime (*T. henryana*). Hardier varieties like Large-Leaf linden (*T. platyphyllos*) sports leaves up to 5'. The showy Silver Linden and hybrid Common Linden (*T. tomentosa*, *T. X platyphyllos*) are tolerant of air pollution and urban conditions with Common Linden tolerant to Zone 2. Weeping Sliver Linden (*T. petiolaris*) makes a stunning statement, growing up to 100' in zones 5-9.



CULTIVATION AND CARE

Easily grown in well-drained soils in full sun to partial shade (minimum 2-6 hours of direct sun) with medium water needs. Prefers moister, moderately rich loamy soils but tolerates a wide range, including clay. Once established, handles drought and dry soils well.

Low maintenance and low susceptibility to most insects and diseases. Grows readily in good conditions. Reliable urban tree. Commonly available at nurseries.

Can be used in hedgerows and windbreaks. Tolerates coppicing and heavy pruning but does not require either. Harvest young leaves for eating in spring and flowers in summer for teas and tincture.

This article was produced by Gloria Flora, who regularly contributes to this section. She lives in the Pacific Northwest.

Reviews

Tending to the Soil

Review by John Wages

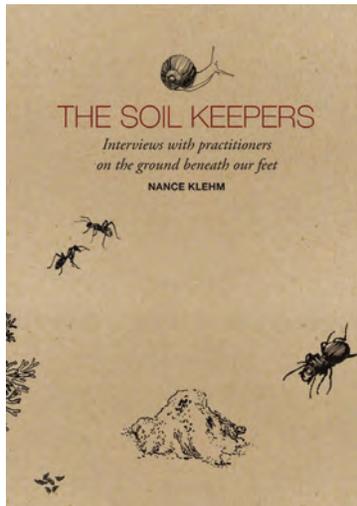
The Soil Keepers: Interviews With Practitioners on the Ground Beneath Our Feet Nance Klehm

Terra Fluxus Publishing. 2019

Paperback with original b/w illustrations by Gwyneth Anderson. 376 pp. \$25.00
Available from
spontaneousvegetation.net or
socialecologies.net.

AT FIRST, *The Soil Keepers* seems difficult to describe. From the title, you might expect a survey of practices to build soil fertility. Well, it certainly has that, but it has a lot more. Basically, it covers everything remotely related to the soil, from pottery to environmental justice. Lest you think it unfocused, consider that soil is the foundation of all our lives, beyond just where our food comes from. Rather than teaching by exposition, the approach is to teach by example, through the experiences of the 42 people the author interviews.

Chapter 1 deals with soil itself and its ecological importance. Eleven interviews span fields from soil science to ceramics, mining, and natural



mineral pigments.

Chapter 2, “Eat Amaranth, Plant Acorns,” sings the praises of perennial crops and forest gardening. Here, we see that this author knows what really makes the gardener tick: “We enjoy the well-being that comes with working the soil.” So that’s why I’ve always enjoyed gardening so much. Food, fresh air and sunshine, exercise, communion with the great outdoors—all those are just extra yields!

“Ecosystems are self-regulating—balancing their abundances between all their living constituents, and we send them back to the starting gate of early ecological succession every time we disturb the soil.” Weeds are the pioneers of this early succession, and to a large extent, our problems with weeds are secondary to tillage. As Klehm says, eat the weeds, including the wild amaranths, and plant trees. “It’s time to grow a forest. Everywhere a forest.”

Earwig & Dragonfly Nymph

Review by John Wages

The Garden Jungle or Gardening to Save the Planet Dave Goulson

London.Vintage Publishing. 2019
Paperback. 280 pp. £9.99 (approx. \$12.39)

OUT OF HIS EXPERIENCES in gardens, orchards, and semi-wild lands, Dave Goulson has written a sort of armchair travelogue to the garden.

While written from his experiences in Britain, his observations are easily extended worldwide, particularly to temperate zone gardeners. The appendix contains a list of pollinator plants, berry plants, instructions for building a simple worm bin, and resources.

A chapter on earwigs is one of the most entertaining in the book. Not simply scavengers that clean up detritus, earwigs are mainly carnivorous, making them beneficial species for the gardener or orchardist. A study in apple orchards showed that removal of earwigs resulted in a three-fold increase in aphids. Remarkably, earwigs are

Following the author’s essay, Chapter 2 presents eight interviews, including ones with Leah Penniman (*Farming While Black*), Martin Crawford (Agroforestry Research Trust), and Mark Shephard (*Restoration Agriculture*). Another interview is with a no-till corn and soybeans farmer in central Illinois. His entire crop is GMO, but he is also completely no-till and has been for several decades. As a result, his soil is deepening and increasing in fertility. He maintains riparian buffer zones and planted 60 acres of problematic pasture to a diversity of trees, including oaks, hazels, and others. I don’t think the intent is to glorify GMO-based no-till, but rather to demonstrate the power of no-till even when other practices may be problematic. The common thread running through all these interviews is the need to leave the soil undisturbed as much as possible. Rather than belabor the point, the author lets the diverse interviewees recount their experiences.

