

Permaculture

Activist

Kids in Permaculture



permacultureactivist.net
Spring
2008
No. 67
US\$6.00
Cdn\$8.95



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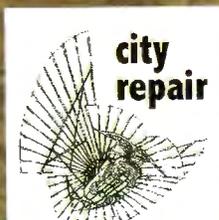
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A Watershed of Youthful Wisdom

Scott Horton

A LONG WITH NOTE PADS, PENCILS, COMPASS, camera, measuring tape, sun hat, and sturdy shoes, I recommend adding a child to your designer's tool kit. Kids are intuitive designers. They are often acute observers of their environment, able to consider things clearly and with an innate reasoning that often escapes those of us who have learned more rationale than genuine logic. In the *Permaculture Designers Manual*, Bill Mollison advises bringing a childlike sense of inquiry to the process of observation: asking ourselves while gathering initial data, "I wonder why...?" instead of drawing conclusions about cause and effect. Kids ask lots of questions and questioning is a designer's stock in trade. When my own process leads to more questions than it reveals answers, I feel that I am on the right track, though having more paths and options than decisive clarity can feel unnerving.

Paying attention to garden faeries

I was recently working on a garden project for a friend with a five-year-old daughter, Viola. I included Viola in the client interviews and asked her lots of questions, although not as many as she asked me. Among other things, Viola is an expert on faeries and has all kinds of information about and experience with them. I asked her how we could design the garden so it would attract faeries and make them happy. She told me about all kinds of plants faeries love—there are rose faeries and columbine faeries, faeries that use plants for houses and leaves and acorn caps for boats; walnut shells for cradles; they ride butterflies and crickets and herd bees; they help make the garden, forest, and meadow more fertile, productive, and beautiful.

Mid-lecture, Viola stopped herself short. "Oh! Oh! Oh!" she gasped. "And we have to have plants so the faeries can make clothes!" I suggested that there was nothing worse than a garden full of poorly dressed faeries, to which Viola rolled her blues eyes and replied, "I know." I admit that at first my interest in asking her about faeries was purely intended to draw her out and tell me what her wants and needs for our garden might be. I realized that thinking about faeries in the garden made me very conscious and considerate of unseen energies and processes necessary for thorough and thoughtful design.

Viola is not short on more prosaic but no less practical information. As we finished talking and left the garden to walk up to the house, Viola suggested we take the winding drive instead of the stairs, probably four to five times the distance. I told her the stairs were shorter and would take us directly to the kitchen, our destination. She replied with a bit of design wisdom

that should be in architecture texts: "No, stairs make it longer." Viola is absolutely right: stairs can make a shorter distance feel longer, plus they deny us the chance to create more edge and enjoy the view a winding path affords.

... stairs can make a shorter distance feel longer, plus they deny us the chance to create more edge and enjoy the view a winding path affords.

A few years ago at the Ecovillage Training Center at The Farm in Tennessee, we were happy to have a few parents and a grandparent taking the design course with small children in tow. Half a dozen kids from ages two to ten stayed the course and added much to the group because we decided to integrate them rather than just relying on ersatz childcare. In addition to participating in gardening, natural building, swaling and other hands-on activities, we assigned the kids their own design project: to create their own ecovillage. The older two kids even sat in on a few classroom lectures and slideshows.

At the end of the course, they presented their design to the group. The kids had paid close attention to the ethics and principles of permaculture and came up with a village design that was well thought out, smart, fun, whimsical, and innovative. They placed their village outside yet within walking distance of where the adults would live. Surrounded by a living fence of berry brambles, elegant pleached fruit trees and plenty of Zone 5 wild lands, admittance was strictly by approval of and accompaniment by a resident child. Adults were excluded during a generous curfew time so the young residents could get on with their lives and business without distraction.

At the center of the kids' village was Seraphina's Dance

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The Permaculture Activist is an independent publication serving the permaculture movement in North America. Our primary goal is to provide information useful to people actively working to establish permaculture systems "on the ground."

Mailing address for subscriptions, advertisements, materials for publication, and all correspondence is Post Office Box 5516, Bloomington, IN 47407. Please see back pages for complete subscription information.

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An ad rate card is available upon request from:
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Please send subscriptions, letters, and material for publication to:
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Bloomington IN 47407 USA
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UPCOMING ISSUES: THEMES and DEADLINES

May #68: Plants on the Move **Deadline March 1**
August #69: Permaculture at Home **Deadline June 1**

Permaculture Activist welcomes your articles, news items, photos, and other materials of interest. Please contact the Editor in advance of your submissions at editor@permacultureactivist.net to request writers guidelines and present your ideas.

Permaculture is a holistic system of DESIGN, based on direct observation of nature, learning from traditional knowledge, and the findings of modern science. Embodying a philosophy of positive action and grassroots education, Permaculture aims to restructure society by returning control of resources for living: food, water, shelter, and the means of livelihood, to ordinary people in their communities, as the only antidote to centralized power. For 25 years Pc has combined top-down thinking with bottom-up action to make a world of difference in over 60 countries. We are everywhere.

Palace (Seraphina was the two-year-old who participated least but loved to amuse the other kids and grownups by dancing and being generally adorable). Seraphina's Dance Palace featured an open floor plan for—what else—dancing. Balconies above provided hammocks and dining areas for dancers who wanted to take time out from the floor to chat, eat, or rest. Up on the roof (which collected rainwater, of course) was a night sky viewing platform with bamboo telescope and a zip line via which young astronomers could fly away from the Dance Palace to various locations in the village. The building sat on pilings in a constructed lake bordered by wetlands that collected grey water from the entire village. A small pier behind the kitchen area of the Palace's first floor allowed villagers to catch the fish they raised and grill it right up or take a boat out on the pond between dance sets.

Dancing, drainage, and design

Houses in their village were shared and took center stage amid lush permaculture gardens drawn in a riot of colored markers and a collage of clipped magazine photos illustrating plants, pathways, and sculpture. The kids told detailed descriptions of the natural building materials and techniques and the rest of us noted that they had "nailed" the principles of passive solar design.

There was a community art studio where the villagers would make ceramics and other crafts for their own use and to sell to visitors and area residents, providing an income source. A Gaviotas-style teeter-totter-cum-water-pump would fill the community cistern with well water during playtime. Water-park style fountains would double as showers for bathing and play with runoff channeled through a Rube Goldberg-worthy water system to the gardens.

The design group even included an airport so they could leave the village from time to time to visit family and friends elsewhere. They placed the runway next to their extensive olive grove so that the plane would have a close and ready source of the oil they designed it to run on.

Play, fancy, and issues of practicality aside, the kids designed a sophisticated model that really paid attention to permaculture ethics and principles in ways that equaled many adult design projects.

Next time you are undertaking site observation or any part of your design project, grab a kid and take notes—you'll be glad you did. △

The kids had paid close attention to the ethics and principles of permaculture and came up with a village design that was well thought out, smart, fun, whimsical, and innovative.

About our upcoming issues

Share your abundant information, skills, and experience by writing for the *Permaculture Activist*. We and the permaculture field rely on the submissions of our readers to create and foster dialog, inspire, and inform, so help care for the Earth, care for people, and share your surplus of ideas and practices by writing for one of our next issues.

Themes and deadlines

"Plants on the Move" will be the theme of issue #68, May 2008, which will focus on how plants move and co-evolve with humans and other animals as we grow and develop. This is a great opportunity for all you ethnobotanists, farmers, gardeners, and experienced plant enthusiasts to share information about propagation, hybridization, acclimatization, grafting, preparation and preservation, ecosystem restoration, bioremediation, and

other relevant issues. Deadline for submissions is March 1.

The theme for August 2008 is "Permaculture at Home." We often get requests to run stories about remarkable permaculture homesites, and this issue will be devoted entirely to model and established projects across the continent and abroad. If you've ever been inspired by a visit to an impressive site—or if there is one you have always wanted to visit and need a reason—now is your chance to share the experience with other readers. Deadline is June 1.

If you are interested in submitting a story or item, check out our Writers Guidelines at www.permacultureactivist.net, and contact us in advance regarding your ideas for submissions at editor@permacultureactivist.net.

One of Our Youngest Rules the Roost

Chicken Mash Layer Cake Midwife Girl

Thorpe Moeckel

MY DAUGHTER RAISES 50 OR SO laying hens as well as a good number of ducks and guinea hens. There are 22 birds in her flock in the yard off the back west eave of the barn. They are two-year-old hens, a mix of Barred Rock, Buffs, Rhode Island Reds, and Aracauna. She ordered them based on appearance and laying capability from the McMurray & McMurray catalog not long after her seventh birthday. There are a variety of bantam mutts out there, too, semi-

"What about a softball mitt?" I asked.

"No thanks," she said.

"A dress?"

"No."

"A doll?"

"No."

I saw it in her eyes: she wanted a fence for her hens, portable and easy to move, so as to keep them in fresh grass and bugs, and to let them fertilize a wider area of ground. The moment shone simple and dazzling. I thought of Delia, our fuzziest barn kitten, pouncing on a grasshopper, chewing it. I thought of the 50 or so migrating monarchs that had been drifting like song in and out of the Mexican sunflowers for the last several days.

It wasn't the first time I'd seen this spark, but rarely had it felt so palpable, so voluptuous and primal. Something, right then, about the link between my daughter and her hens haunted, delighted, and eluded me. I didn't understand it. I didn't need to understand it. I tried to bathe in it, like I bathe in what the river says when it breaks over rocks: with no comprehension yet utter belief.

Kids, by their nature, resist definition. To say you have to raise them to understand them is not saying it right, nor is it true. Even once you know that a big part of raising them is letting them raise you; it is hard to talk about the matter without sounding maudlin.

Growing vegetables and raising animals is the same way; you're better off pouring your friend a glass of fresh goat milk than telling him what it's like to milk a goat morning and night for months on end. Your pal who also milks a goat may as well have a glass, too, because her experience and how she thinks and talks about it will likely be different than your own. Smile and give them both a bouquet and they'll know the deal, your deal, with growing flowers. But serve early spring collards, steamed in gobs of butter, with last winter's salt-cured jowl drizzled over it hot, and they might know the meaning of life.

I was thinking these thoughts the other afternoon as we



Sophie Moeckel with a harvest of eggs and offspring of one of her 50 chickens.

wild and just as full as the purebreds of that curious nobility of manner and plumage that chickens possess.

In her other flock, there are 30 young heritage breed hens and two roosters. Ten ducks—five Indian runner and five buffs—also live there. She keeps this raucous, lively community in spaces defined by a portable electric mesh fence/chicken tractor combo that we just moved to a new spot. After they fertilize the ground there and we move them again, we hope to plant some fruit trees before long. This year, for her ninth birthday, Sophie asked for a portable electric fence with a solar charger. I have to admit this perplexed me.

zipped in our 4-cylinder down I-81. Traffic was the usual hallucinogenic mix, more tractor-trailers than SUVs and compacts combined. We were 20 miles from our home, headed south and about to descend the long hill into Buffalo Creek Valley, in Rockbridge County. It is a beautiful place, even at seventy miles per hour, swerving to avoid a collision.

We were almost back in the right lane when my daughter burst into tears as a semi passed us, its trailer loaded with cages, too many birds to a cage, some of the chickens dead. It was a crowded moment. I don't know what you call what I did. I didn't think about the dead and dying birds. Nothing came to mind about the recent avian flu policy at my workplace or the level of the gas gauge or the hard-working guy driving the semi or the how the semi with its micro-cide of birds served as a banner, flaunting tax breaks for agribusiness. Things felt, suddenly, very tender. I was quiet. I watched the road. I let her cry it out.

This is not a story about highways or driving. This is about my daughter and her chickens and how she and her chickens turn over all my fields, and it isn't really a story. It's about permaculture, too, but that's a big, ungainly word, defined better in practice than in language. I wish I could be clearer about all this, but it is my nature to be clear by being impressionistic. So the wind blows. If whatever I don't know about living on this earth I don't know even more wonderfully each day, then things are going okay.

A constant guide

People who know Sophie know her as a sturdy, sensible nine-year-old who looks a bit like Shirley Temple in the pastoral mode. Her hair is dirty blond and less curly than it used to be, and some days she wears a cloth head covering to keep it all in. She is a good-natured, sensitive kid with a sense of the absurd that seems even more well-honed by the fact that she swore off wearing anything but dresses, preferably homemade ones, at the ripe age of eight.

I don't have any other children, except for the several in me that vie for the spotlight most days. Sophie is more mature and interesting than any of these internal rascals. Her relationship with the world has angered me at times. How often can a guy have his foundation replaced? Truly, this girl has a willful joyousness and vigor, beautiful in its rootedness, that very few people in my experience can match; among them, her mother and an old friend Patrick, a chef and Tai Chi master, who also do not seem to be of this world and yet deeply in it.

So it isn't all proud daddy to say that Sophie is our most constant guide when it comes to the wild waters of family that we, like so many others, navigate. The girl bears a grace that's both innate and cultivated. She knows instinctively, in people and places, when things are amiss and degraded beyond the hurt general to our century. But it isn't all instinct. Sophie attended a two-week permaculture design course with her mother Kirsten for the opportunity to camp and be with new people and then participated in all the lectures and projects, earning a certificate, giving her confidence and helping shape her intuition towards a more fluent sense of the land as a living system. Even now she

loves discovering new guidebooks and cookbooks and people for inspiration and know how. When she's not learning from her chickens or whatever else—playing with friends or jumping on the trampoline or doing schoolwork or reading or doing the

“This year, for her ninth birthday, Sophie asked for a portable electric fence with a solar charger.”

thousand other things a young girl does—she's often dipping into the latest issue of *Backyard Poultry* or *Countryside: The Magazine for Modern Homesteaders* for new discoveries.

There are eggs, of course, daily, beautiful eggs and what dozens we don't eat or barter, Sophie sells. She sells to a co-op, she sells to all sorts of people, and she keeps her earnings in a quart Mason jar from which she draws to buy feed, feed made with the best stuff she can find. Finding feed that isn't made of crap, by the way, is one of the kid's latest projects; naturally, she'd prefer that we just grew and ground it ourselves.

Recently we arranged a deal where we trade eggs for bread from a local baker. He grows as excited for the thick, sunset-orange yolks as we for his *la miche* and multigrain, sourdough and rye, all made from the finest unbleached flour. Taking eggs to Alex is as satisfying as bringing the bread home for Kirsten and Sophie. He opens each pack, less to inspect them than to ingest the sensuality of their color and form, as subtly different from day to day, egg to egg as the weather and changes in air pressure, the timbre and density of the garden and woods.

This all reminds me of the time I needed Sophie's help with something and found her in the chicken house. It was cold. She was bundled in parka, facemask, hat, and mittens. The ground was frozen. I stood by the door and saw her squatting to pet a chicken in a laying box. “What are you up to?” I asked.

“Bonnie's laying,” she whispered.

I watched Sophie and the hen a while. The one eye of the hen I could see seemed to be looking both through and at the things there were to see—waterer, feeder, roosts, laying boxes, shafts of light, shadows, hay. Sophie continued to rub her hand down the chicken's head and over her back. It was quiet in there. I remembered a poem by Baron Wormser, a Maine writer. I hadn't thought of it in a while.

"A Quiet Life"

What a person desires in life
is a properly boiled egg.
This isn't as easy as it seems.
There must be gas and a stove,
the gas requires pipelines, mastodon drills,
banks that dispense the lozenge of capital.
There must be a pot, the product of mines
and furnaces and factories,
of dim early mornings and night-owl shifts,
of women in kerchiefs and men with
sweat-soaked hair.
Then water, the stuff of clouds and skies
and God knows what causes it to happen.
There seems always too much or too little
of it and more pipelines, meters, pumping
stations, towers, tanks.



Home made natural building, Sophie-style, for the brood's temporary indoor stay.

And salt—a miracle of the first order,
the ace in any argument for God.
Only God could have imagined from
nothingness the pang of salt.
Political peace too. It should be quiet
when one eats an egg. No political hoodlums
knocking down doors, no lieutenants who are
ticked off at their scheming girlfriends and
take it out on you, no dictators
posing as tribunes.
It should be quiet, so quiet you can hear
the chicken, a creature usually mocked as a type
of fool, a cluck chained to the chore of her body.
Listen, she is there, pecking at a bit of grain

that came from nowhere.

The poem, which I love for many reasons, I loved even more for what it now so glaringly left out—any consideration of the person who keeps the chickens and how the chickens are kept. Sophie looked up. Her face reminded me of nothing but her face. "I do this a lot, daddy," she said, her breath visible in the cold. "I like to play chicken midwife."

Later, I thought about the title of Wormser's poem and how gently it prepares readers for the reckoning with quiet the poem dramatizes. "This isn't as easy as it seems," the poem says of boiling an egg before it blasts instructively a braided litany of the industrial and spiritual realities underpinning the manufacture of energy. Wonderfully, the poems works through all this astute and mouthy mental-politico-mystical-social realm, to its physical, image-based ending—chicken and grain—that enacts a quiet all the more quiet and palpable for the struggle, the shifts of mind and thought and perspective it has entertained and endured.