Chapters on land use and managing grief and disturbance precede a great chapter more or less about wastes. Interviews cover the use of manures and other organic wastes as soil amendments, urine as fertilizer, rainwater collection and stormwater usage (interview of Brad Lancaster), and natural burials.

“Everything flow towards soil.” What great inspiration from this unassuming little volume. If you gain motivation and new ideas from reading about what others have done and are doing, *The Soil Keepers* is worth a read. Δ

just one species among approximately 2,000 arthropods that inhabit unsprayed British orchards. Of that number, 25% are potential pests, another 25% are predators on those pests, and the rest are benign as far as the orchardist is concerned. It really is a jungle out there.

Entertaining makes for fun reading. Every page has a new story or scarcely believable factoid (wait for the Giant Earwig of St. Helena), but it’s the snippets of practical information and guidance that make this book useful. The author’s deep experience over some 40 years of gardening make for technical pointers we can trust. As if to

inject the subliminal message that this book grows out of the author's own life experience, each chapter begins with a recipe. Often with no discernible connection to the subject of the chapter, these are welcome snippets. Unlike so many online recipes these days, I suspect these will all "click" and be worth eating. The blackberry jam is very simple. It uses the whole-fruit. I'm anxious to try it on a small scale with our boysenberries.

The obligatory chapter on disappearing honeybees contrasts the one-dimensional services of robotic bees (yes, robotic pollinators have actually been suggested as a solution for pollination of crops once honeybees are gone) with the multi-dimensional way of ecosystems. In the UK, the honeybee performs only about a third of pollination. The responsibility for the majority falls to solitary bees, wasps, flies, butterflies and moths, and beetles. In subtropical and tropical climates, bats, hummingbirds, parrots, lizards, and marsupial mice (!) take up the task. Urban beekeeping has become popular and touted as a solution to declining pollinator populations. While it's true that urban hives typically out-produce rural ones due to the abundance of flowers in gardens, a reduction in honey yield per hive suggests that there are now too many beehives in some urban areas. What to do? Think like an ecosystem. Adding more flowers is a better approach than adding more beehives. As the author points out, "the more diversity of flowers you can squeeze in, the more creatures you will please."

At this point, the chapter on bees turns its focus to other bees, including bumblebees and solitary bees. In addition to a food source, these bees need places to nest. The author has much experience in building and testing various designs for bumblebee nests. Here, for example, is where some useful technical information comes shining through. First is the best engineered bumblebee nest (available from Nurturing Nature in the UK, although shipping to the US seems prohibitive) which traces its pedigree to Norwegian bumblebee expert Atlee Mjelde, who has been designing, building, and testing bumblebee nest boxes since

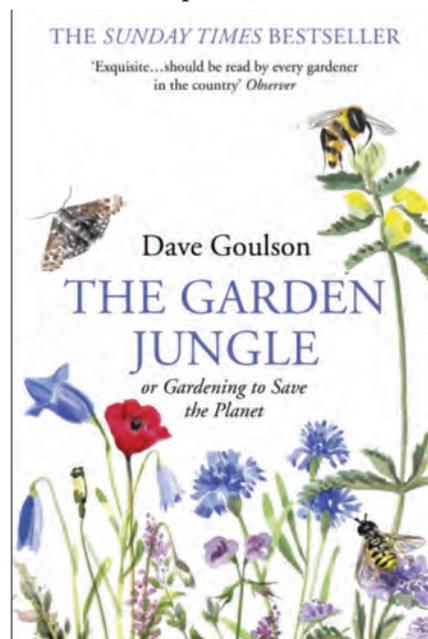
1968. The author shares his homemade nesting constructs that seem to work fairly well.

Moving on from the bumblebees, the author introduces us to a myriad of descriptively named solitary bees. Nurturing Nature's website has photos of their observation nest boxes, which show what's going on inside, as the bees fill up the chambers with paralyzed prey or pollen, depending on the species. A prescient observation here notes that the relative ease of attracting solitary bees to nesting units suggests their habitat is more in short supply than that of bumblebees—"dead trees full of holes are not common in the modern, tidy world." Again, the author shares some tidbits: drill holes of varying sizes in blocks of wood and place these throughout the garden, assemble bundles of old bamboo, or stuff tin cans with hollow stems. This sheer enthusiasm for solitary bees (and wasps) made me walk out to my own "Bee Hotel," a collection of hollow tubes of various sizes with a small shed roof on top, which hangs in a jujube tree. To my surprise, I found a tiny wasp carrying a jumping spider 3 or 4 times her size, frantically searching for a tube large enough to accommodate the spider! After 20 or more tries, she was able to squeeze the spider in—amazing to see.

My favorite chapter, "Dive into the Pond," deals with garden ponds. These are small ponds, sometimes as

small as ten square feet. "For me, the magic of a pond is in the extra life it brings." Exploring with a collecting net ("pond-dipping"), we find dragonfly nymphs, diving beetles and their larvae, newts, and of course various frogs and tadpoles. If you don't have a pond, dig one! The author has dug a pond in the garden of every house he's lived in, "starting at age seven." Therein lies the author's credentials to write not just a chapter, but a whole book on garden ponds. Brief discussions of the merits and down-sides of waterproofed concrete, rigid plastic, or flexible butyl liners lead to the conclusion that a puddled clay pond is best. What is puddled clay? How do you make a pudding clay pond? Now, gentle reader, I wouldn't want to spoil the surprise. Buy the book and find out. Regardless of what kind of pond you decide to build, it will almost certainly host a diverse community of life within just a few weeks. Avoid fish in small ponds, according to the author, if your goal is to encourage diverse insect and amphibian life in the garden. Next comes a detailed treatment of rot holes, clefts in dead trees that hold water long enough for small ecosystems to take hold. It's great reading and another reason to dig a pond. The pine hoverfly, believed to be Britain's rarest insect, and its larval form, the rat-tailed maggot (alas no illustration), provides a case study of the importance of rot holes. Intriguingly, we get a description of artificial rot holes (aka hoverfly lagoons) that can attract a variety of species to the garden. The author shares his experiments with various approaches to these artificial rot holes. Hoverflies (syrphid flies) are important pollinators, and we do well to encourage them in the garden. "Installing some kind of pond... is the single measure you can take in a garden that will do most for biodiversity while occupying only a small space."

Not to neglect one of the most significant benefits of the pond, encourage children to explore with dipping nets the pond and to watch as species come and go. Garden ponds are valuable teaching tools, with the potential to intrigue and draw young minds away from TV and computer screens into the real world.



Ants, worms, composting, invasive plants are treated in subsequent chapters as inventive and instructive denizens of the garden. The final chapter more or less sums up the message of the book. Gardening has the potential to reduce shopping miles and grocery bills. But, like almost everything else, the consumerist culture has commodified it. Walk into your local garden center and take your pick from the many beautiful plants on life support, goosed into greening up and blooming with doses of chemical fertilizers and heavily sprayed in greenhouses with insecticides and fungicides. Take one home. It'll most likely be dead in a year. You may have had the same experience. In many parts of the country, you'd be lucky to find any meaningful choice in organic fertilizers, much less anything affordable. Bagged compost, peat, bird feeders, and garden statuary are all available. But you don't need any of that. The author notes that the best sources of plants are neighbors, family, and friends. Industrial farming, food waste, and excessive meat-eating are discussed. The history of British allotments provides one solution to the problem that many people lack land on which to grow a garden. A study from the Netherlands compared multiple measures of health in people holding allotments with their immediate neighbors. While no differences in health measures were seen in younger subjects, people over age 62 with allotments scored higher in every category of health and well-being. These results don't, of course, tell us why there is a difference. It could be related to nutrition, exercise, or participation in community.

We all know there are limits to individual action in this age of global crisis and change, but gardening is something we can all do to help ensure our children and grandchildren inherit a healthy planet.

Recommended for the new gardener or anyone thinking about venturing into gardening. Also recommended for the casual gardener, for the things you may have missed and tales of the rat-tailed maggot, or as a gift. △

Growing Great Food: A Citizen's Guide to Backyard Carbon Farming

Acadia Tucker
San Francisco. Stone Tier Press. 2019.

Paperback with b/w illustrations and tables. 157 pp. \$19.95

ACADIA TUCKER, AUTHOR of *Growing Perennial Food*, has written a book for beginning gardeners that approaches backyard food gardening from the perspective of climate change and CO₂ drawdown. In fact, the book begins with a chapter covering each of the seven major regions of the USA and predictions of near-term climate changes, drawn from the Fourth National Climate Assessment (2018). The book emphasizes healthy soil as the key to growing great food. All of this is great and refreshing, instructive, etc., but when the book arrives at a discussion of particular vegetables, it's clear that this is for the beginner. And clearly, that is its intended audience, with a chapter on "Starter Perennials," for example. Someone who didn't grow up with gardens or who is growing for their first or second season will find this book useful, as it covers much that more advanced garden books will not think to mention because you're "supposed" to already know. Well, there are going to be an awful lot of folks learning to grow beans for the first time and thinking it's the hardest thing they've ever done. That's where books like this one fill a growing need. I do, however, wonder at the treatment of tomatoes and peppers as tender perennials. Of course, that's what they are. But, for temperate growers, is this a practical classification? Most peppers and tomatoes are grown as annuals. Overwintering them may be easy if you have a climate-controlled house or greenhouse, but for the rest of us, winter takes a toll, and plants that struggle through winter may never be as vigorous as new spring transplants. Aside from these types of questionable designations, *Growing Great Food* presents a vision for backyard (or front yard) gardens producing great food for every home. △

Black Commons, Community Land Trusts, & Reparations

David Bollier

ACQUIRING MORE LAND for ACLTs dedicated to African-American cultural use would be a great way to address a colossal historic wrong. It would serve as a practical and effective reparation that would benefit many African Americans and communities, and could at the same time reclaim land for ecological and socially valuable purposes.