There is very little quiet about Sophie's life with her chickens, and yet there is so much quiet about her life with her chickens. I don't know which statement contains more truth. They are both true, the way saying despair can be more quiet than joy is not untrue. I know this much: Sophie, Kirsten, and I, we all get fired up about the eggs. I can't help but to sing badly and loudly sometimes when I'm cooking them or holding them or sawing an old fenceboard to build another nesting box. Once—this must have been in a dream—I witnessed Kirsten and her mother standing over a loaded skillet, describing the color of the yolks. Fire, Kirsten said. Turk's cap lily, said her mom. This went on. Pumpkin, one said. Tangerine, said the other. Autumn, I say now, trumpet vine, gravity, brook trout roe.

Quiet or not, Sophie's time with her chickens can get wild. She has been pecked in the eye by a broody hen, crapped upon, spurred by Dinosaur, a feisty old Brahma rooster that later she helped me pluck and gut before she sliced the onions to enrich the broth of its stock. She has heard the cock fights and hen pecks of her parents' arguments about this and that. She has found chickens in various states of disrepair—victims of opossum, fox, and hawk. She has shined the light as I shot at an unlucky opossum returning, perhaps, to again rip the head off a chicken without having the decency to eat it.

And Sophie has boiled eggs, painted faces and flowers and butterflies on eggs, hid and hunted eggs, and dropped eggs on her way back from the barn. She has fed cracked eggs to our hogs, our dog, the barn kittens, the housecat, and the chickens' themselves. Most every day she feeds the shells to the garden via the compost and to the delight of many through the flowers and vegetables raised in soil made rich by that compost.

There was a day in August. Sophie was in the chicken yard. The air was hot and dusty and still. I had taken a break from gutter repair to see what she was doing. The girl was up to something—I could see it in her face, sweaty and red, as she

dipped an old coffee can in the barrel that collects rain from the roof. A storm cloud cauliflowered over Purgatory Mountain, just to our west. Bugs hummed. Chickens strutted. I could sense my kid's awareness of these things in the easy, intent way she carried the full coffee can, stepping between birds, to an old wooden crate she'd stood bottomsides up.

There was a handleless frying pan on the crate. I recognized the pan from some cobwebbed nook of haydust and woodscrap

There are eggs, of course, daily, beautiful eggs and what dozens we don't eat or barter, Sophie sells.

that are indigenous to our old log barn. Sophie poured a bit of water over the layer mash in it. There was a stick leaning on the crate and she took it and looked around a minute, pausing to watch Rambo the bantam rooster chase Abner the big rooster in a comedy of manners as much as scale. Eleven and a half thousand other things were happening and not happening. A hen clucked. The fence hid in weeds and grasses. I had a sudden hunch, not entirely whimsical, that I was present at the origins of *noh* theatre, the Japanese form that embodies transience and quiet elegance, where the stage is simple and the actors never rehearse together.

Sophie lurched then. The commotion, among the other commotion, was sudden, strange, and inevitable, like an old take on a new idea. "Be patient, Greyledge," the child clipped as she shooed a big barred rock away from the pan of mush she was stirring with the stick. Greyledge twirred. I smiled. Sophie grinned, resumed her stirring. Why do chickens always look so endearing and ridiculous I wanted to ask, but my daughter was in a groove. I wouldn't bother her with Chicken Appreciation 101. No need to consider, out loud, the way a chicken's head pistons on its neck, the chest puffed out, the strange boots of its legs, what it must be like to have wings, very beautiful wings, and yet spend so much time on the ground.

Sophie kept at it. She picked some honeysuckle leaves from where the plants grew along the fence. They were dust-covered, leathery. As she ripped the leaves into fine pieces, she hummed a song I didn't recognize, a sort of hymn. I fell into rhythm with it. Her voice was natural and wonderfully unpolished; in it somewhere I heard all the chickens on highways and in restaurants, barns and kitchens, warehouses and backyards. I wondered if there were more of these birds at any given moment than humans on our continent. It was a weird moment, spreading its paint somehow on all to come. What she was really singing for, I don't know, but it probably had something to do with the

day and the life and the birds and the gift she would soon offer them, a layer mash cake with an icing of shredded honeysuckle leaves. Whatever it was, I was glad to hear it. The chickens seemed to like it too. △

Thorpe Moeckel lives with his family on a small farm in western Virginia, where in addition to vegetables they raise chickens, pigs, sheep, goats, and ducks for food and fun and soil health. His books of poems are Odd Botany (2002) and Making a Map of the River (2008).

A Note from Sophie's teacher

When Kirsten Griffith signed onto my permaculture design course in Floyd County, Virginia two summers back, I knew I was in for a treat. She brought together a great background in international development with her own gutsy love of farming the Virginia hills north of Roanoke. She also brought her daughter, which as I came to appreciate, was the greatest delight of all.

When Fred Carter had showed up eight months earlier at my 2005 course in Owen County, Indiana with his 8-year old son Akin in tow, I rediscovered just how agile the 8-year old mind can be as the adults in the class got impromptu lessons in solar energy design and environmental ethics from their young tutor. So when Kirsten asked...I was pretty well primed to invite a young student to sit through the class.

When Sophie showed up for every session, taking careful illustrated notes that she invited me to review, I was more than intrigued, and when she debuted in a shimmering, full-length blue chiffon gown as the water princess in her team's design presentation, I knew the future was going to be an interesting era. As I've long maintained, the design course isn't graded. People from all walks of life sit through it, and who can say what they will do or where they will go? Sophie earned her certificate those two hot summer weeks on Free State Creek, and Dr. Lee Barnes and I were honored to award it to her. —Peter Bane △



A Permaculture Parable

Ruby Kay: The Accidental Permaculturist

Scott Horton

WE'VE ALL BEEN ASKED TO GIVE a presentation explaining permaculture to the un- or semi-initiated; thinking of what to do can be a real challenge. How do we effectively explain something that takes a minimum of 72 hours for us to grasp just the beginnings of the basics? How can we make sure an allotted 30-60 minutes holds interest and contains a compelling call to action for an audience or classroom? The difficulty can be compounded when talking to children: reciting laundry lists of ethics, principles and examples can cause even the most attentive to fidget and fade.

I had done talks, slideshows, garden walks, panel discussions, Q&As and other formats, always feeling that the success of "selling" permaculture eluded me. A few years ago when asked to talk to the local garden club, I decided to abandon dry lists of ethics and principles and the slides that illustrated them. Instead I told a story inspired by a woman named Ruby Kay.

**She is everyone's gardener
grandmother, or a
benevolent, no-nonsense
Auntie Mame of the
outdoors.**

The story of Ruby Kay, the Accidental Permaculturist, seems to interest listeners because Ruby Kay is based on a real person who embodies values, virtues, and characteristics that remind us of archetypal elders many people have known or known of. She is wise in her practicality, deeply engaged in the world of humans and nature, and clearly enjoys solving problems in elegantly efficient ways. She is everyone's gardener grandmother, or a benevolent, no-nonsense Auntie Mame of the outdoors. After telling the story, I invariably get comments like, "I had a neighbor when I was growing up who gardened like that and the story took me right back there." Or, "I think this is the way most

people used to think about and do things." Or my favorite, "Wow, permaculture sounds like a lot of common sense."

When I tell the story to kids, I invite them to think about and propose solutions to Ruby Kay's problems before telling how the horsewoman solved them, hopefully instilling the beginning threads of design process in my listeners. By the end of the telling, our ethics and principles have been covered without my having mentioned the word permaculture. I give handouts of suggested reading and links so that people can continue the process of inquiry Ruby Kay and I have hopefully sparked.

As I have told the story over the years, it has grown, organically of course. I can't resist adding a little seasoning here and there and have incorporated details from others' stories, lives, and experiences with affectionate gratitude for the fact that I stand happily on their broad and sturdy shoulders. But it remains Ruby Kay's story at heart, so take it to yours feeling free to retell it and add details of your own gleaned from inspiring people you have known.

Ruby Kay the Accidental Permaculturist

Ruby Kay is a woman I know who lives in the high desert of southern California. I first met Ruby Kay when I needed worms for my garden after I moved to Southern California—she raises them. She and her husband retired there 12 or 15 years ago from a tract house in suburbia where they had lived for many years raising a family and working nine-to-five jobs.

Now there are three things you need to know about Ruby Kay:

1. Ruby Kay loves horses.
2. Ruby Kay hates to waste anything.
3. Ruby Kay makes just about the best pie in Riverside County.

Horses are the reason Ruby Kay and her husband moved to the country to begin with. She had been around them as a girl and felt blessed enough to have two that she had boarded for many years while living in the suburbs, caring for them and riding them on weekends and evenings as often as she was able. But now it was time for Ruby Kay's two horses to have a home with her and her husband, and she planned to spend all their new spare time riding and grooming and relaxing. Ruby Kay and her husband

bought 40 acres with a small mobile home in the yucca and juniper-dotted landscape of Riverside County.

But Ruby Kay had just one problem. The desert is hot and bare and the horses had no shelter to protect them. Ruby Kay set about deciding what kind of stables would be best for her horses. She looked at catalogs, spoke to other horse people and her boarding stable and found stock plans, but none of the options was right. Most were made of cold aluminum, vinyl, and other manufactured materials, were expensive, and would not fit in with the landscape. "Whatever happened to a good old fashioned barn?" Ruby Kay wondered to her husband.

Not long after, Ruby Kay was driving through the landscape and she noticed there were sheds, outbuildings, and barns on neighbors' land that were either not being used or falling down. Since she hated to see anything go to waste, Ruby Kay thought what a great idea it would be to approach her neighbors and ask if they wanted the buildings cleared at no cost in exchange for her and her husband using them to build stables. Not only was it a great ice-breaker to meet the new neighbors, but Ruby Kay soon had collected several small sheds and a lot of fencing. She and her husband reassembled the materials into a little stable village not far from their house with plenty of room for her horses, a paddock, a tack room, a water trough made from an old claw-foot bathtub, and space for several more horses. "Just in case," Ruby Kay told her husband. They painted the little horse village barn red and it fit the landscape and the needs of Ruby Kay's horses like a well-used feedbag.

Starting small and at the beginning

But Ruby Kay had just one problem. As cozy and shady as her horse village was, it was still hot and dusty out on the land when she rode her horses. So Ruby Kay decided to plant trees to provide shade. She had been an avid gardener and cook her whole life, learning from her mother and grandmother the joys and benefits of growing food at home, and she thought what a great idea it would be to have little islands of vegetable gardens surrounding oases of trees throughout the landscape. Ruby Kay didn't want just any trees. "Why plant more junipers or cypress or poplars that will just look pretty and provide shade; let's plant fruit trees," she told her husband. Using their favorite pie recipes as a guide, Ruby Kay sat down and planned what kinds of fruit trees they would plant. She studied catalogs and talked with other gardeners in Riverside County and came up with a plan that would include trees that would produce all kinds of fruit from early spring through late fall.

Ruby Kay looked at the landscape and decided to plant the trees in natural hollows which she noticed collected rainwater and where native plants seemed to flourish. She and her husband dug the hollows a little larger, hoping they would collect more water and in time become more fertile and productive. The first year, Ruby Kay and her husband planted a couple dozen trees—apples, pears, cherries, plums, almonds, peaches, nectarines, and others. Each year following they planted more trees, and now they have more than 200 fruit trees peppering their 40 acres of land. With good mulching and in time, Ruby Kay was able to

plant vegetable gardens around the trees, only having to run water from a hose in the warmest weeks of the summer. Soon her kitchen, pantry, closets, and even shelves in the tack room were full of jars of fruits, preserves, pie fillings, vegetables, soups, and



Care for her horses led Ruby Kay to embody what we know as the ethics of permaculture.

sauses; her freezer was full of pies, and the horses were happy with snacks of apples, carrots, and other produce. Neighbor kids flocked to Ruby Kay's land to play after school in the greening landscape, to visit the horses, and to chat with Ruby Kay and her husband.

But Ruby Kay had just one problem. Soon there was much more produce than she, her husband and the horses could use. She had begun giving neighbors and church-members baskets and jars of goods from her garden until many said, "Thanks Ruby Kay, we love your gifts from the garden, but we haven't used up the last batch you gave us!"

So Ruby Kay decided to sell her surplus produce at the local farmers' market. Buyers loved the fresh produce from the crazy horse lady who had transformed desert to garden and, as you can imagine, her pies and preserves sold quickly as word spread and demand grew. She bartered her produce for goods from other

growers. Soon Ruby Kay was making enough money to be able to buy hay and straw for her horses and before long, she decided to buy two more horses retired from a neighboring farm.

But Ruby Kay had just one problem. As her horse farm grew, so did the pile of manure behind the horse village. She was using as much as she could mulching and fertilizing her fruit tree garden oases, and she hated the thought of wasting it and of spending the money to have the manure hauled away to the dump. Ruby Kay's husband suggested they start a worm farm using the manure as a growing medium. "You could sell the worms and their castings at the farmers' market—have you seen how much a bag of worm castings costs at the nursery, Ruby Kay?"

"Ruby Kay had just one problem . . ."

So Ruby Kay's worm farm was born. She and her husband laid out neat mounds of horse manure and connected gutters from the house and horse village roofs to collect rainwater in a tank to water the worm farm with a simple drip irrigation system. They placed the worm patch right behind the horse village next to the drive so they wouldn't have far to schlep manure or worms from barn to worm patch to garden. She began to sell worms and castings at the farmers' markets and from home. When visitors and friends come, she proudly pitchforks open a mound to show the writhing red bundles of worms her horses' waste supports.

But Ruby Kay had just one problem. With her gardening, worm farming, cooking, and market duties, she had no time any more to spend with her horses. So she decided to offer part-time work to neighbors' teenaged children, teaching them how to care for the horses and ride, how to tend the gardens and the worms, can fruits and vegetables, and eventually to take over a few farmers' markets for her. Ruby Kay now had time to ride and enjoy the fruits of all her and her husband's hard work. It seemed like Ruby Kay had solved all her problems and could now really begin to enjoy her retirement.

But soon Ruby Kay had just one problem. A few of the neighbor boys who used to play in her gardens had grown into teenagers and had been given dirt bikes for Christmas. It seemed to Ruby Kay that they spent endless hours riding up and down the dirt road that bordered her land, raising dust, making noise, and annoying her and her horses relentlessly. She tried talking to the boys, then yelling, knocked on their parents doors to plead with them to stop the dirt bikes, and she even called the sheriff. They all said,

"That's what boys do, it's a free country and our private road, too, so you will just have to get used to it." Ruby Kay was infuriated. She and her husband had worked so hard to create their own peaceable paradise to enjoy and share and it just didn't seem fair that the quiet and tranquility could be destroyed by selfish, rowdy kids.

One particularly hot and dusty day, Ruby Kay snapped. She had had enough of the boys' noise and lack of consideration. She was halfway from the horse village to the road where they were riding and she stopped short. It suddenly occurred to her that perhaps in order to deal with the problem, she really needed to understand it. She continued to the road and called the boys over to her. "I just want to talk to you for a few minutes, I promise not to get mad, please just hear me out." The boys slowly walked over to Ruby Kay with "guilty" punctuating their faces and posture. "You boys used to love to play in the garden and pet the horses before you began riding your dirt bikes," she said. "And it occurs to me that I really don't get what is so all-fired exciting about riding these motorcycles up and down the road all afternoon. So I want to ask you what it is you like about it?"

Common reasons, common ground

The boys thought for a moment, clearly thinking this was a trap or trick question. Then the youngest spoke up: "It gives me a feeling of power." Another joined in: "I like being outside and so close to nature." The third concurred: "I like feeling the wind fly around me when I go fast." "And the sunshine," the first added. Ruby Kay suddenly got it. "I think I understand now, because these are some of the same reasons I like to ride my horses." The boys offered her a turn on the dirt bikes and while she didn't think she would repeat the experience, she did have to admit that it was quite a thrill speeding through the land. She, in turn, invited the boys to ride the horses from time to time. While the boys didn't give up their dirt bikes, they did ride the horses often. Ruby Kay was able to check her blood pressure when they were on the bikes by remembering their kindred reasons for their respective interests. In time, the boys grew up and moved away



to begin their own adult lives. The sounds and dust of the dirt bikes became a memory and Ruby Kay was able to get back to her busy peace and quiet.

But Ruby Kay had just one problem. The boys had worn deep ruts in the dirt road on the hill above her gateway. When the winter rains came, they washed the ruts into gullies making the road a muddy, gravelly, dangerous mess. Ruby Kay and her husband considered paving their stretch of road but hated to

It is one of the haikus of entitlement our Western culture has created and seems to buy in bulk.

waste the money and run the risk of inviting more and faster traffic on their little-traveled drive.

Ruby Kay thought what a waste the runoff water was, and a plan emerged: they repaired and graded the dirt and gravel road so that it channeled the water slowly and gently beside the road to a drainage ditch ending in a small but deep little pond below the gate within view of the house and horse village. Ruby Kay planted water iris, rushes and juncas, cattails, lilies, cress, water chestnuts, native willow, and more plants in and around the new little pond. After a few seasons, birds were flying, looping, and twittering around it, dragonflies perched on leaf tips, and frog song filled the evening air. The land and home seemed nearly perfect now to Ruby Kay and her husband, who had spent a dozen years solving problems by working with the land.

But Ruby Kay had just one problem. She and her husband were tired from all their work creating abundance and community.

So Ruby Kay and her husband hired an unemployed carpenter neighbor to build them a little gazebo on the banks of their new pond, where they would sit on cool evenings talking, holding each other, and enjoying the view of the land they had together helped to transform. They shared memories of the friends they had made and stories about the kids who had grown up before their eyes, while eating some of Ruby Kay's pie.

And this was just about the most delightful solution to Ruby Kay's one problem she and her husband ever came up with.

That's the story of Ruby Kay, the Accidental Permaculturist, who, through common sense and a desire to create harmony and abundance cared for the Earth, cared for people, and shared what she learned and produced. But before I leave you, I want to say one more word about pie.

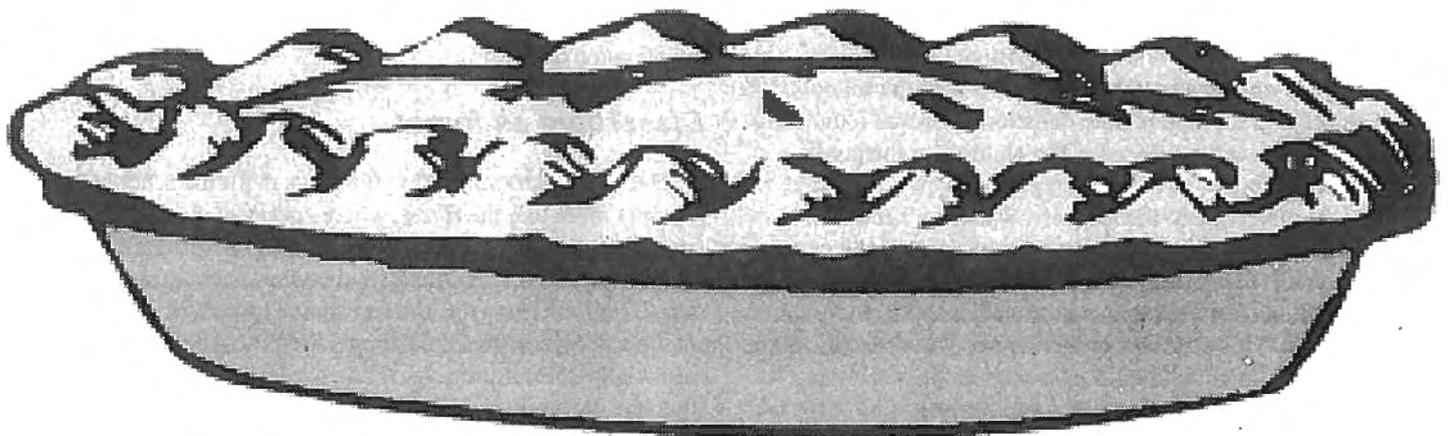
We are all familiar with the expression "I'm gonna get my piece of the pie." It is one of the haikus of entitlement our Western culture has created and seems to buy in bulk. It is as if we somehow believe that because of accidents of birth and privilege, the world somehow owes us a share and a stake in the sweet and satisfying. But consider if we had one of Ruby Kay's pies to cut up and share among just the readers of this story. How big would each piece be and how satisfied would each of us be with our sliver?

That's our just one problem at hand. So what's the solution? Make more pie.

Permaculture is about making more pie, and by embodying the ethics and principles we become more concerned with making our own piece of the pie and sharing it, than about our entitlement to others' pastry.

So the next time you have just one problem, think about how Ruby Kay might go about solving it and make some pie. Δ

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May the Circle Be Unbroken:

The School as Ecosystem

Sam Dunlap

It's a chilly autumn morning at the school garden. The second group of garden helpers for the day is Ms. Daniel's kindergarten class. Gathered around the circle, we stand for the lesson because the cold, wet straw bale seats are less than inviting. Shivering, one of the students exclaims, "Maybe we should go to the compost pile to warm up!" The comment alone is enough to warm me. I share this youngster's fascination with the heat produced by a pile of cafeteria leftovers. Hearing that association from the mouth of a five-year-old makes the work we're doing feel like it's having an effect.

Classroom in Bloom is a small non-profit started in 2005 in the Methow Valley of north-central Washington. While school garden programs are flourishing around the country, there are a couple of things that make Classroom in Bloom unique. One is that it is in a rural location. The Methow Valley is nestled in the foothills of the North Cascades, where summers are dry and winters are long. There is a long history of agriculture in the area, which is beginning to change, as developers knock and second-homers flock. The Classroom in Bloom garden exists as an oasis on the school campus, situated between the elementary and high schools.

Also interesting about Classroom in Bloom is that it is financially and organizationally unaffiliated with the schools. It is funded through grants and private donations, but was founded to enhance the learning experience of the children in the public school system. Classes of children in grades K-10 come out to the garden at the discretion of the teachers, who have been consistently receptive since the start. For this reason, the program is a good model for building ties between established institutions and organizations that seek to integrate sustainable practices into the mainstream. This could be applied in many settings, including schools, nursing homes and assisted living facilities, prisons, children's homes, private companies, and beyond.

At Classroom in Bloom, we think of the school campus as a system. As such, it is a microcosm of the Methow Valley, which

is a microcosm of our society as a whole. All of us work in this pattern of concentric circles. Working with children at the school, and with the help of groups and individuals acting toward sustainability in other communities, we hope that the effects of what we teach will ripple outward through these circles.

One of our goals is to have the school system look more like an ecosystem. In nature, energy comes from the sun and all resources are recycled. There is no waste. The by-products of one element of the system become the food of another. Fallen leaves and dead trees, for example become the feast of bacteria, fungi, worms, actinomycetes, and many others, which turn the forest remnants into the nutrient-rich soil that sustains plant growth once again.

How does the school ecosystem function? Resources tend to move linearly, with both source and sink existing outside the system. Energy comes in. Food, electricity, paper, manufactured goods, the students and teachers, all arrive on campus. The transportation of all of these is dependent on ancient sunlight in the form of petroleum that is extracted from distant lands. On the other end, waste leaves the system. Paper, plastic, food waste, other garbage items, and sewage

are all taken away.

Classroom as forest

One of Classroom in Bloom's goals is for the school to function more like the forest, where energy comes from the sun and all resources cycle rather than moving in a straight line from source to dumpster. Growing food on the school grounds is one step. Using the energy of the sun and of 14 classes' worth of students per week, fresh, nutritious food is brought to the cafeteria petroleum-free. As we do garden chores with the students, we work to educate them not only on the ecological value of growing their own food, but also on that food's nutritional and health value. Healthy bodies and minds are



School-grown snacks from the garden look almost too good to eat.

essential to creating healthy communities.

This fall, one group of students in each class would spend garden chore time in the "Sensory Kitchen," a room in our new shed, where they would prepare simple raw food arrangements that displayed as many colors as possible. At the end of the period, they would share this food with their classmates and explain to them the nutritional values those different colors represent.

This fall also represented the biggest harvest so far. Food grown on site went to the cafeteria, where it was incorporated into the menu as needed by a very cooperative lunch staff. Onions, potatoes, and carrots disappear steadily throughout the winter from their home in the walk-in cooler. Students and teachers seem equally excited about the garden-fresh food that comes out of the cafeteria.

On the waste side of the ecosystem equation, this fall marked the beginning of our composting program. Starting on a once-a-week basis, all food waste and napkins from the kitchen and both school cafeterias, as well as all coffee grounds from two local bakeries, are collected and taken to the compost "pit" at the Classroom in Bloom garden. So far, the biggest collection day yielded 180 pounds!

The compost pit, dug two feet down for winter insulation, is filling with layers of green matter from the garden, lunch scraps (including meat and milk), coffee grounds, straw, manure, and soil. And it's heating up, as testified by the cold-fingered kindergartener mentioned above who wanted to bask in its warmth. As I stand in the cafeteria on Wednesdays, telling kids what can and can't go in the compost, I make sure to remind them that what they're tossing in the bucket now will grow next year's lettuce and carrots.

We are hoping to keep the compost process going through

food scraps through the several feet of snow to the pile. We are considering sleds, snowshoes, and shovels.

Other winter activities include going into the classrooms once a month to do various things, from teaching about local food



systems to making worm bins and starting mushroom kits. The summers, when students are out of school, are limited to garden maintenance, and have also included a free garden series open to the community, in which guest speakers give lectures and demonstrations about various aspects of gardening.

School systems thinking

These programs are steps toward making the school function more like an ecosystem. But the school exists within the larger context of the Methow Valley, which may also be seen as an ecosystem. As in nature, there is an order in which micro-ecosystems are nestled within larger ecosystems. For this reason, we are constantly seeking to extend Classroom in Bloom's efforts further into the community. It is part of an effort to view the valley in which we live as an integrated system, and to pursue as many ways as possible to make this system a closed loop, where resources are generated, used, and recycled within the community. To this end, we are forging links with the Kiwanis Club, who recently built a beautiful new shed at the garden, a new local radio station, whose staff are excited to air our "sustainablips" (short messages about sustainability), the above-mentioned bakeries which collect compost for our garden, and a tree service, which donates load after load of wood chips.

We convey the concept of the school as an ecosystem to the kids through teaching in a hands-on style, so they can experience what we are talking about. In this vein, the "circle," the gathering space within the garden where we begin and end each class, is an extremely valuable part of what we do. It is a space to hear and to be heard and is representative of the ecological cycles that we

"Maybe we should go to the compost pile to warm up!"

the winter. In addition to the insulation the pit provides, the pile is covered by a greenhouse door, which slopes down from the back of the pile to the front at a steep enough pitch to shed snow. This door hinges at the top from a post-and-beam support, and is surrounded by straw bales to keep it as warm as possible inside. On a recent zero-degree morning, I lifted the door to find the compost thermometer reading 130°F (55°C)! It seems the main obstacle will be not the freezing temperatures, but getting the

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teach about.

A final aspect of the school ecosystem, which does not appear in the forest, is the flow of ideas into and out of the system. We hope that the lessons and ideas the students receive from the garden will inspire them with more ideas and creativity to carry our efforts beyond the school grounds to their homes and other places and communities. May the circle be stretched and strengthened. Δ

Sam Dunlap lives in Winthrop, WA, where he works in native plant restoration and garden education. He teamed up with Lexi Koch and Anaka Mines, Classroom in Bloom's founders, in 2007. He can be contacted at sam_dunlap@yahoo.com.

*This article has been adapted from a version that first appeared in *Sustinere: A Practical Journal of Sustainable Community*, a publication put out by The Partnership for a Sustainable Methow (www.sustainablemethow.net).*



Teaching and Learning from Children

Permaculture Education Comes Home

Rhonda Baird

TEACHING PERMACULTURE—sharing knowledge of permaculture and the life-skills necessary to implement it—has been the domain of adults. It is completely understandable that people, looking around them and assessing the grave situation of the modern world, would focus on sharing what they saw and continue to see with other adults. The permaculture movement needs this. And yet, there are others now, who look around and say, “What about the next generations?” Parents ask themselves what skills are most important for my child now and into the future? Those who lean toward environmental education wonder how to incorporate permaculture into their work.

Finding a niche, answering a calling

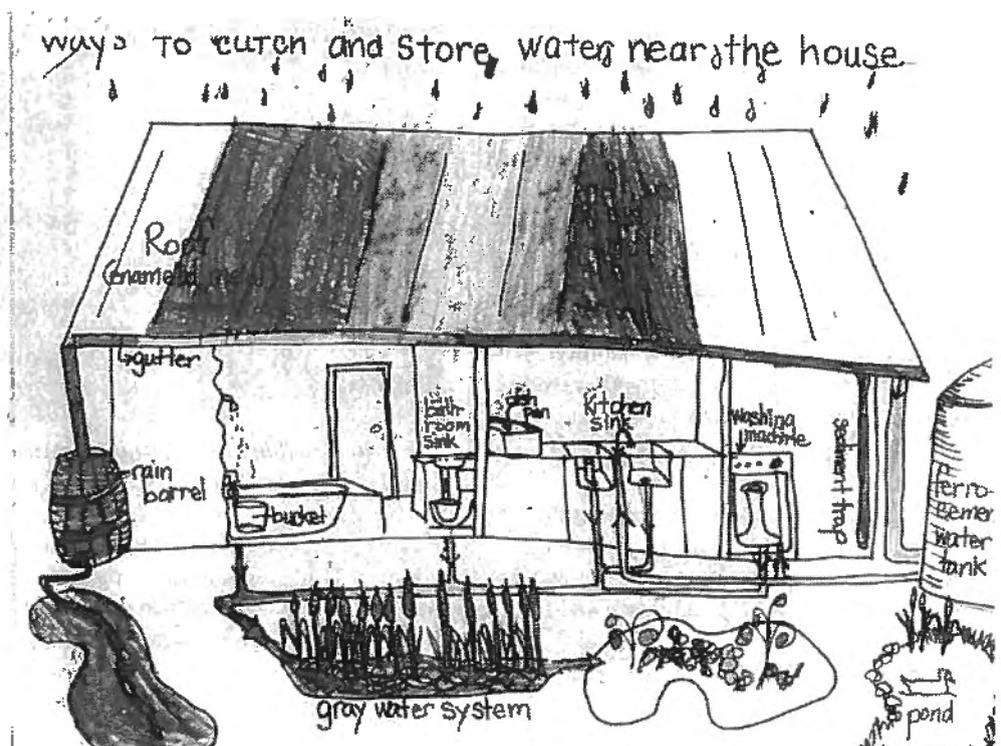
The details of what I have been doing and how I came to offer a year-long and then a semester-long permaculture course seem a bit dry compared to the experience of teaching children, but understanding how I got started might be helpful to some. I fell into teaching permaculture to children backwards, almost out of necessity. Like most work done in permaculture, though, it grew organically out of the needs of the community and my own sense of abundance.

About a year after I took my own permaculture design course and committed to learning how to become a teacher, I decided to homeschool my daughter, Maya. I couldn't stand by and have my daughter spend every day in the care of teachers and other children that did not share our family's values and who might push her in the direction of the mainstream US culture. Instead, I joined a tiny Waldorf-inspired cooperative driven by myself, a forest economist, and a mother running an organic clothing company. Each mother taught a course for the other's children each week, and the other mothers encouraged me to teach permaculture to the children. There was an exchange of energy, but money was not part of the model. That year, I modified the usual organization of the traditional design

course to meet the educational needs of kindergarten and first-grade aged children, and I used Waldorf-inspired techniques for organizing the sessions. Tackling such big topics as water and biogeography made me nervous, but we had an entire school year to explore. The results were amazing. The children were active and engaged. They asked great questions, and we had a lot of fun together.

Starting small and growing

The second year, because of scheduling, I shortened the course into thirteen weeks and taught permaculture to children in the broader homeschool community. Initially, I requested a fee for each child, but found that the homeschooling community culture was very limited in its resources. As a relative outsider, parents were interested in permaculture, but not willing to pay what I initially asked. Also, I think a certain amount of independence found in homeschooling parents prevents them from participating in a class that isn't seen as essential to their child's education. Who can blame them? One of the lovely things



Maya's home water system design.

about homeschooling is the ability to structure the child's time and learning according to their or the family interests. For the coming spring, I've committed to teaching a four-week course for third- and fourth-graders and at least one one-day format for parents and children in my community.

Observation is a natural daily occurrence with young children. . .

Beyond the homeschool community where I live in Bloomington, Indiana, there are many people, including friends and colleagues, doing important work with children in public schools. That work is vital. In this era, our society is not set up for parents to stay at home and homeschool or otherwise educate their children about permaculture. So some form of nature awareness is needed in the schools. However, the work done in the local schools is more about basic environmental education or school gardens. Nutrition is a key component of the work. There is a need to bring permaculture design and skills into the conversation of the educational community, and I believe it needs to start by empowering families to make changes in their homes. It is ultimately up to parents to determine which values and educational components they believe are important for their children and to ensure those components are included in their own education of the child.

Bloomington, a progressive, university island in the sea of conservative Indiana, has several layers of wonderful community—many of them attempting to move toward sustainability. Action is taking place among neighborhoods, city appointed commissions, non-profits, and individuals. Amidst all of this, the homeschooling community here is a mix of religious and political beliefs reflecting the surrounding county. Most active parents in LEARN (Life Education and Resource Network), are very interested in permaculture, both for their children and for their home situations.