Theft of Black land has been remarkably common over the decades, as a number of journalistic accounts have documented in recent years. In 2019, for example, Pro Publica (1) and The New Yorker described how white developers and lawyers used legal trickery and corrupt judges to take over ancestral land owned by two Black brothers in Carteret County, North Carolina. The practices have been widely used in the South as a way to steal land from African Americans.

Between outright bans on black ownership of land, discriminatory lending policies, racially motivated zoning, and legal ploys to steal land, African Americans have often had trouble acquiring land and thereby the wealth that could bring them into the middle class. It is estimated that between 1910 and 1997, African Americans lost an estimated 90% of their farmland.

Professors Julian Agyeman of Tufts University and Kofi Boone of North Carolina State University recently noted that "land loss has plagued black America since emancipation." They suggested that it is time to look again at 'black commons' and collective ownership as a solution.

In a piece on The Conversation website (2), they cite a study showing "a 98% decline (3) in black farmers between 1920 and 1997," which contrasts sharply with "an increase in acres owned by white farmers (4) over

the same period. In a 1998 report, the U.S. Department of Agriculture ascribed this decline to a long and ‘well-documented’ history of discrimination against black farmers, ranging from New Deal and USDA discriminatory practices (5) dating from the 1930s to 1950s-era exclusion from legal, title and loan resources.”

What might be done to reverse this injustice that has caused a cascade of harm to African Americans for generations?

Agyeman and Boone call attention to collective ownership of land as a historic vehicle for Black emancipation and progress. For example, they note the cooperatively run “Freedom Farms” (6) that civil rights organizer Fannie Lou Hamer established on 40 acres of prime Mississippi Delta land in the mid-1960s. Her idea was to enable former sharecroppers and poor Black farmers to become independent of local white landowners and their political power.

The current issue of Harper’s magazine has a wonderful piece, “We Shall Not Be Moved,” by Audrea Lim (7), which describes another civil rights experiment – community land trusts – that has helped Black farmers take charge of their lives.

In 1969, Shirley and Charles Sherrod other civil rights activists – including Bob Swann, founder of the Schumacher Center – came together to create one of the first community land trusts, New Communities Farm, near Albany Georgia. While the project eventually went under – a victim of a severe drought and discriminatory USDA finance practices – the venture was the beginning of a much larger CLT movement that has grown and flourished since then, thanks in part to the fierce advocacy of Bob Swann.

The Schumacher Center for a New Economics has seen CLTs as a powerful tool for addressing inequities in wealth in general and for African Americans in particular. In a 2018 proposal (8), the Schumacher Center suggested that a Black-led CLT could be used as “a national vehicle to amass purchased and gifted lands in a Black Commons

with the specific purpose of facilitating low cost access for Black Americans hitherto without such access. In short, creating one piece of a Black Reparations Movement.”

As the proposal explains: The community land trust is a tested and known entity for holding working lands in a commons while at the same time facilitating leaseholders ability to build equity in homes and other improvements on the land. Donors would be assured that their one-time donation of land would not again enter the market but would remain a permanent part of a Black Commons. Individual leaseholders could change, and buildings sold, but the land would continue to be held in the nonprofit structure dedicated to serving those disenfranchised by a history of discriminatory practices.

The concept of Black Commons has great appeal on a number of levels. It would serve as a fitting, effective vehicle of reparations. It would ratify a rich history of African American collective emancipation while embracing new forms of collective action and peer governance. One can, in fact, trace a direct line from Fannie Lou Hamer’s Freedom Farms and Black CLT farms to the traditions of Black credit unions and mutual aid funds, as described by Jessica Gordon Nembhard in her book *Collective Courage*.

The digital world of peer governance and provisioning is another space for such peer-support to flourish. Check out such Black commons as Urban Patch (9), a nonprofit that uses crowdfunding to build community spaces in the inner city of Indianapolis and foster economic development; and the Movement for Black Lives (10), as cited by Professors Agyeman and Boone.

The time is ripe to explore and develop these new sorts of commons, which can open the door for new types of social collaboration and solidarity in fighting racism and building flexible yet strong post-capitalist institutions. Δ

David Bollier is Director of the Reinventing the Commons Program at the Schumacher Center for a New Economics and co-founder of the Commons Strategies Group. He blogs at Bollier.org and lives in Amherst, Massachusetts. This article first appeared on his blog (<http://www.bollier.org/blog/black-commons-community-land-trusts-and-reparations>) and is reprinted here by permission of the author.