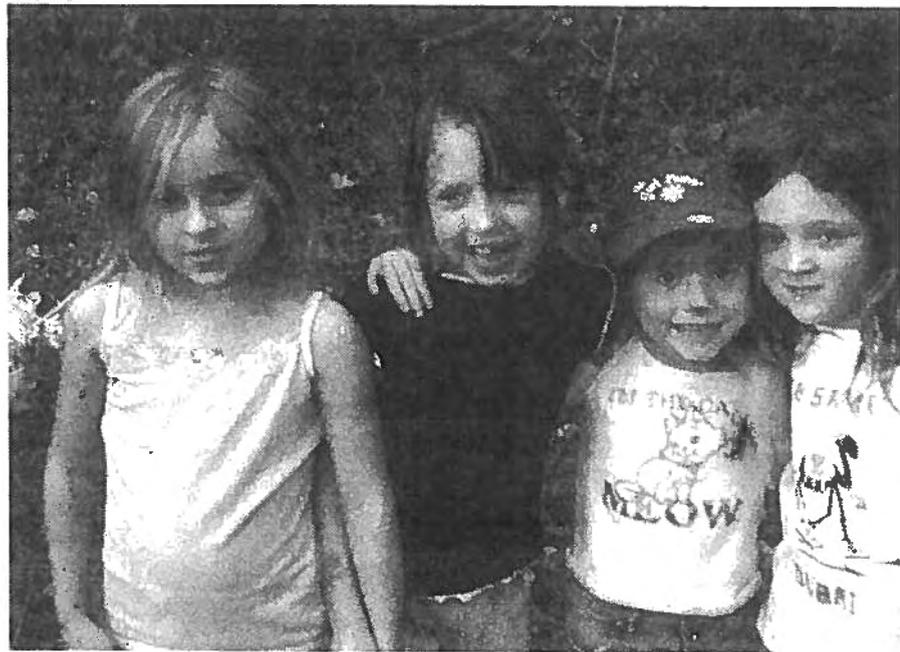
Within or closely connected to LEARN are a number of other homeschooling families that ascribe to Waldorf principles in their parenting and education. Because I knew I wanted consciously to

explore Waldorf as an approach to educating my daughter, I was very keen to connect with this part of the community. The richness of the relationships and the depth of experience I gained from working with this approach to education became the key to how I structure and present permaculture to children.

I use imaginative retellings, stories from around the world, songs and circle time in the structure of my courses with younger children. I also use a lot of outdoor and experiential activities with them. Each child completes a design book using materials suggested for that age-group in the Waldorf-based systems. I find that the children, whether they are used to these practices or not, become engaged in the process of creation stimulated by the setting.

How it should be done

Teaching children permaculture, one quickly realizes this is how it should be done. Permaculture should be a way of being that evolves from the community with the stirrings of the child's imagination. The breakthrough from denial into action that is such a wonderful catalyst for design courses, the hunger that adults exhibit to know more, is a separate thing from children's experience with permaculture. Children should be experiencing the world through the permaculture lens from their first steps in



Sharing teaching and learning resources in homeschooling promotes friendships and bonds and brings children and families together.

formal or informal education. Children who are allowed to integrate themselves more completely with nature and to experience the surrounding ecosystems routinely seem more facile with permaculture as a subject. They grasp the deeper meaning of the stories. They sense the importance of their place in the world as future gardeners and restorers of a landscape and community in need of healing. The work of childhood—to learn

how the world works and to find one's place in it—is the foundation for design work. Adults taking a design course often have to re-configure their place in the world and their own responsibility for the situation in which they find themselves. They also have to fight against the mainstream society's messages they've been exposed to and imprinted on for years. While many adults find this freeing, for others it continues to be a major challenge to implementing permaculture in their lives.

Younger children are learning the basic rules in life—how to share, how to play fairly, how to ask for what they want, and how to take care of themselves and the world around them. This translates very easily to the core ethics of permaculture—earth care, people care, and fair share. It also sets the children up for practical work with these ethics. What do you do when you have so many people and so much water in an area? What about the animals and plants? What might be a solution? Children get it. Their answers to difficult questions are not so different from adult answers. They just often cut through all of the “awareness” adults have of current acceptable policy. They begin by doing what children do best—paying attention.

Observation is a natural daily occurrence with young children, but to deepen that practice and to have them consciously work with the patterns of the natural world and the behavior of animals and plants around them is one of the true joys of teaching children. In the courses, I've been able to cover most of the subjects presented at a full design course but some of the lessons at which children seem particularly apt include: patterns, ecosystems, biogeography and climate, interdependence, energy, water, soil, and forests. It is so exciting to see children recognize, appreciate, and include natural patterns in their artwork throughout the class. At a young age, many are able to experience individual phenomena of the natural world and appreciate the detail, but they are also beginning to compile complicated understandings of the natural systems that support the world around them. They begin to see the strings in the web of life. They are also very much interested in the invisible worlds that support life—the soil, forces of climate, and derivation of all energy from the sun.

Creating new designers

I should note that in the courses I teach, each child does work each session that captures the essence of the lesson for them in a “design book.” That book then becomes a portfolio of ideas for them to share with parents, family members, and other educators. As much as permaculture needs ambassadors in the world, these children are fantastic. Their work proves their understanding of the lessons, and they become quite patient, eloquent speakers on the subjects we cover.

Children are invested in making changes in their lives and their families' lives that lead to sustainability. They do not want to contribute to pollution, water wasting, energy squandering, land degradation, etc... Given the opportunity, their natural talent for designing and organizing home, garden, and farm spaces demonstrates their adaptability and ingenuity.

At different points in the curriculum, I give the children

opportunities to design on paper, and to make models with scrap cardboard, wood, or clay. I've even used mashed potatoes and butter. By giving them the opportunity to learn experientially about the principles of permaculture and to solve problems by themselves—or with others in the group—the children build their confidence. They see themselves as part of the permaculture tribe. They develop as human beings in their real milieu. What could be more important than giving young people the sense that they can provide water, energy, healthy soil, living gardens and forests, and homes for themselves? Even though they still need to finesse the details of their education, these children recognize that they can do these things for themselves, in community, and in earth community.

Children get it... They begin by doing what children do best—paying attention.

Working with parents is just as important to me as working with the children. This has two aspects. First, I consider the parents the true educators of their children. My role is to work in cooperation with the parents to introduce the children to the subject. For this reason, I don't directly cover evidence of overshoot, human-caused ecosystem collapse, and so on. Pollution, over-population, social inequity and other such subjects are discussions for children and parents primarily. Some children are extremely aware of these problems. Others are quite oblivious. If nothing else, I believe each child should be protected until that child is ready to deal with the issue. These are weighty enough topics; most adults don't want to talk about them. At the same time, many children bring up issues of distribution when we talk about the ethic of fair share, or pollution or extinction when we talk about ecosystems. Others ask tricky questions about reducing the use of resources. I try to let the students work out the answers for themselves. These are very fruitful moments for the class.

At the end of each session, I send home or e-mail a half-sheet of information about what we covered that day, explaining the core concepts, detailing the activities we did, and suggesting follow-up activities for the week to come. This supports the children and the parents in their learning. I am able to educate them both through this work. I find parents become interested in helping with the class, offering to host field trips or class sessions, or borrowing books from my library. All of this seems like a lot of healthy cross-fertilization and potential for my community. The continual question is: How best to reach more parents and children!

The village buy-in

The community has been responsive no matter what form of teaching I've chosen to offer. The longer format was hard for the homeschooling community to maintain because those families are more apt to drop a commitment if life or interest changes in some way that doesn't work for them. At the same time, the

Working with parents is just as important to me as working with the children.

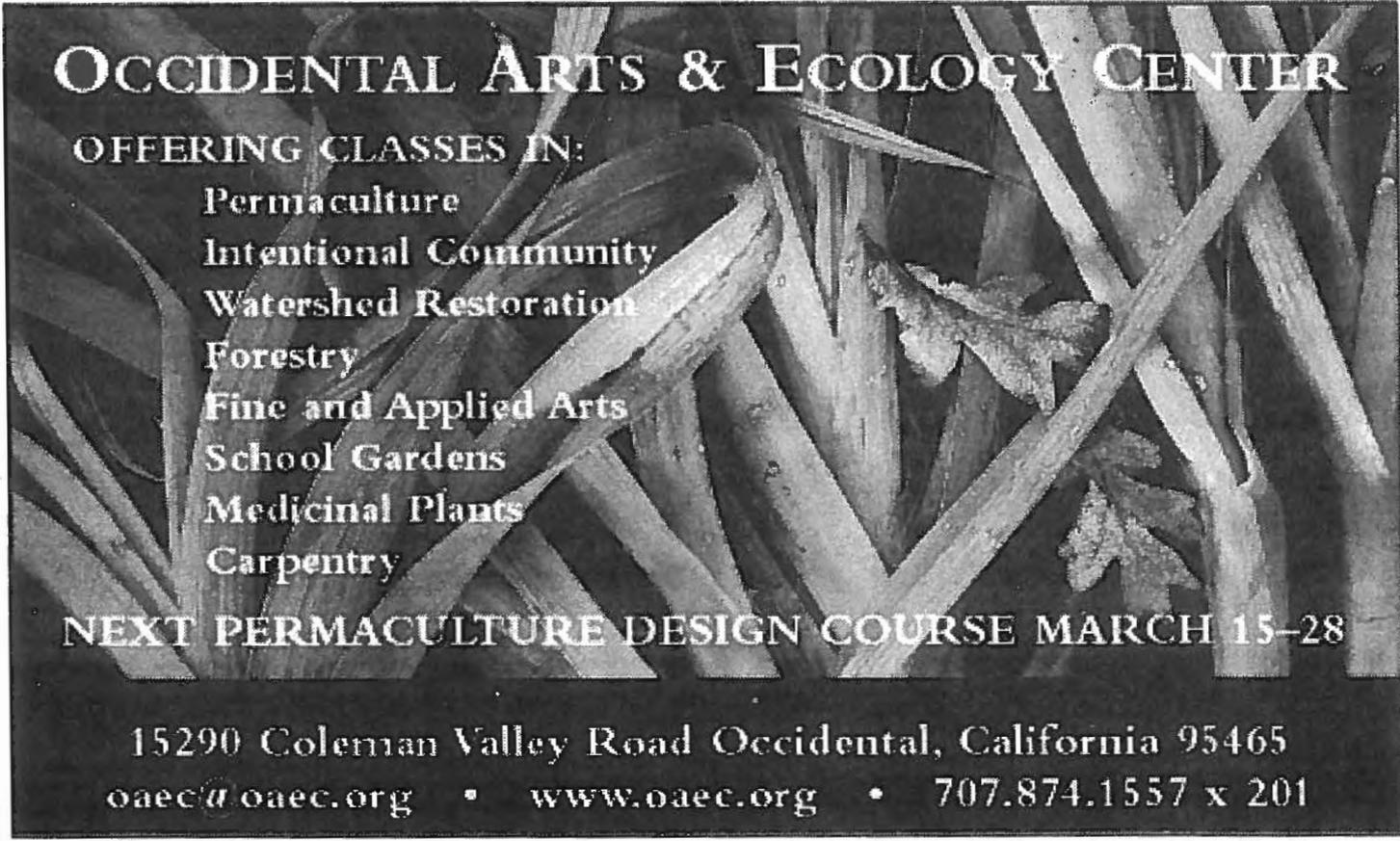
longer times and regular schedule, combined with continued engagement in the subject, works really, really well for other families. For the first course, I taught a four-hour session with a half-hour break in the middle. In the second course, the activities and subjects went by so quickly, there was no time for restlessness—but there was more pressure on parents to follow

wanted to know when I would offer the next one.

In the spring of 2008, I will be coordinating with a former adult student, now doing graduate work in education, to offer a four-week permaculture class at the local alternative school. I am also hoping to offer one-day classes for parents and children together as an introduction to permaculture. I think the shorter formats will be exciting opportunities for me to build interest in the larger Bloomington and regional community. I am also working on formalizing at least one set of permaculture curriculum guides to distribute.

As I look at much of what is happening around me, the future fills me with a sense of foreboding. I remember holding my infant daughter on September 11, and asking myself, "what have I done?" At the end of the day, I knew that I had brought her into the world to be a part of the solution. Each child has that potential ready to burst forth under the right conditions. It is very satisfying to be a part of nurturing them and empowering them by sharing the possibilities of permaculture. It would be wonderful for others who feel the same way to begin sharing the work and the ideas in their communities. △

Rhonda Baird has been working with parents and children in various situations—including programming for homeless families and domestic violence programs—for over a decade, but only began teaching permaculture in 2005. Besides her work with children, she teaches adult programs with Peter Bane and Keith Johnson. She can be contacted at rhonda.b@insightbb.com.



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up with their children. After the course ended, the parents were

Introducing High School Students to Permaculture

Kelly Simmons

I RECENTLY HAD THE OPPORTUNITY to introduce high school students to permaculture at a private school in Boulder, Colorado. The students had spent the previous months in their Economics & Sustainability class studying the global manufacture of shoes. They had traced the components of a running shoe, where all the components were made, as well as the ingredients of those components and where they came from. They visited a national chain department store and catalogued all the shoes sold, along with the country where each had been manufactured. It came as no surprise that most of the manufacturing was being done in China and other Asian countries, such as Indonesia, at great human and environmental cost. As they drilled down into more and more detail, they also began to investigate Chinese labor policies and the US stock market. The students were in the midst of reading *Cradle to Cradle* by William McDonough and Michael Braungart, when I was invited to speak to them about permaculture. I was allotted about an hour or so, plus an opportunity to take them on a field trip to local sites.

Given their months-long study of the overwhelming problems inherent in the global system of trade and manufacture, I assumed the students would be hungry for solutions, and so I chose to focus on permaculture as a systemic solution to the looming environmental and cultural crises that we read about every day.

Solutions from what kids already know

The challenge was to introduce permaculture as a solution (in an hour!) to students who had been studying economics. Over the years, I'd attended a number of introductory lectures on permaculture that focused on food raising, household self-reliance, greenhouse designs, and landscape design. Intuitively I felt to focus on these topics, important as they are, would be the wrong approach with these students, but I wasn't sure what would be the best alternative. So I began to read Bill Mollison's writings on society, nations, and economics. In doing so, I came across these remarks, "We already know how to solve every clean energy and sensible shelter problem in every climate," and "We have already invented and tested every necessary technique and technical device and have access to all the biological material that we could ever use."

So if this is more or less true, why are we in such danger of ruining our planet? I decided to organize my talk around the permaculture concepts of ethics and "invisible structures."

I opened with these quotes and an outline of permaculture

ethics, including examples of what those ethics mean in practice. I proposed the idea that in order to make a big enough change to save ourselves and our planet, we must examine and reform the ethics and values we use to make decisions; that the problem is not a lack of technical know-how. In order to make a fundamental change, we will have to re-think our decisions about all kinds of things, but most especially about how we define wealth, assets, success, and meaningful work.

During our discussion we revisited the ideas of wealth and assets.

The students were captivated by these ideas and had many questions for me, most notably about permaculture's Third Ethic: "sharing the surplus and limiting consumption." We had a lively back and forth about what living the ethics might look like in practice, which led into a discussion of redesigning human systems, (especially economic systems) to be more sustainable and what permaculture has to offer in that realm. I introduced the basic permaculture design strategies such as working with nature, catching and storing energy, and wasting nothing. I spoke at length about invisible structures and how our systems of business and money impact the environment and ourselves, giving examples of credit unions, micro-lending, and bartering as sustainable alternatives. I made a conscious effort to tie each example or strategy back to the basics of permaculture ethics as a useful decision-making tool.

During our discussion we revisited the ideas of wealth and assets. I outlined permaculture ideas about degenerative, generative, and regenerative assets as well as Mollison's ideas about passive, active, and unethical investments. We contrasted their study of global shoe manufacturing and its attendant social and environmental costs with the social and environmental costs and benefits of local shoemaking using local resources or even resources that might be waste from another business. This led to more discussion about "efficiency" as a value in business and manufacturing and the unexamined costs that mask inefficiencies.

We talked about the closed system of our earth with its finite resources, and their unexamined desire to be millionaires living the high life. (I asked for a show of hands of how many wanted to be millionaires). Can we live permaculture ethics and also accumulate so many resources so as to be millionaires? We talked again about sharing the surplus and limiting our consumption, and what is important and sustainable about living that ethic.

The end of my lecture was devoted to a brief outline of domestic self-reliance using the Integral Urban House model from the Farallones Institute—raising food, using the sun for energy, turning waste into fertilizer, capturing water. We compared this model to the closed system of the planet and tied that to sustainable human settlement. We talked together about what we could do right now to change the way we live and the decisions we make. I spoke about the permaculture principle of starting small and building on success. I invited them to begin thinking about the values and ethics they are living in their day-to-day choices about which coffeehouse to frequent, whether they really need that new pair of cool jeans, or whether taking the bus was too much trouble.

The response was enthusiastic. They began brainstorming about what they could do in their lives and at school. One student told me she was thinking a lot about sharing her surplus time with a family in her neighborhood who needed child care. Another student told me he wanted to design a greenhouse as a closed

system for his class project. Another asked about using permaculture to redesign the school to be more sustainable. Another student told me they'd had lots of people from the community come speak about sustainability, but permaculture was the most interesting.

be a local resource to them as they worked on their projects. Those will be fleshed out and executed in the Spring semester. I'm looking forward to seeing what the students come up with.

The response from their teacher was very positive, especially the focus on

We talked together about what we could do right now to change the way we live and the decisions we make.