Endnotes

1. <https://features.propublica.org/black-land-loss/heirs-property-rights-why-black-families-lose-land-south/>
2. <https://theconversation.com/land-loss-has-plagued-black-america-since-emancipation-is-it-time-to-look-again-at-black-commons-and-collective-ownership-140514>
3. <https://thecounter.org/usda-black-farmers-discrimination-tom-vilsack-reparations-civil-rights/>
4. https://www.ers.usda.gov/webdocs/publications/46984/19353_ra174h_1_.pdf?v=41056#:~:text=Land%20ownership%20by%20Black%20farmers,acres%20owned%20by%20White%20farmers.
5. <https://ejournal.org/news/one-million-black-families-have-lost-their-farms/>
6. <https://snccdigital.org/events/fannie-lou-hamer-founds-freedom-farm-cooperative>
7. <https://harpers.org/archive/2020/07/we-shall-not-be-moved-collective-ownership-black-farmers/>
8. <https://centerforneweconomics.org/publications/proposal-for-a-black-commons/>
9. <http://urbanpatch.org>
10. <https://m4bl.org>

EVENTS

Permaculture Design Course Online

Description: Oregon State University's online Permaculture Design course is a great way to build essential sustainable landscape design skills in a convenient online format. After ten weeks, you will complete a finished design with:

- * One-on-one guidance from experts who will walk you through each assignment.
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Instructors: Andrew Millison and others

Contact: pace.oregonstate.edu/permaculture

**14 IPC
(International Permaculture
Convergence)
Argentina
postponed to
November-December 2021**

All updates regarding these events will continue to be shared on the official webpage 14ipc-argentina2020.org and on social media.

Permaculture Design Course Online

Dates: Ongoing

Description: Our course is the classic, official 72-hour Permaculture Design Certificate Course (PDC) as taught by the founders of permaculture.

This course involves study modules supported by practical exercises, fieldwork, and videos.

Instructors: Dr. Alan Enzo, Jessica Enzo, Steven Cran, Steve Hart

Cost: \$550

Contact: PermacultureEducation.com
info@PermacultureEducation.com

Permaculture Design Course Online

Dates: Jan. 18-May 7, 2021

Location: Online

Description: Take the permaculture design course in a way that works for you! Through more than 15 years of teaching the permaculture design course and facilitating online learning. The course will cover the standard material of the PDC (acknowledged by PINA), as well as include additional material on sociocracy, project development, connection to the landscape, garden development, and community-building practices and projects. Students found in the past that the focus on personal implementation over the length of the course and the emphasis on practice supported their understanding and development as practitioners.

One-to-one mentored experiences are also a part of this course and support your learning, as well as one-on-one support throughout the course. Set up a call to see if this is a good fit for you.

Instructors: Rhonda Baird, lead; guest instructors throughout; former student "reunion" and community

Cost: Sliding scale: \$750-\$1,150. Payment plans available.

Contact: rhonda@shelteringhills.net;
shelteringhills.net

Permaculture Design Course Costa Rica

Dates: Variable dates, October 2020 through March 2021

Location: Finca Terra, Puerto Viejo, Costa Rica

Description: Finca Tierra offers the international standard curriculum of 72-hour permaculture certificate course. The course covers the fundamentals of ecological design with a particular emphasis on perennial woody polyculture food systems or food forests. This course goes beyond the theoretical and focuses of real-world situations in this food forest and has a strong emphasis on hands-on application and practical skills. It offers the experience of learning in an immersive setting from mature systems with which students have daily interactions. The methods and techniques will transfer directly to any climate.

Finca Tierra is a 9-acre permaculture homestead and a food forest located in the lush jungle of the Costa Rican Caribbean Coast. Our infrastructure includes natural buildings constructed from local materials (bamboo, leaf thatch and onsite timber), renewable energy systems, biological flush toilets, rainwater catchment, organic vegetable gardens, a plant nursery, a seed bank, medicinal plants, food forest, bamboo woodlots, and native trees.

The accommodation is in natural buildings, and the food is from our farm and other local organic farmers. With the completion of the course, Finca Tierra will issue a Permaculture Design Certificate. This is a very hands-on course. Mornings are usually devoted to practical applications and afternoons are dedicated to course lectures.

Instructors: Ian and Ana

Cost: \$1,650 USD

Contact: fincatierra.com

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Send Event and Calendar Listings for Issue #118

(November 2020)

Wild Yields

by the September 15 deadline

events@permaculturedesignmagazine.com

Permaculture Design Course California

Dates: October 2020-March 2021,
Six weekends

Location: Los Angeles, CA

Description: The Permaculture Design Course is our flagship program and is a rigorous 6-month immersive training of:

- ... Hands-on Learning
- ... Real Design Projects
- ... 1-on-1 Mentorship
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Permaculture ethics and principles can be used in every aspect of life, large or small, from community to agriculture, craftwork and art, finance and education, law and security, architecture and science, the list goes on.

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Within weeks of starting the program under the supervision of Larry Santoyo and his team, you will think more strategically and rationally than the majority of design professionals out there.

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Permaculture Design Course California

Dates: December 5-18

Location: Occidental, CA

Description: Two-week residential intensive using the beautiful grounds and facilities at OAEC as our classroom. 100 hours of course time including lecture, discussion, hands-on activities, and visits to local permaculture examples. Students will learn the ethics, principles and practices of “permanent culture” by exploring topics such as: organic gardening, water retention and generation, erosion control, community process, energy systems, composting, natural building techniques and much more. Groups create a real design project for a local community organization. Course and retreat participants at OAEC can also expect to experience powerful personal transformation and inspiring networking opportunities. Upon completion of the course, you will receive a Certificate of Permaculture Design, accredited by the Permaculture Institute of North America.

Instructors: Brock Dolman, Kendall Dunnigan, and guests

Cost: \$1,750; \$1,850

Contact: oaec.org

Permaculture Design Course California

Dates: October 10-March 7, 2021;
April 3-September 5, 2021;
Six weekends

Location: Santa Cruz, CA

Description: Our course brings in leading designers and teachers from around the region, each experts in different areas of permaculture. The Santa Cruz Permaculture network of instructors, alumni, community partners, and resources continues to grow each season, and by participating in our course, you become part of this network! Read interviews with our alumni here to learn how folks use the skills and knowledge they gain in this course.

Additionally, course participants work in teams throughout the six month program to design a holistic permaculture plan for a real-life property in the community. The hands-on learning, workshops, and readings throughout the course prepare students with knowledge and whole systems thinking strategies that allow them to create detailed and thoughtful design projects.

Instructors: John Valenzuela, Lydia Nielsen, and many more.

Cost: \$1,250

Contact: SantaCruzPermaculture.com

Permaculture Service Day California

Dates: First Sunday of every month

Location: Sivananda Yoga Farm,
Grass Valley, CA

Description: Learn through hands-on volunteer work on the land and participate in a free workshop, open house, and tour of the Sivananda Yoga Farm in the beautiful foothills of the Sierra Nevada. Enjoy free yoga class, meditation, chanting, and two organic vegetarian meals.

Instructors: Colin Eldridge

Cost: FREE!

Contact: 530-272-9322

yogafarm.org

yogafarmregistration@sivananda.org

Permaculture Design Course Arizona

Dates: Spring 2021

Location: Tucson, 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.

Course topics include agroforestry, appropriate technology, building design, design principles and patterning, site analysis, drylands gardening principles, ecosystem restoration, philosophy and ethics of Permaculture, regenerative community economics, soils and erosion control, village and community design, water harvesting, invisible structures, and many other topics. The classroom site is in the Central Tucson area and at other Permaculture sites in the Tucson area. Much of the class is held outdoors. This course is taught and facilitated by, each with two and a half decades of Permaculture experience, as well as our many extraordinary associate SPG teachers.

Instructors: Dan Dorsey, Brad

Lancaster, and Barbara Rose

Cost: \$785

Contact: Dan Dorsey

dorsey@dakotacom.net

sonoranpermaculture.org

Permaculture Design Course Vermont

Dates: July 30-August 8, 2021

Location: Vermont

Description: This course offers a uniquely hands-on opportunity to gain skills in applied permaculture skills immersed in one of North America's most diverse and intensive permaculture research sites now 17 years in, along with our 2nd site where we are establishing our approaches learned over a decade at the first site, to the commercial permaculture farm scale.

Participants engage with high-performance home and community resource systems that are more resilient in the face of problems posed by peak oil, climate change, environmental toxicity, and the inability of existing economic and social systems to deal with such challenges.

The course is staffed by those who live and make a living as designers, farmers, extension agents and health care providers. This is not permaculture as a fantastic idea, it's an immersion in how numerous systems actually work over a decade and beyond. It's proof of concept.

Participants engage with high-performance home and community resource systems that are more resilient in the face of problems posed by peak oil, climate change, environmental toxicity, and the inability of existing economic and social systems to deal with such challenges.

These include systems such as:

A high performance cold climate home and established zone 1 gardens, 17 years in place. Mature fruit, nut, pond, zone 1 homestead systems A high performance earth-sheltered greenhouse in year 8. A root cellar and established food preservation strategies Established medicine gardens and medicine-making techniques in use. A working homestead shop, barn and much else well into its 2nd decade. 7,000 feet of agroforestry hedges and farm-scale permaculture plantings in year 7.