In order to nurture the seeds I had planted, I left a copy of *The Global Gardener* video with the teacher, so students could begin seeing the international aspects of permaculture and permaculture practices.

I revisited the class a week later for a field trip to a few local sites. Students were still enthusiastic and excited and I fielded questions about what they had been seeing in the video. We visited my house and looked in on my chickens and bees, we visited my neighbor who runs a neighborhood-based CSA using his neighbors' front yards for his farmland, and we visited EcoScape Design, a local permaculture-inspired landscape design firm. During these visits, several students asked about volunteering at each venture and there was much discussion about class projects and permaculture. I also agreed to

ethics and solutions to the global crisis. He felt the experience had been very empowering for his students after many months of study. We agreed to continue working together and his interest in permaculture for his own life has been piqued as well.

I would have liked to introduce students to more of the design principles, patterning, observation, guilds, and more appropriate technology. My hope is that this brief introduction will whet their appetites so that they will continue to seek out more ways to learn permaculture. Most importantly, I hope this introduction will lead these students to begin thinking more creatively about the kind of world they want to live in and ways to change our current one.

Although it might seem a somewhat unusual approach to high school students, the focus on ethics and invisible structures seemed to work well in this urban setting. It might also work well for college students with little experience raising food, where ordinances and lack of land availability may make farming impossible, or where the cultural milieu is more centered around buying and selling than growing and raising. △

Kelly Simmons is the Director of the Boulder Sustainability Education Center in Boulder, CO where she teaches classes in permaculture and urban-focused sustainable living skills. More information, at www.bouldersustainability.org.



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Kids Restoring the Land in Mexico

Bolitas de Vida

Scott Horton

I FEEL LIKE I'M IN A COOKING CLASS, with ingredients measured out in front of me ready to make seedballs with Trathen Heckman, a permaculturist and activist in northern California. I'm a muddy Martha gone green. We roll up our sleeves and begin to get messy making some powerful, pregnant pellets that can help build soil, re-introduce beneficial microbes, plants and invertebrates to even severely degraded ecosystems. Making seedballs is fun and easy and kids especially love them.

Like many permaculturists, I first learned about seedballs when I read Masanobu Fukuoka's *The One Straw Revolution*. But my friend Beto really taught me how magically transformational seedballs can be, not only to the land, but to education and community.

Beto is a ten-year-old student at an incredible eco-school in Tlaxco, Mexico, one of 57 amazing forces of nature that attend the school in that small agricultural town in the mountains east of Mexico City. As part of their sustainability-based curriculum, these kids literally grow up learning how to restore the earth and enhance their community through daily acts of awareness, care and action.

On a sunny afternoon a few Decembers ago, Beto was coaxed by one of his teachers to share with a group of 30 gringos and Mexicans how he and the other students have been using seedballs for years to restore acres of land degraded by deforestation and over-grazing. He explained how they go into the hills in the fall to collect the seeds of native species. As they gather them, they are careful to be gentle with the seed heads of the grasses and wildflowers they harvest, making sure they don't damage the delicate plants. They are diligent about not taking all the seeds from a seed head—they want nature to be able to do her own work while they help. Beto and his friends know the names and the many uses of the plants, where they grow, when they flower and seed.

In the Spring, the students make *bolitas de vida* (little balls of life) from local soil, compost, clay and the seeds. They return to the hills and scatter the *bolitas* before the rains may come and take over the rest of the process for them.

Standing on the spot where Beto taught us about seed balls, I

... they want nature to be able to do her own work while they help.



Ten-year-old Beto (right of center) and his classmates in Tlaxco study the usual subjects as well as how to restore the Earth, care for people and cherish community at their elementary school.

looked across the little river valley as he spoke. Where I stood was parched and compacted soil, abused by human activity and only now responding to the kids' restorative efforts. Across the valley are green, forested hillsides that forty years ago, Beto's teacher Paco told us, looked just like the land on which we stood, before concerted restoration and care brought it back to life.

As I have returned to Tlaxco many times since first meeting Beto and his classmates, I have witnessed the slow and steady expansion of their work to restore the land that nurtures

them and supports their community. I can't help but think that they will pass their experiences and responsibility on to their families and friends and down to their own children when they are grown. In this way, seeds of change are sown for a future harvest of health and connectedness.



Beto shows some of the seeds he and his friends have collected and will incorporate into bolitas de vida.

Seedballs

Developed by Masanobu Fukuoka, father of Japanese sustainable agriculture and author of *The One Straw Revolution*, seedballs are a technique for establishing plant life on land damaged by negative human impacts. Composed of soil, clay and a mixture of seeds that build soil fertility, seedballs protect the seeds from rodents and birds while they soak up and hold moisture that gives the plants a jumpstart in harsh conditions. Seedballs have been used to restore desertified soils, to re-introduce grasses and wildflowers to burned areas, and to establish beneficial cover crops on over-grazed land. △

Scott Horton is Editor of the Permaculture Activist. He can be contacted at lasemillabesada@hotmail.com. To learn more about Beto's eco-school in Tlaxco, Mexico, and how to take one of the many courses offered locally by Proyecto San Isidro and the Cob Cottage Company, visit <http://www.cobcottage.com>.

Making Seedballs

Kids love seedballs—they are easy, fun to make, and a great introduction in miniature to seeds, plants, soil, and nature. Here is a recipe I have used with success for many years:

Ingredients:

3 parts dry, powdered red art clay or other dry clay
2 parts dry, finely sifted compost
1/2-1 part mixed seeds

I find the powdered art clay works well but have used other types including clay dug on site. The important thing is it must be dry and finely sifted or powdered. You can also add a powdered mycorrhizal fungus preparation if you like.

You can use any kinds of seeds but it's great to think about where you will distribute your seedballs and what the soil and land there may need. For this reason, many seedballers use mixes of good cover crops and native plants.

Combine the dry clay and seeds in a bowl or bucket—this ensures the seeds will get a fine coating of clay dust on them which helps suspend them evenly throughout the seedball mixture.

Mix in the compost.

Add water slowly (it is easier to add more water a little at a time than it is to remove water if your mixture becomes too gooshy). You want the wet mixture to have the consistency of firm modeling clay. Too dry and the balls won't hold together; too wet and the seeds will sprout before the balls dry.

Once you have the mixture right, pinch off a small amount, enough to roll 1/2-inch balls between the palms of your hands. Place the finished balls in the sun to dry. This may take an afternoon or a couple of days depending on your climate, humidity, etc.

Once the balls are completely dried, they can be strewn about the landscape or stored in covered containers for future use.

Tips from Master Gardeners

Sowing the Seeds of Gardening

HERE'S A SUITE OF SHORT ARTICLES from the Colorado State University Cooperative Extension's Master Gardener program that is full of practical advice for getting young children interested in gardening.

Children in the Garden

*By Judy Sedbrook, master gardener,
Colorado State University Cooperative
Extension, Denver County*

There are few things children enjoy more than digging in the dirt and making mud pies. They are fascinated by looking for worms and bugs and love to water the garden and anything else in the near vicinity. Children also enjoy planting seeds, watching them grow, and harvesting what they have grown. By cultivating their curiosity about these things, you can help them to develop a love of nature and gardening. They will also enjoy the special time they get to spend with you.

To start, encourage their enthusiasm by planting seeds that mature quickly and are large enough for a child to handle easily.

Vegetables are a good choice for young children. They germinate quickly and can be eaten when mature. Some popular choices are radishes, zucchinis, pumpkins, carrots, lettuce, peas, broccoli, and potatoes. Children may even be encouraged to eat vegetables that they have grown and would otherwise avoid. If you have enough room in the garden, gourds are a good choice. After harvesting, they can be decorated and used as birdhouses or autumn table decorations.

To add interest and color to the vegetable garden, you might want to add some herbs and flowers such as marigolds, nasturtiums, chives, basil, rosemary, and sweet peas.

Children love to choose the seed packets or starter plants for their gardens and should be allowed to do the planting themselves. They can then proudly say it is "theirs." After the planting has been done, be sure to put the empty seed packet or tag in the soil next to the plants to mark their spot. It's also fun to note the date you have planted and the weather conditions, and to keep a journal noting the progress of germination, growth,

and soil and weather conditions as the plants grow. This annotation process can train children in keen observation skills, and the information can be used in subsequent years to help plan and plant.

It is important to include the child when deciding where to put the garden. This can be a good time to talk about what is required for a successful garden. Teach the young gardener that growing a healthy garden begins with good soil. Explain that plants, just like people, need to eat and drink. Make sure that the chosen spot gets enough sun and has a readily available source of water. The garden should be located where it is easily accessible to the child and can be admired by others.

When a place is chosen, remember to keep it small. Measuring out a "yardstick" garden keeps the size easily manageable for most children. If you live in an apartment or don't have much space, gardening in pots and containers can be fun and productive. Allow the child to use his or her imagination in choosing containers to be used as planters. Just about anything that holds soil and has good drainage can be used as a pot.

Watering and weeding their garden may not hold as much interest for children as the planning and planting did. Garden

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tasks will be easier to remember if you put a garden calendar in your child's room or on the refrigerator. That way he or she can take charge of completing the tasks and crossing off the days when each task has been completed.

Activities in the garden do not have to be limited to

By cultivating their curiosity about these things, you can help them to develop a love of nature and gardening.

springtime. Fall is a good time to have children assist in composting, mulching, planting trees and spring-blooming flower bulbs, and greenhouse maintenance.

Re-seeding small areas of lawn over to garden can be a fun activity for children. They will be more likely to stay off of the newly seeded areas if allowed to contribute to the project.

Children should have their own tools to use in the garden. Child-sized rakes, hoes, spades, and gloves can be found in most garden shops, home improvement centers, and catalogs. Less expensive alternatives might include old, heavy kitchen spoons for digging and measuring cups for scoops.

Sometimes waiting for spring to plant a garden is just too long for a child. Many plants can be successfully grown indoors by children, including the pits and seeds of items purchased at the grocery store. Avocado pits can be grown in a glass in the window, and the top cut off of a pineapple and grown in a piepan can make a nice houseplant.

Herbs are a good choice to plant indoors for children. They grow fast and can then be tasted. With pruning, herbs will grow all winter and can be planted outdoors in the spring. If there's a cat in the house, children may enjoy growing catnip on a windowsill in a pot.

Of course, don't plant your gardens in a square or rectangle. A "pizza" garden can be planted in a circle and divided into wedge-shaped sections. Assign each child his or her own section or plant different plants in each section. Or use a tripod support to train climbing plants such as sugar snap peas, beans, or nasturtiums to grow a living teepee. Try planting sunflowers in a circle or square, leaving space for entry, and tying the tops loosely together near the heads to make sunflower houses or "hideouts." The floor can be covered with a section of old carpet or planted with clover or thyme.

* * *

Planting a Garden with your Child

By Jo R. Frederiksen, Colorado State University Cooperative Extension Master Gardener, Denver County

School's out, but, hey!, what do the kids do for the next three months before school bells ring again?

How about helping your child plan and plant a garden? From preparing the soil, selecting the plants, planting seeds or transplants, and watching them grow to finally harvesting the crops, gardening is great family entertainment.

Keep two steps in mind: How much space is available for the garden and what is the age of the child? For a two- to four-year old, planting packets of seeds and one or two plants each of tomato and pepper creates a big garden world even though it seems like a small space to you.

It's smarter to care intensively for a small space rather than a plant a big spread that can overwhelm both you and the child. Miniature vegetable varieties also may be more accessible and understandable to small children.

If you have almost no space at all or perhaps you live in a townhouse or apartment, a small corner or balcony can provide adequate space for a child's container garden. It's surprising what you can grow and amazing how attractive the multi-colored leaves of heirloom lettuces and chards look in combination with other greens in containers. You'll find special varieties of heirloom tomatoes as well, just for this purpose. Sweet and chili peppers, bush beans, and other vegetables also do well in containers.

You can help children five- to eight-years old, grow a larger garden with a greater variety of full-sized plants, such as tomatoes, peppers, lettuce or other greens, radishes, carrots, squash, and your favorite herbs. And don't forget the sunflowers and multi-colored flowering kale, always favorites with children of any age.

Children five to eight can begin to grasp plants' differing needs as well as the insects that live around and on them. A little later, they'll begin to understand the natural environment and will be able to tell beneficial insect predators from harmful "bugs."

It's fun to go to the nursery or barter with fellow gardeners and select one or two items you've not seen grown, but like to eat. Experiment with growing something new. I had particularly good luck with globe artichokes last year. They are decorative, and appear similar to an exotic thistle. Globe artichokes are sturdy perennials and do well with low maintenance and a sunny location.

Look for disease-and-pest-resistant plants for a child's garden. Children love to touch, and fingers often end up in their mouths, so organic and pesticide-free plants are safest. Vegetables that are fairly problem-free include beets, carrots, cucumbers, onions, peas, radishes, spinach, and rhubarb.

After watching, watering, and working this summer, you and your child will have shared hours of fun and learning together.

* * *

Plant Projects with Kids

By Robert Cox and Shirley Marken, CSU
Cooperative Extension agents, horticulture

The family that gardens together grows together.

Pardon the parody, but gardening is good for families. And, if parents enjoy working with plants, it's likely that kids will learn to enjoy plants, too.

Parents who want to develop kids' interest in gardening can begin with some plant projects that are just plain fun. You also can add to the list of kids' plant projects by perusing these books: *Let's Grow: 72 Gardening Adventures with Children*, by Linda Tilgren, or *Kids Gardening: A Kid's Guide to Messing Around in the Dirt*, by Kim and Kevin Raftery.

Seed germination

Roll a paper towel into a cylinder and place inside a jar. Wet the towel so it sticks to the glass. Place seeds of beans, radish, corn, or squash between the towel and the jar. Put an inch of water in the bottom of the jar to keep the towel moist. Place the jar in a warm, well-lighted room, but out of direct sunlight. Let children record the dates of planting and germination.

Children also can make a "seed doll" to observe germination. Moisten a paper towel and spread it flat. Place three or four rows of seeds on the towel. (Large seeds, such as beans, are most interesting for children to watch.) Fold in two edges of the towel to cover the seeds; roll as in a cinnamon roll. Fasten with two rubber bands and put in a plastic bag to stay moist. Every two or three days, carefully unwrap the "doll" to see if the seeds have sprouted. Be sure the towel doesn't dry out or become too soggy. Children can dissect the sprouted seeds to inspect them or they can plant them to grow. Even adult gardeners sometimes begin seeds this way.

Eggheads

When cooking eggs, carefully crack and save lower two-

thirds of shell intact. Wash the shells, then draw mouth, eyes, and nose on the outsides with a felt tip pen. Fill shells with potting soil. Sprinkle herb seeds on surface and gently press seeds into soil. Water gently, put the eggshells in an egg carton and cover with a lid. Keep the soil moist but not soggy. The sprouts become "egghead hair" and can be clipped with scissors to keep short or let go for the shaggy look. Seedlings may be transplanted directly into the garden complete with the nutrient-rich eggshells.

Another way to do this is to dip pine cones in water (don't soak them), and then roll in soil which has been mixed with seeds. Roll the pine cones in the soil-seed mixture. Place the cones in egg cartons to help them stay upright. Soon the seeds will sprout and the entire cone will have "green hair." Kids can clip it or leave it shaggy, as with the eggheads.

Personalized Pumpkins

In May, plant pumpkin seeds in garden soil well amended with aged manure or compost. Water and wait for germination. Mulch well with straw and keep the weeds pulled. Fertilize lightly every two weeks. Where flowers develop on the sprawling vine, you'll soon see tiny pumpkins at the base of female flowers. Once a pumpkin is a few inches in diameter, let your children write their initials on the pumpkin with a felt marking pen. With a paring knife, go over the initials, using enough pressure to scrape the pumpkin skin. As the pumpkin grows, so will the initials! Remove other pumpkins that form later to allow the personalized pumpkins to grow as large as possible.

Harvest the pumpkins when the rind is hard and orange. Let light frost nip the vines, then harvest before hard frost, leaving three to four inches of stem on the pumpkin.

Use pumpkin for jack-o-lanterns, pies, and seeds. Suggest that kids guess the number of seeds in the pumpkin. Roast the washed seeds on a cookie sheet. Sprinkle on a little salt before roasting at 300°F for about 30-40 minutes, stir every 10-15 minutes. ▲

For more information and great ideas about gardening with kids, visit www.coopext.colostate.edu/4DMG/Children/ingarden.htm



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Growing an Integrated Unit Organically

Food Unlocks Interest in Sustainability

Dianne Clipsham and Letitia Charbonneau

WHAT WOULD AN INTEGRATED THEMATIC unit incorporating the goals and methods of global education look like? This was the question that two teacher-librarians (one middle school, one secondary) and one middle school French immersion teacher set out to explore as we planned the launch of a Grade 8 food unit on World Food Day (October 16) in 1993. We knew that the topic of food would rank high in interest among 13-year-olds; and we realized that having students investigate issues raised by the choices they make about the food they eat would offer us many opportunities for integrating traditional subjects (i.e., geography, language arts, visual arts, health, and science) with the goals of global education (development, peace and social justice, environment, and human rights).

We wanted the unit to help students develop both their research abilities and their initiative. We therefore tried to replace the traditional teacher-driven approach with a more democratic student-driven approach, using techniques of cooperative learning and peer teaching, and giving students the information they needed to begin their quest for answers to problems that they themselves identified. Whereas, formerly, the availability of resources might have determined the content of the unit, this time decisions about the problems to investigate were made by the students, and resources were then found to explore those issues more fully. Risky? For sure. But, with three teaching partners, two of whom had previous experience with these students, we thought we could involve them and inspire them to action, as well as present opportunities for learning.

In planning the unit, we took very seriously the goal of process-mindedness, as expounded by Selby and Pike in *Global Teacher, Global Learner*, that "students should learn that learning and personal development are continuous journeys with no fixed or final destination." (1)

The unit included three stages: developing awareness, providing opportunities for analysis, and lending support for action. (2) These stages were integrated into a process intended to develop creative problem-solving abilities with emphasis on divergent and convergent thinking skills (see Figure 1).

Awareness

Students began the unit on World Food Day by playing a simulation game called *Playing Fair? The Rules of World Hunger*, (3) which sets out to dispel some of the myths about food shortages and to identify the causes of hunger. In playing

Subject areas: geography, language arts, visual arts, health arts, and science
Key concepts: integrated learning, process-mindedness, problem solving, global awareness
Skills: research skills
Location: indoors and outdoors
Time: 2-3 months
Materials: research tools

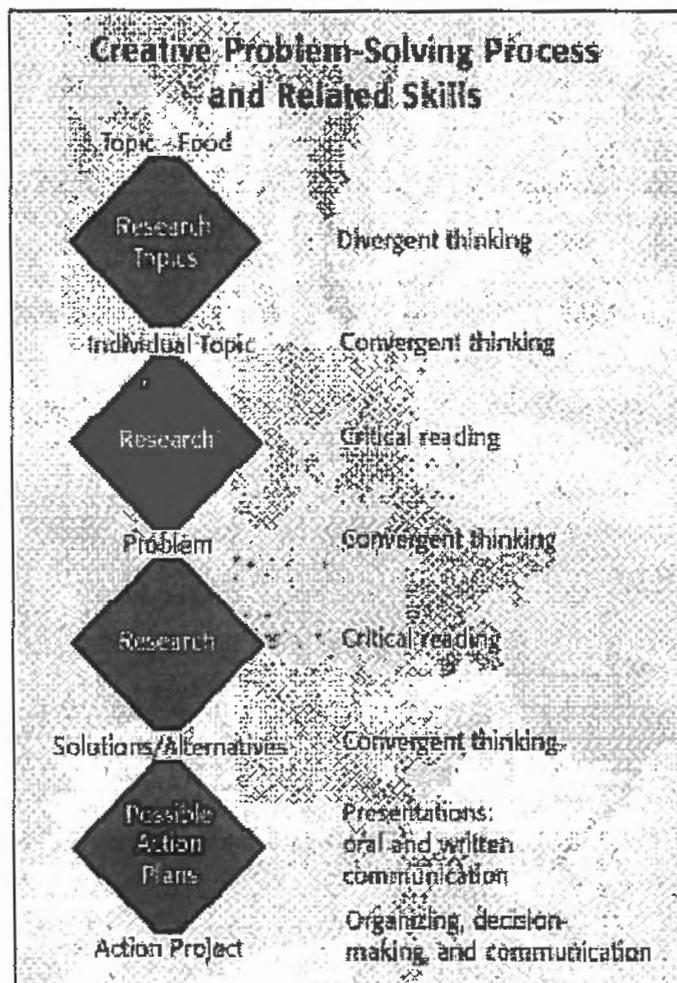


Figure 1

the game, students learned that the main cause of hunger is not insufficient food, natural disaster, laziness, overpopulation, or ignorance of modern agricultural methods, but, rather, poverty. Students' interest was further stimulated by a series of spelling dictations from *The Supermarket Tour* (4) that related to the low nutritional value of popular breakfast cereals. Students also explored statistics related to food production and distribution using the *MacWorld* atlas and database on CD-ROM.

The theme of food was then introduced as a focus of a research project. Students brainstormed possible topics, first individually and then in small groups. Together we made a web of all their ideas, from which they selected their research topics (see figure 2). In previous research projects, students had been expected to formulate a fairly specific problem before beginning their research. This time, they had only very broad topics, and they worked closely with the teacher-librarian in the school resource center to focus and refine them.

The research component was integral to the process. In the first stage, the middle school teacher-librarian began by building on skills that students had previously acquired while researching the theme of water. After cautioning them that this kind of research can be frustrating and that they would "need a high level of tolerance for uncertainty," she introduced them to a wide variety of current materials from government and non-government agencies and provided a learning log to guide their research. The students were responsible for contacting local, national, and international agencies by telephone (in the library office) or for using the school fax machine to set up interviews

Example Supermarket Tour Questionnaire

Station 1: Fresh Produce

1. (Space left for notes on experts' information)
2. Identify seven countries and their products.
3. In what country do the majority of products originate?
4. Is it always possible to identify the country of origin? Why or why not?
5. Can you find a product that seems to be Canadian/American but is actually from another country? What do you think causes this confusion?
6. What is used to preserve the mandarin oranges?
7. Can you find other examples of how fresh produce is preserved?

Sample Problem Statements

- Chemical fertilizers and pesticides can affect our health. What are the alternatives?
- Why are independent farmers' revenues decreasing? Who benefits?
- Raising cattle creates environmental problems. What can people do to eat less meat but still get the protein they need?
- Food packaging is a problem for the environment and increases the cost to buyers. How can food be transported and preserved without so much packaging?
- Many countries need food relief so that people will not suffer from hunger. What are the good and bad aspects of food aid? What needs to happen so that food relief is no longer needed?
- Eating disorders can damage your health. What causes these disorders and how can young people be helped to overcome them?
- Some animals suffer because of the way they are raised. What are some of the ways this could be avoided?

or add to their materials. At the end of the first research component, students formulated a problem statement based on the information they had collected. (See "Sample problem statements.")

Analysis

Having formulated their problem statements, students then moved from the awareness stage to the analysis stage. At this point, the unit became more student-driven and the classroom teacher became much more a facilitator and co-learner. Students who had similar areas of interest were placed together in groups, and within their groups they pooled information and became experts in that area.

The six groups covered a wide range of topics and issues, from nutrition and vegetarianism to food processing, agricultural practices, and food distribution. We wondered, however, whether their research would lead them to see the displays in the local food store with new eyes. We decided to take a supermarket tour in order to find out. For the tour, the groups were jigsawed, so that every tour group had one member from each of the expert groups. Students were given a questionnaire (see "Example of Supermarket Tour Questionnaire") and were expected to gather information at each of several defined stations in the store. In

addition, individual "experts" were responsible for sharing relevant information they had acquired, thus putting their research into context.

As a follow-up to the supermarket tour, students saw the video *The Hand That Feeds the World*. (5) While its focus is gender roles in food production and distribution, the film is also a very accessible introduction to the notion of food as a commodity. It provides a brief overview of the historical progression leading to the debt crisis that has forced many developing countries into maintaining cash-crop economies that reduce self-reliance and create a dependency on expensive imported products. The video helped students put the information they had gathered on the supermarket tour into a more global context. Discussion and analysis following the tour helped to prepare students for the second stage of research, which was to identify solutions to their problem.

The next step in the research process was a visit to the Merivale High School library where the teacher-librarian and her "peer researchers" introduced the Grade 8 students to resources within and beyond the school walls. The students learned how to locate and evaluate sources from a variety of media, from newspapers and magazines on CD-ROM to the Internet.

Aware of one another's research problems, students began to share information and many came to realize that numerous food issues are closely connected. For example, students studying the economic impact of chemical pesticides and fertilizers came across information related to the impact of these products on human health, which they passed on to students working on health and nutrition. Students working on the health effects of meat consumption found information on the environmental costs of raising beef, which they passed on to students working on the environmental impact of agriculture. Many students also began to discover that what is happening in developing countries is also happening at home (e. g. the impact of agribusiness on individual farm incomes, requiring farmers to work at other jobs). Our hopes began to materialize at this point, as students became enthusiastic learners.

Presentation

Students presented their information orally to their jigsawec groups and handed in written reports in which they were required to give background information on their problem and justify the solution(s) they had identified. Their imagination and originality made it a pleasure to evaluate their work. Games, videos, articles, posters, and pamphlets were only some of the forms their reports took. The high quality and depth of the reports reflected well-honed research and thinking skills, and convinced us that the students had been able to integrate, analyze, and evaluate a tremendous amount of information.

Action

Following their presentations, students, now aware of the problems and solutions identified by the class, started formulating plans for an action project. Examples of actions toward solutions included:

- participation in World Vision's 30-Hour Famine;
- persuading the student council to "purchase" four hectares

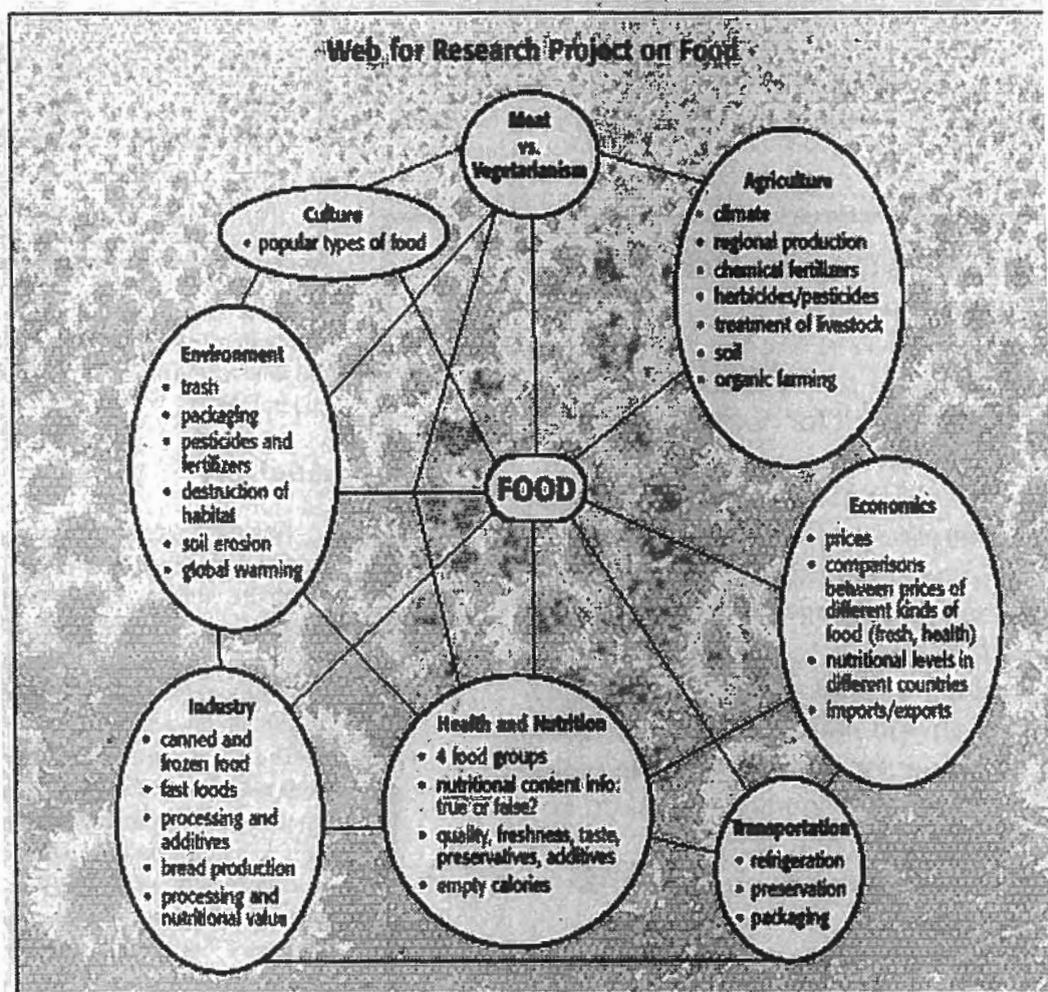


Figure 2

(10 ac) of rainforest through the World Wildlife Fund;

- increased participation in the school's Trashless Thursdays program;
- planning for a video on eating disorder or a video on eating disorders;
- creating a game for younger students that integrated all of the food issues we had explored.

The students were provided with a guide to planning action projects (see "Action Planning Guide"), but the outcome of these projects was very much left to their initiative and persistence. Not all students were able to follow through because of logistics and time constraints; however, all of them benefited from planning together. This phase of the unit was crucial, for how could students think that their work or the problem they researched was significant if it ended with a report gathering dust on the teacher's desk? Their experience in this area demonstrated that change occurs in many small ways and that, individually and collectively, they could make a difference.

Evaluation

In such a process-oriented unit, skills development was much more the focus of evaluation than was content. Since the French immersion teacher was responsible for teaching science, geography, language, and visual arts, aspects of each activity and product were identified as pertaining to at least one of these subjects for summary evaluation, making it a truly interdisciplinary unit.

Formative evaluation was an important part of the process, helping both to guide the development step by step, and to make the students accountable for their use of class time and for deadlines. (See "Evaluation criteria") Peer evaluation was used a great deal to assess group work and presentations, and provided a means for making students accountable to one another.

The unit in retrospect

The success of this unit depended in large part on the presence and programs of teacher-librarians in both the middle school and high school settings. All three of us worked together to guide and nurture each student's independent thought and action. To succeed, we had to give up the time-honored teacher's role as the fount of all knowledge.

Nevertheless, we had to be aware of the concerns students would have as they became more conscious of food issues, and we had to become informed on these issues ourselves so that we could offer guidance. In the process, our own biases undoubtedly appeared. The students forced us to "walk our talk;" Letitia, for example, could not appear with a fast-food burger in her classroom again!

Experiences and explorations were planned to raise questions about food issues, but students were quick to form their own opinions. For example, the fact that cheese produced locally is priced higher than the corporate brand taught them about economies of scale—and many students saw the value of supporting local products even at a higher price. Similarly, they

knew from previous research that pesticides are an environmental problem—but the fact that they are also a health problem convinced students of the value of organic produce. Parents, no doubt, were educated as well.

The students' enthusiasm and eagerness to influence change

Action Planning Guide:

Developing a Strategy

1. Identify key people to work with on the issue: who has power? who has responsibility? who is affected?
2. Determine obstacles to accomplishing your goal as well as the resources available to overcome them.
3. Consider ways to build support in class, school, and the community.
4. Outline a plan and a timeline; identify tasks and roles (who will do what when?)

Organizing

These organizing principles may help guide you in your action project:

1. Dialog: be willing to listen to other viewpoints and to change positions.
2. Support: work as a team; build support within your group and in the community; think of the people, not only of the tasks; get advice and help.
3. Leadership: be a facilitator rather than a director; share leadership rather than taking control; listen, encourage, help, and show appreciation.
4. Appropriate action: don't make assumptions about what others want or need; be realistic; try to fit in with others' efforts; keep others informed.
5. Persistence: be ready to take risks, learn from mistakes, and be flexible; don't give up!
6. The means are the ends: the way you go about creating something will reflect on what you create; respect others rather than antagonize them.

was astonishing to us. The three months we spent on the theme was not long enough and some students carried on throughout the year. Here are some of their comments:

"This project has really made me careful about what I put in my mouth."

"I had never thought that what I was eating made any difference to somebody else in another part of the world."

"I wish all our units had action projects. That was the part I felt the best about."

Partners developing an integrated global unit have to be willing to take risks and they must commit to working together in a more democratic, organic way of teaching than ever before. The integrated approach might seem time-consuming, and certainly involves much coordination and effort on everyone's part; but the results—such as seeing students making connections between global issues, and linking these to their own lives—are definitely worth it. And we really have no choice, for, as Thomas Berry has said, "What is clear is that the Earth is mandating that the human community assume a responsibility never assigned to any previous generation." (6)

Letitia Charbonneau teaches Primary Core French at A. Lorne Cassidy Elementary School in Stittsville, Ontario. Dianne Clipsham is a global education and school library consultant in

Ottawa, Ontario. Both are founding members of the Ottawa Global Education Network <www.globaled.org>. Gayle Brus is the third partner in the development and implementation of this unit, teaches at Henry Munro Middle School in Gloucester, Ontario.

Notes

1. Graham Pike and David Selby. *Global Teacher, Global Learner*. Hodder & Stoughton, 1988, p. 35.
2. For this approach, we credit the work of Janice Brown; see The Leaven Project for Social Justice, One World Research and Education Project.
3. "Playing Fair? The Rules of World Hunger," World Vision Canada, 1990. <worldvision.ca>
4. Philip White. *The Supermarket Tour*. Ontario Public Interest Research Group, 1990.
5. Canadian World Food Day Association. *The Hand That Feeds the World*. Out of print. Excellent current information is available from <www.oxfam.ca/campaigns/WorldFoodDay.htm>.
6. Thomas Berry. *The Dream of the Earth*. Sierra Club Books, 1990.