This course includes the standard certificate curriculum but goes beyond the typical Designer's Certification Course by utilizing the background of skills-based trainings offered in Whole Systems Skills, and is filled with practice-based, learning-by-doing experiences, not only concept and information-based study.

Instructors: Ben Falk and team

Cost: \$2,150

Contact: WholeSystemDesign.com

Permaculture Design Course Missouri

Dates: September 10-20

Location: Dancing Rabbit Ecovillage, Missouri

Description: Permaculture is all about creating sustainable human habitat. What better place to learn about sustainable human habitat than an ecovillage?

Using our twenty-year-old ecovillage as a living laboratory, our Permaculture Design Course interweaves the wisdom and knowledge of the permaculture movement with the firsthand learning experiences of an intentional community.

Central to this course are interactive learning experiences around the ecovillage, project-based learning, and opportunities for creative expression, human connection, and celebration. Prepare to be surprised and inspired!

Our 2020 PDC focuses on:

- a focus on climate change solutions
- learning from community members experienced in gardening, farming, natural building, alternative energy, self-governance, communication skills, cooperation, and conflict resolution;
- exploration of social and financial permaculture, as well as personal "inner sustainability"

Instructors: Sharon Bagatell, Olivia Miller Peterson, Erik Peterson

Cost: \$1,395

Contact: dancingrabbit.org/permaculture/

Permaculture Design Course Pennsylvania

Dates: February 17-May, 2021

Location: Philadelphia, PA

Description: Come join us for our annual Winter/Spring permaculture design course! The permaculture design course, or PDC, is an intensive 72-hour internationally recognized permaculture certification. It's designed to give participants the inspiration and knowledge they need to make a positive change in the world, needed now more than ever. It will give you the skills necessary to design your home/yard/landscape into an ecologically-resilient edible system, and for some, it could be the first stepping stone to a permaculture career in design, education, consulting, or regenerative farming.

This course will be offered as a weekend course designed for local residents who don't have time to take an intensive (and expensive) two-week PDC. This course will be mostly classroom-based but will also include hands-on components. It will go through the basics of permaculture design relating to different climates, energy, natural building, the global climate, social systems, and more.

Hundred Fruit Farm is a ten-acre permaculture farm that has been in operation for a little over two years now. We farm using only regenerative practices and aim to create a diverse agroecological system that includes multiple animal and plant species. We grow many different types of fruits and berries, vegetables, mushrooms, pastured meats, pastured eggs, and will someday have nuts as well.

Cost: \$650-750

Contact: HundredFruitFarm.com

Permaculture Design Course

Texas

Dates: June 5-18, 2021

Location: Georgetown, TX

Description: During this Permaculture Design Course, participants will be introduced to the ethics, principles, and methods of Permaculture while learning how to design, create, and maintain agriculturally productive ecosystems and sustainable human settlements.

The two week intensive class structure is designed with teachers in mind but is open to anyone, and is ideal for anyone who wants to complete their certification in a shorter time frame. This intensive permaculture design course will cover, but is not limited to: Introduction to permaculture – ethics, principles, methods and function of design. Patterns in nature & design. Climate and how to mimic natural ecosystems. PA Yeoman's Scale of Permanence. Water management strategies. Earthworks & Mapping. Eliminating Waste & Increasing Yields. Soil sciences & soil conservation strategies – roads, dams, conservation terraces, key line plowing. Culinary, medicinal, pollinator, and annual gardens. Edible beneficial perennial gardens. Intensive cell grazing systems. Plant propagation & wood lot management. Participants will create a design of their own to take home.

Instructors: Kirby Fry and Pete Van Dyck

Cost: \$795

Contact: EarthRepairCorps.org

Permaculture Design Course New York

Dates: January 16, 2021 and 14
Saturdays

Location: Warwick, NY

Description: Midsummer Farm has been an active teaching farm for many years, offering workshops as well as large scale intensive courses on topics such as Organic Gardening, Herbalism, Biodynamics, Homesteading, Holistic Health, and Sustainable & Artisanal Living. So many of these things culminate in our Permaculture Design Course.

We believe in teaching Permaculture on a useful, practical, effective scale. There is a strong focus on homesteading and small farm development. You may want to combine your Permaculture learning experience with Homesteading ... we offer a Homesteading Course as well, which truly complements the permaculture course, and we offer a discount if you sign up for both!

Our PDC course is, like our farm, special and different from many other permaculture courses. The Midsummer Permaculture Course will focus on using the permaculture concepts in context and in real-world usages. It is a practical and hands-on course. Along with exploring the major aspects and principles of permaculture, we will be focusing on applying these concepts to the development of small-scale farming and other holistic-styled businesses.

We find that Permaculture is a perfect and simple way to create an energized atmosphere of nature and life bubbling all around you. And that's our main goal - creating a space that acts as nature does - healing and magical and full of life.