Originally published in Teaching Green: The Middle Years, New Society Publishers, 2004. Reprinted with permission.

Evaluation Criteria

For a research project:

Throughout the project, the student:

- identifies appropriate sources of information
- uses a variety of different and current sources of information
- takes clear point form notes
- distinguishes between fact and opinion
- takes clear point form notes
- distinguishes between fact and opinion
- detects and describes author's bias
- identifies main points and secondary detail
- collects sufficient information to support main topic
- formulates relevant research questions
- organizes research notes
- effectively uses supporting visual information (graphs, tables, maps, diagrams)
- prepares and edits a draft of final report
- respects timelines
- uses quotations and footnotes correctly

- prepares a complete bibliography
- clearly identifies, describes, and explains the problem and solution(s) related to his/her topic.

For group work: some criteria for peer- or self-evaluation of students' participation.

Throughout group work, the student:

- participates effectively in group discussions
- contributes to group effort with relevant information and ideas
- respects the group's timelines
- helps others by sharing relevant information
- listens to and respects others' ideas
- demonstrates initiative or leadership
- performs as an effective "expert" during the supermarket tour
- gives an effective oral presentation with supporting visual information
- contributes to the group's action plan
- participates in undertaking the group's action plan.

Back-to-the-Tap Movement Gains Momentum

Bottled Water Boycotts

Janet Larsen

FROM SAN FRANCISCO TO NEW YORK to Paris, city governments, high-class restaurants, schools, and religious groups are ditching bottled water in favor of what comes out of the faucet. With people no longer content to pay 1,000 times as much for bottled water, a product no better than water from the tap, a backlash against bottled water is growing.

The US Conference of Mayors, which represents some 1,100 American cities, discussed at its June 2007 meeting the irony of purchasing bottled water for city employees and for city functions while at the same time touting the quality of municipal water. The group passed a resolution sponsored by Mayors Gavin Newsom of San Francisco, Rocky Anderson of Salt Lake City, and R. T. Rybak of Minneapolis that called for the examination of bottled water's environmental impact. The resolution noted that with \$43 billion a year going to provide clean drinking water in cities across the country, "the United States' municipal water systems are among the finest in the world."

While the Mayors Conference fell short of moving to stop taxpayer money from filling the coffers of water bottlers, a growing number of cities are heading in that direction. Los Angeles, which has restricted the purchase of bottled water with city funds since 1987, now has more company. By the end of 2007, purchasing bottled water will be off-limits for San Francisco's departments and agencies, saving a half-million dollars each year and reducing greenhouse gas emissions. St. Louis is poised to ban bottled water purchases for city employees in early 2008.

Urging governments to lead by not buying

At the launch of Corporate Accountability International's "Think Outside the Bottle" campaign in October, Mayor Anderson of Salt Lake City described the "total absurdity and irresponsibility, both economic and environmental, of purchasing and using bottled water when we have perfectly good and safe municipal sources of tap water." He urged city government departments and restaurants to stop buying bottled water.

In November, the city council of Chicago, beleaguered by swelling landfills and a stretched budget, placed a landmark tax of 5¢ on every bottle of water sold in the city in order to discourage consumption. That same month, Illinois state agencies were banned from purchasing bottled water with government funds. With 86 percent of used water bottles in the United States ending up as garbage or litter instead of being recycled, switching from the bottle to the tap helps to alleviate the trash burden.

New York City is urging residents to drink tap water, which is

naturally filtered in the protected Catskill forest region. In Kentucky, the Louisville water utility hands out free bottles for residents to fill with "Pure Tap." Dozens of other local governments are talking up tap water and are looking into banning the bottle.

Tap water promotional campaigns would have seemed quaint a few decades ago, when water in bottles was a rarity. Now such endeavors are needed to counteract the pervasive marketing that has caused consumers to lose faith in the faucet. In fact, more than a quarter of bottled water is just processed tap water, including top-selling Aquafina and Coca-Cola's Dasani. When Pepsi announced in July that it would clearly label its Aquafina water as from a "public water source," it no doubt shocked

Los Angeles, which has restricted the purchase of bottled water with city funds since 1987, now has more company.

everyone who believed that bottles with labels depicting pristine mountains or glaciers delivered a superior product.

Despite the less-frequent quality testing and sometimes commonplace origin of the product, bottled water consumption has soared. Annual consumption in the United States in 1976 was less than 2 gallons for every man, woman, and child; some 30 years later, Americans on average each now drink about 30 gallons of bottled water a year.

All this hydration costs Americans more than \$15 billion a year. The price of individual bottles of water ranges up to several dollars a gallon (and more for designer brands), while tap water is delivered directly to homes and offices for less than a penny a gallon. People complaining about \$3-a-gallon gasoline may start to wonder why they are paying even more per gallon for bottled water.

With sales growing by 10% each year, far faster than any other beverage, bottled water now appears to be the drink of choice for many Americans—they swallow more of it than milk,

juice, beer, coffee, or tea. While some industry analysts are counting on bottled water to beat out carbonated soft drinks to top the charts in the near future, the burgeoning back-to-the-tap movement may reverse the trend.

In contrast to tap water, which is delivered through an energy-efficient infrastructure, bottled water is an incredibly wasteful product. It is usually packaged in single-serving plastic bottles made with fossil fuels. Just manufacturing the 29 billion plastic bottles used for water in the United States each year requires the equivalent of more than 17 million barrels of crude oil.

After being filled, the bottles may travel far. Nearly one quarter of bottled water crosses national borders before reaching consumers, and part of the cachet of certain bottled water brands is their remote origin. Adding in the Pacific Institute's estimates for the energy used for pumping and processing, transportation, and refrigeration, brings the annual fossil fuel footprint of bottled water consumption in the United States to over 50 million barrels of oil equivalent—enough to run 3 million cars for one year. If everyone drank as much bottled water as Americans do, the world would need the equivalent of more than 1 billion barrels of oil to produce close to 650 billion individual bottles.

Concerns about this high energy use and the associated contribution to climate change, along with worries about waste,

are driving many groups back to tap water. The United Church Canada is one of the religious groups abandoning bottled water for moral reasons. The Berkeley school district no longer offers bottled water. And after watching 3,000 empty bottles pile up each week, the Nashville law firm Bass, Berry, & Sims has stopped stocking bottled water.

... it no doubt shocked everyone who believed that bottles with labels depicting pristine mountains or glaciers delivered a superior product.

Europeans have long led the world in per person consumption of bottled water. Italy tops the list worldwide, with Italians drinking 54 gallons per person in 2006. Italy is closely trailed in per capita consumption by the United Arab Emirates and Mexico followed by France, Belgium, Germany, and Spain.

Yet even in Western Europe the bottle is starting to lose clout. Rome, a city of many historic fountains, is promoting its tap water. Florence's city council, schools, and other public offices offer only city water. In the United Kingdom, the Treasury and the Department of Environment, Food and Rural Affairs have ceased offering bottled water at official functions. Bottled water sales in Scandinavia are projected to fall because of growing environmental concerns.

Even France, home to Evian, is seeing a sales slowdown. During a 2005 tap water promotion campaign in Paris, the water utility handed out refillable glass carafes. Now Paris Mayor Bertrand Delanoë serves only tap water at official events and encourages others to do the same. Total bottled water sales in France fell in 2004 and 2005, but rebounded in 2006.

Slowing sales may be the wave of the future as the bottle boycott movement picks up speed. With more than 1 billion people around the globe still lacking access to a safe and reliable source of water, the \$100 billion the world spends on bottled water every year could certainly be put to better use creating and maintaining safe public water infrastructure everywhere.

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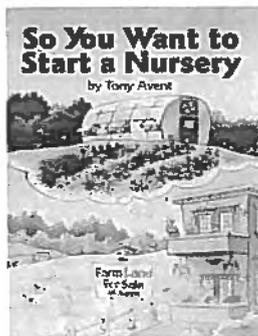


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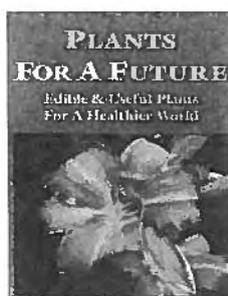


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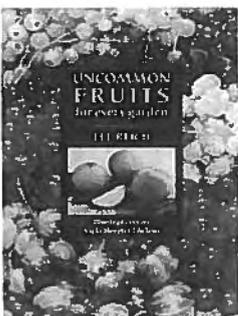
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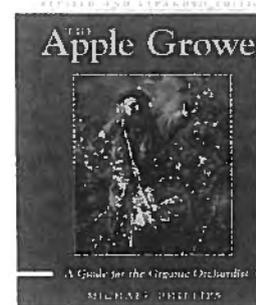
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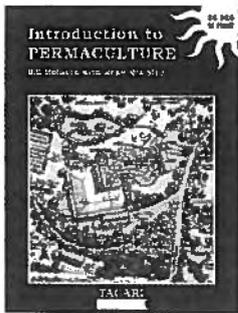
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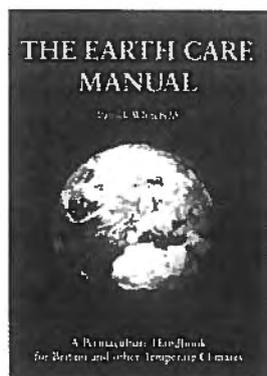
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Progress in Renewable Energy

Solar Cell Production Up 50% in 2007

Jonathan G. Dorn

PRODUCTION OF PHOTOVOLTAICS (PV) jumped to 3,800 megawatts worldwide in 2007, up an estimated 50% over 2006. At the end of the year, according to preliminary data, cumulative global production stood at 12,400 megawatts, enough to power 2.4 million US homes. Growing by an impressive average of 48% each year since 2002, PV production has been doubling every two years, making it the world's fastest-growing energy source.

Photovoltaics, which directly convert sunlight into electricity, include both traditional, polysilicon-based solar cell technologies and new thin-film technologies. Thin-film manufacturing involves depositing extremely thin layers of photosensitive materials on glass, metal, or plastics. While the most common material currently used is amorphous silicon, the newest technologies use non-silicon-based materials such as cadmium telluride.

A key force driving the advancement of thin-film technologies is a polysilicon shortage that began in April 2004. In 2006, for the first time, more than half of polysilicon production went into PVs instead of computer chips. While thin films are not as efficient at converting sunlight to electricity, they currently cost less and their physical flexibility makes them more versatile than traditional solar cells. Led by the United States, thin film grew from 4% of the market in 2003 to 7% in 2006. Polysilicon supply is expected to match demand by 2010, but not before thin film grabs 20% of the market.

The top five PV-producing countries are Japan, China, Germany, Taiwan, and the United States. Recent growth in China is most astonishing: after almost tripling its PV production in 2006, it is believed to have more than doubled output in 2007. With more than 400 PV companies, China's market share has exploded from 1% in 2003 to over 18% today. Having eclipsed Germany in 2007 to take the number two spot, China is now on track to become the number one PV producer in 2008. The United States, which gave the world the solar cell, has dropped from third to fifth place as a solar cell manufacturer since 2005, overtaken by China in 2006 and Taiwan in 2007.

Strong domestic production is not always a good indicator of domestic installations, however. For example, despite China's impressive production, PV prices are still too high for the average Chinese consumer. China only installed 25 megawatts of PV in 2006, exporting more than 90% of its PV production, mainly to Germany and Spain. But large PV projects are expected to increase domestic installations. China is planning a 100-megawatt solar PV farm in Dunhuang City in the northwestern province of Gansu, which would have five times the capacity of the largest PV power plant in the world today.

Despite its skies being cloudy two-thirds of the time, Germany has been the leading market for PV installations since it overtook Japan in 2004. In 2006, Germany, adding 1,050 megawatts, became the first country to install more than one gigawatt in a single year. Driven by a feed-in tariff that guarantees the price a utility must pay homeowners or private firms for PV-generated electricity, annual installations in Germany alone have exceeded those in all other countries combined since 2004. There are now more than 300,000

Growing by an impressive average of 48% each year since 2002, PV production has been doubling every two years, making it the world's fastest-growing energy source.

buildings with PV systems in Germany, over triple the initial goal of the 100,000 Roofs Program launched in 1998. Growth is set to remain strong, as a feed-in tariff of 49¢ per kilowatt-hour will remain in place through 2009.

Japan, the United States, and Spain round out the top four markets with 350, 141, and 70 megawatts installed in 2006, respectively. Thanks to a residential PV incentive program, Japan now has over 250,000 homes with PV systems. But the country is currently experiencing a decrease in the growth rate of PV installations resulting from the phase-out of the incentive program in 2005 and a limited domestic PV supply due to the polysilicon shortage.

In contrast, the growth in installations in the United States increased from 20% in 2005 to 31% in 2006, primarily driven by California and New Jersey. The California Solar Initiative was launched in January 2006 as part of the state's Million Solar Roofs program to provide more than \$3 billion in incentives for

solar power. The goal is to generate 3,000 megawatts of new solar power statewide by 2017. New Jersey's Clean Energy Rebate Program, which began in 2001, offers a rebate of up to \$3.50 per watt for residential PV systems, contributing to a more than tripling of installations between 2005 and 2006. Other states,

Spain also initiated a feed-in tariff in 2004 that guarantees that renewable energy will be bought by utilities at three times the market value for 25 years.

such as Maryland, have passed renewable portfolio standards that mandate a certain percentage of electricity generation from solar PV. For Maryland, the goal of producing 2% of electricity from the sun by 2022 is expected to lead to 1,500 megawatts of PV installations in the state.

Initial estimates for the United States as a whole indicate that PV incentives, including a tax credit of up to \$2,000 available under the US Energy Policy Act of 2005 to offset PV system costs, helped to achieve an incredible 83-percent growth in installations in 2007.

Spain tripled its PV installations in 2006 to 70 megawatts. A building code that went into force in March 2007 requires all new nonresidential buildings to generate a portion of their electricity

with PV. Spain also initiated a feed-in tariff in 2004 that guarantees that renewable energy will be bought by utilities at three times the market value for 25 years. In September 2007, a 20-megawatt PV power plant, currently the largest in the world, came online in the Spanish town of Beneixama and is producing enough electricity to supply 12,000 homes. By the end of 2008, cumulative PV installations in Spain are expected to exceed 800 megawatts, twice its original 2010 goal.

Of the world's PV manufacturers in 2007, Sharp (Japan), Q-Cells (Germany), and Suntech (China) claimed the top three positions. But after holding the top spot for more than six years, Sharp, hampered by limited access to polysilicon, is likely to post only a 4-percent growth in production in 2007, well below the 50% industry average. However, Sharp's annual thin-film production capacity is on track to increase from 15 megawatts today to 1,000 megawatts per year in 2010.

Suntech, a relatively new firm started in 2001, was the fourth-largest PV manufacturer in 2006, and eclipsed Kyocera in 2007 to take third place. In the first half of 2007, Suntech produced almost as much PV as it did in all of 2006.

Capitalizing on the polysilicon supply crunch, First Solar in the United States moved into the top 15 global manufacturers in 2006 by producing 60 megawatts of cadmium telluride thin-film PV, triple its production in 2005. In the first half of 2007, First Solar leapt onto the top 10 list, moving up five spots to number eight and continuing its reign as the fastest-growing PV manufacturing company in the world.

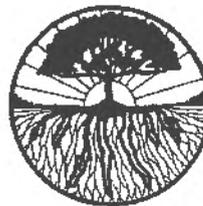
The average price for a PV module, excluding installation and other system costs, has dropped from almost \$100 per watt in 1975 to less than \$4 per watt at the end of 2006. With expanding polysilicon supplies, average PV prices are projected to drop to \$2 per watt in 2010. For thin-film PV alone, production costs are expected to reach \$1 per watt in 2010, at which point solar PV will become competitive with coal-fired electricity. With concerns about rising oil prices and climate change spawning political momentum for renewable energy, solar electricity is poised to take a prominent position in the global energy economy.

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Feeding Eight Billion Well

Lester R. Brown

IN APRIL 2005, THE WORLD FOOD PROGRAMME and the Chinese government jointly announced that food aid shipments to China would stop at the end of the year. For a country where a generation ago hundreds of millions of people were chronically hungry, this was a landmark achievement. Not only has China ended its dependence on food aid, but almost overnight it has become the world's third largest food aid donor. (1)

The key to China's success was the economic reforms in 1978 that dismantled its system of agricultural collectives, known as production teams, and replaced them with family farms. In each village, the land was allocated among families, giving them long-term leases on their piece of land. The move harnessed the energy and ingenuity of China's rural population, raising the grain harvest by half from 1977 to 1986. With its fast-expanding economy raising incomes, with population growth slowing, and with the grain harvest climbing, China eradicated most of its hunger in less than a decade—in fact, it eradicated more hunger in a shorter period of time than any country in history. (2)

While hunger has been disappearing in China, it has been spreading in sub-Saharan Africa and parts of the Indian subcontinent. As a result, the number of people in developing countries who are hungry has increased from a recent historical low of 800 million in 1996 to 830 million in 2003. In the absence of strong leadership, the record or near-record grain prices in late 2007 will likely raise the number of hungry people even further, with children suffering the most. (3)

One key to the threefold expansion in the world grain harvest since 1950 was the rapid adoption in developing countries of high-yielding wheats and rices originally developed in Japan and hybrid corn from the United States. The spread of these highly productive seeds, combined with a tripling of irrigated area and an 11-fold increase in world fertilizer use, tripled the world grain harvest. Growth in irrigation and fertilizer use essentially removed soil moisture and nutrient constraints on much of the world's cropland. (4)

Now the outlook is changing. Farmers are faced with shrinking supplies of irrigation water, a diminishing response to additional fertilizer use, rising temperatures, the loss of cropland to nonfarm uses, rising fuel costs, and a dwindling backlog of yield-raising technologies.