We also like to think about Permaculture as a type or style of Homesteading - Homesteading in a beautiful way using nature as a guide in achieving sustainability, restoration, and abundance.

Instructors: Barbara Taylor-Laino,
Mark Laino and guests.

Cost: \$985

Contact: MidsummerFarm.com

Permaculture Design Course North Carolina

Dates: September 16-27

Location: Asheville, North Carolina area

Description: This hands-on permaculture design course (PDC) engages the mind, body, and heart. Students get to see permaculture in action in a wide variety of settings, from urban gardens to forest farms. Throughout the program we get our hands dirty and engage all of your senses; it's about learning by doing. Every one of the instructors incorporates permaculture into their landscapes, businesses, and day-to-day lives. You'll learn from their successes and failures, as they share candidly about diverse experiences applying permaculture principles to real-life situations.

Throughout the 12 intensive days you'll build connections amongst your fellow students while working on real-world design projects for local community members. Interspersed within the course are hands-on activities like gardening, natural building, basket weaving, and pressing fresh apple cider.

Instructors: Laura Ruby, Natalie Bogwalker, and guests.

Cost: April 24 – July 23, 2020: \$1,129 – \$1,525 with \$300 meal plan option

July 24 – September 15, 2020: \$1,229 – \$1,625 with \$300 meal plan option

Contact: Hannah, admin@wildabundance.net

wildabundance.net/classes/permaculture-design-certification-course/

Calendar

September

September 10-20. Dancing Rabbit Eco-village, Missouri. Permaculture Design Course. dancingrabbit.org/permaculture/.

September 16-27. Asheville, North Carolina. Permaculture Design Course. wildabundance.net.

September 21-December 11. ONLINE. Permaculture Design Course. sheltering-hills.net.

October

October-March. Los Angeles, CA. Permaculture Design Course. permacultureacademy.com.

October 10-12, southern Indiana. Touch the Earth Workshop. rhonda@touch-the-earth.life.

October 10-March 7. Santa Cruz, CA. Permaculture Design Course. SantaCruz-Permaculture.com.

October 20-March 2021. COSTA RICA. Permaculture Design Course. fincatierra.com.

December

December 5-18. Occidental, CA. Permaculture Design Course. oaec.org

2021

January

January 16 start. Warwyck, NY. Permaculture Design Course. MidsummerFarm.com.

January 18-May 7. Online. Permaculture Design Course. rhonda@shelteringhills.net. ShelteringHills.net.

February

February 17-May 7. Philadelphia, PA. Permaculture Design Course. Hundred-FruitFarm.com.

Spring, Tuscon, AZ. Permaculture Design Course. sonoranpermaculture.org

June

June 5-18. Georgetown, TX. Permaculture Design Course. EarthRepairCorps.org.

July

July 30-August 8. Vermont. Permaculture Design Course. WholeSystemDesign.com.

Ongoing

Online. Permaculture Design Course. info@PermacultureEducation.com, PermacultureEducation.com.

Online. Permaculture Design Course. pace.oregonstate.edu/permaculture

Online. Food Forest Course. workspace.oregonstate.edu/course/Permaculture-Food-Forests

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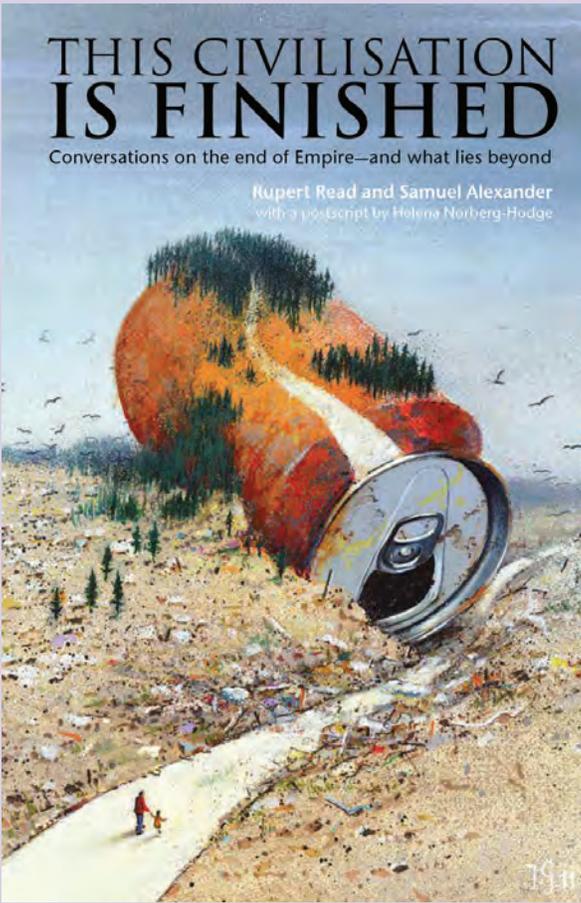
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