At the same time, they also face a fast-growing demand for farm products from the annual addition of some 70 million people a year, the desire of some five billion people to consume more livestock products, and the millions of motorists turning to crop-based fuels to supplement tightening supplies of gasoline and diesel fuel. (5)

This helps explain why world grain production has fallen short of consumption in seven of the last eight years, dropping world grain stocks to the lowest level since 1974. Farmers and agronomists are now being thoroughly challenged. (6)

Rethinking land productivity

The shrinking backlog of unused agricultural technology and the associated loss of momentum in raising cropland productivity is found worldwide. Between 1950 and 1990, world grain yield per hectare climbed by 2.1% a year, ensuring rapid growth in the world grain harvest. From 1990 to 2007, however, it rose only 1.2% annually. This is partly because the yield response to the additional application of fertilizer is diminishing and partly because irrigation water supplies are limited. (7)

This calls for fresh thinking on how to raise cropland productivity. One way is to breed crops that are more tolerant of drought and cold. US corn breeders have developed corn varieties that are more drought-tolerant, enabling corn production to move westward into Kansas, Nebraska, and South Dakota. Kansas, the leading US wheat-producing state, has used a combination of drought-resistant varieties in some areas and irrigation in others to expand corn planting to where the state now produces more corn than wheat. Similarly, corn production is expanding in more northern states such as North Dakota and Minnesota. (8)

1. "Last Food Shipment Signals End of 25-Year WFP Aid to China," *Asian Economic News*, 8 April 2005; US Dept. of Agriculture (USDA), Production, Supply and Distribution, electronic database, at www.fas.usda.gov/psdonline, updated 10 August 2007; UN World Food Programme, "China Emerges as World's Third Largest Food Aid Donor," press release (Rome: 20 July 2006).

2. Xie Wei and Christian DeBresson, *China's Progressive Market Reform and Opening* (Geneva: UN Industrial Development Org., 2001); USDA, op. cit. note 1.

3. UN Food and Agriculture Organization (FAO), *The State of Food Insecurity in the World 2006* (Rome: 2006), p. 8; Madelene Pearson and Danielle Rossingh, "Wheat Price Rises to Record \$9 a Bushel on Global Crop Concerns," Bloomberg, 12 September 2007.

4. Thomas R. Sinclair, "Limits to Crop Yield," paper presented at the 1999 National Academy Colloquium, Plants and Populations: Is There Time? Irvine, CA, 5/6 Dec. 1998; Patrick Heffer, "Short-Term Prospects for World Agriculture and Fertilizer Demand 2005/06-2007/08" (Buenos Aires: Intl. Fertilizer Industry Assn., January 2007); 1950/1960 data

Another way of raising land productivity, where soil moisture permits, is to increase the area of multicropped land that produces more than one crop per year. Indeed, the tripling in the world grain harvest since 1950 is due in part to impressive increases in multiple cropping in Asia. Some of the more common combinations are wheat and corn in northern China, wheat and rice in northern India, and the double or triple cropping of rice in southern China, southern India, and rice-growing countries in Southeast Asia. (9)

The spread in double cropping of winter wheat and corn on the North China Plain helped boost China's grain production to where it rivaled that of the United States. Winter wheat grown there yields close to four tons per hectare. Corn averages five tons. Together these two crops, grown in rotation, can yield nine tons per hectare per year. China's double cropped rice yields eight tons per hectare. (10)

Forty years ago, north India produced only wheat, but with the advent of the earlier maturing high-yielding wheats and rices, wheat could be harvested in time to plant rice. This wheat/rice combination is now widely used throughout the Punjab, Haryana, and parts of Uttar Pradesh. The wheat yield of three tons and rice yield of two tons combine for five tons of grain per hectare, helping to feed India's 1.2 billion people. (11)

In North America and Western Europe, which in the past have restricted cropped area to control surpluses, there is some potential for double cropping that has not been fully exploited. In the United States, the lifting of planting area restrictions in 1996 opened new opportunities for multiple cropping. The most common US double cropping combination is winter wheat with soybeans as a summer crop. Since soybeans fix nitrogen, this reduces the need to apply fertilizer to wheat. (12)

A concerted US effort both to breed earlier maturing varieties and to develop cultural practices that would facilitate multiple cropping could substantially boost crop output. If China's farmers can extensively double crop wheat and corn, then US farmers—at a similar latitude and with similar climate patterns—could do the same if agricultural research and farm policy were reoriented to support it.

Western Europe, with its mild winters and high-yielding winter wheat, might also be able to double crop more with a summer grain, such as corn, or with a winter oilseed crop. Elsewhere, Brazil and Argentina have an extended frost-free growing season that supports extensive multicropping, often wheat or corn with soybeans. (13)

In many countries, including the United States, most of those in Western Europe, and Japan, fertilizer use has reached a level

where using more has little effect on crop yields. There are still some places, however, such as most of Africa, where additional fertilizer would help boost yields. Unfortunately, sub-Saharan Africa lacks the infrastructure to transport fertilizer economically to the villages where it is needed. As a result of nutrient depletion, grain yields in much of sub-Saharan Africa are stagnating. (14)

One encouraging response to this situation in Africa is the simultaneous planting of grain and leguminous trees. At first the trees grow slowly, permitting the grain crop to mature and be harvested; then the saplings grow quickly to several feet in

The key to China's success was the economic reforms in 1978 that dismantled its system of agricultural collectives. . .

height, dropping leaves that provide nitrogen and organic matter both sorely needed in African soils. The wood is then cut and used for fuel. This simple, locally adapted technology, developed by scientists at the International Centre for Research in Agroforestry in Nairobi, has enabled farmers to double their grain yields within a matter of years as soil fertility builds. (15)

Another often overlooked issue is the effect of land tenure or productivity. In China, this issue was addressed in March 2007 when the National People's Congress passed legislation protecting property rights. Farmers who had previously occupied their land under 30-year leases would gain additional protection from land confiscation by local officials who, over a number of years, had seized land from some 40 million farmers, often for development. Secure land ownership encourages farmers to invest in and improve their land. A Rural Development Institute survey in China revealed that farmers with documentation of land rights were twice as likely to make long-term investments in their land, such as adding greenhouses, orchards, or fishponds. (16)

from USDA, in Worldwatch Institute, *Signposts 2001*, CD-ROM (Washington: 2001); USDA, *op. cit.* note 1.

5. UN Population Division, *World Population Prospects: The 2006 Revision Population Database*, at esa.un.org/unpp, updated 2007.

6. USDA, *op. cit.* note 1.

7. *Ibid.*; Worldwatch Inst., *op. cit.* note 4.

8. USDA, National Agricultural Statistics Service (NASS), *Crop Production 2006 Summary* (Washington: Jan. 2007); USDA, NASS, QuickStats, electronic database, at www.nass.usda.gov/Data

_and_Statistics/Quick_Stats, viewed 28 Sept. 2007.

9. USDA, *op. cit.* note 1; Worldwatch Inst., *op. cit.* note 4.

10. John Wade, Adam Branson, and Xiang Qing, *China Grain and Feed Annual Report 2002* (Beijing: USDA, 2002); USDA, *op. cit.* note 1.

11. Double-cropping yields from USDA, *India Grain and Feed Annual Report 2003* (New Delhi: 2003); UN Population Div., *op. cit.* note 5; USDA, *op. cit.* note 1.

12. Richard Magleby, "Soil Management and Conservation," in USDA, *Agricultural Resources and Environmental Indicators 2003*

Despite local advances, the overall loss of momentum in expanding food production is unmistakable. It will force us to think more seriously about stabilizing population, moving down the food chain, and using the existing harvest more productively. Achieving an acceptable worldwide balance between food and people may now depend on stabilizing population as soon as possible, reducing the unhealthy high consumption of animal products among the affluent, and restricting the conversion of food crops to automotive fuels.

Raising water productivity

With water shortages emerging as a constraint on food production growth, the world needs an effort to raise water productivity similar to the one that nearly tripled land productivity during the last half of the twentieth century. Land productivity is typically measured in tons of grain per hectare or bushels per acre. A comparable indicator for irrigation water is kilograms of grain produced per ton of water. Worldwide, that average is now roughly 1 kilogram of grain per ton of water used. (17)

Since it takes 1,000 tons of water to produce one ton of grain, it is not surprising that 70% of world water use is devoted to irrigation. Thus, raising irrigation efficiency is central to raising water productivity overall. Using more water-efficient irrigation technologies and shifting to crops that use less water permit the expansion of irrigated area even with a fixed water supply. Eliminating water and energy subsidies that encourage wasteful water use allows water prices to rise to market levels. Higher water prices encourage all water users to use water more efficiently. Institutionally, local rural water users associations that directly involve those using the water in its management have raised water productivity in many countries. (18)

Data on water irrigation efficiency for surface water projects—that is, dams that deliver water to farmers through a

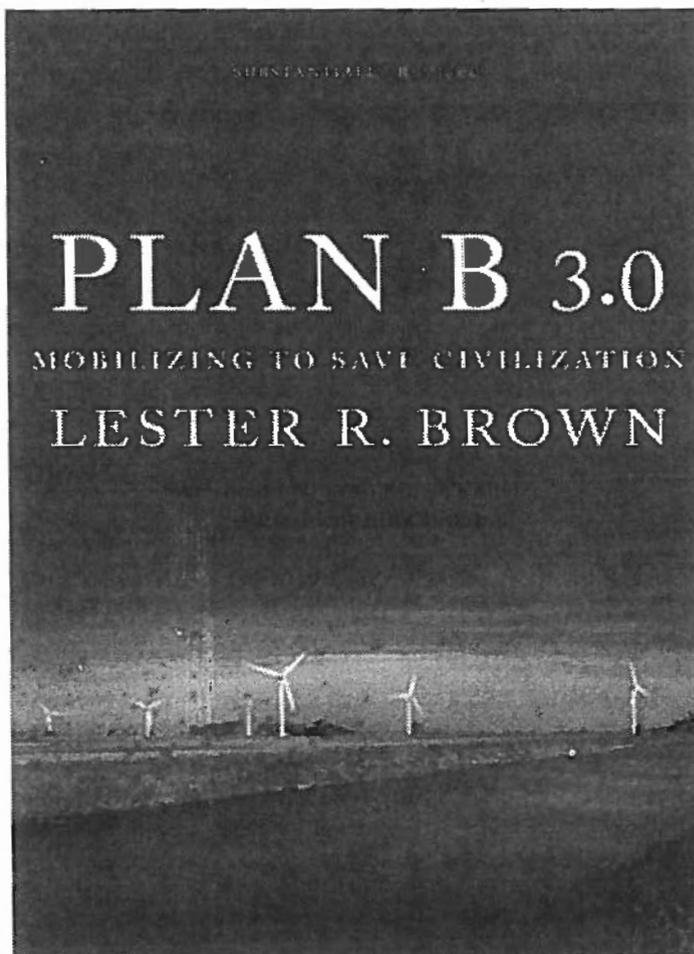
network of canals—show that crop usage of irrigation water never reaches 100% simply because some irrigation water evaporates, some percolates downward, and some runs off. Water policy analysts Sandra Postel and Amy Vickers found that “surface water irrigation efficiency ranges between 25 and 40% in India, Mexico, Pakistan, the Philippines, and Thailand; between 40 and 45% in Malaysia and Morocco; and between 50

and 60% in Israel, Japan, and Taiwan.” Irrigation water efficiency is affected not only by the type and condition of irrigation systems but also by soil type, temperature, and humidity. In hot arid regions, the evaporation of irrigation water is far higher than in cooler humid regions. (19)

In a May 2004 meeting, China’s Minister of Water Resources Wang Shucheng outlined for me in some detail the plans to raise China’s irrigation efficiency from 43% in 2000 to 51% in 2010 and then to 55% in 2030. The steps he described included raising the price of water, providing incentives for adopting more irrigation-efficient technologies, and developing the local institutions to manage this process. Reaching

these goals, he felt, would assure China’s future food security. (20)

Raising irrigation water efficiency typically means shifting from the less efficient flood or furrow system to overhead sprinklers or drip irrigation, the gold standard of irrigation efficiency. Switching from flood or furrow to low-pressure sprinkler systems reduces water use by an estimated 30%, while



(Washington: Feb. 2003), Chapter 4.2, p. 14.

13. USDA, op. cit. note 1; Randall D. Schnepf et al., *Agriculture in Brazil and Argentina* (Washington: USDA Economic Research Service (ERS), 2001), pp. 8-10.

14. FAO, ResourceSTAT, electronic database, at faostat.fao.org/site/405/default.aspx, updated 30 June 2007; USDA, op. cit. note 1.

15. Pedro Sanchez, “The Climate Change: Soil Fertility/Food Security Nexus,” summary note (Bonn: Intl. Food Policy Research Inst., 4 Sept. 2001).

16. Edward Cody, “Chinese Lawmakers Approve Measure to Protect Private Property Rights,” *Washington Post*, 17 March 2007; Jim Yardley, “China Nears Passage of Landmark Property Law,” *New York Times*, 9 March 2007; Zhu Keliang and Roy Prosterman, “From Land Rights to Economic Boom,” *China Business Review*, July/August 2006.

17. Worldwatch Inst., op. cit. note 4; USDA, op. cit. note 1; water use for grain production from FAO, *Crops and Drops* (Rome: 2002), p. 17.

18. Water requirements for grain production from FAO, *Yield Response to Water* (Rome: 1979); water use from I. A. Shiklomanov, “Assessment

switching to drip irrigation typically cuts water use in half. (21)

As an alternative to furrow irrigation, a drip system also raises yields because it provides a steady supply of water with minimal losses to evaporation. Since drip systems are both labor-intensive and water-efficient, they are well suited to countries with a surplus of labor and a shortage of water. (22)

A few small countries—Cyprus, Israel, and Jordan—rely heavily on drip irrigation. Among the big three agricultural

Since it takes 1,000 tons of water to produce one ton of grain, it is not surprising that 70% of world water use is devoted to irrigation.

producers, this more-efficient technology is used on 0.33% of irrigated land in India and China and on roughly 4% in the United States. (23)

In recent years, small-scale drip-irrigation systems—virtually a bucket with flexible plastic tubing to distribute the water—have been developed to irrigate small vegetable gardens with roughly 100 plants (covering 25 sq. m.). Somewhat larger drum systems irrigate 125 sq. m. In both cases, the containers are elevated slightly, so that gravity distributes the water. Large-scale drip systems using plastic lines that can be moved easily are also becoming popular. These simple systems can pay for themselves in one year. By simultaneously reducing water costs and raising yields, they can dramatically raise incomes of smallholders. (24)

Sandra Postel estimates that the combination of these drip technologies at various scales has the potential to profitably irrigate 10 million hectares of India's cropland, or nearly one tenth of the total. She sees a similar potential for China, which is now also expanding its drip irrigated area to save scarce water. (25)

In the Punjab, with its extensive double cropping of wheat and rice, fast-falling water tables led the state farmers' commission in 2007 to recommend a delay in transplanting rice from May to late June or early July. This would reduce irrigation water use by roughly one third since transplanting would coincide with the arrival of the monsoon. This reduction in groundwater use would help stabilize the water table, which has fallen from 5m below the surface to 30m in parts of the state. (26)

Institutional shifts—specifically, moving the responsibility for managing irrigation systems from government agencies to local water users associations—can facilitate the more efficient use of water. In many countries farmers are organizing locally so they can assume this responsibility, and since they have an economic stake in good water management, they tend to do a better job than a distant government agency. (27)

Mexico is a leader in developing water users associations. As of 2002, farmers associations managed more than 80% of Mexico's publicly irrigated land. One advantage of this shift for the government is that the cost of maintaining the irrigation system is assumed locally, reducing the drain on the treasury. This means that associations often need to charge more for irrigation water, but for farmers the production gains from managing their water supply themselves more than outweigh this additional outlay. (28)

In Tunisia, where water users associations manage both irrigation and residential water, the number of associations increased from 340 in 1987 to 2,575 in 1999, covering much of the country. Many other countries now have such bodies managing their water resources. Although the early groups were organized to deal with large publicly developed irrigation systems, some recent ones have been formed to manage local groundwater irrigation as well. Their goal is to stabilize the water table to avoid aquifer depletion and the economic disruption that it brings to the community. (29)

Low water productivity is often the result of low water prices. In many countries, subsidies lead to irrationally low water prices creating the impression that water is abundant when in fact it is scarce. As water becomes scarce, it needs to be priced accordingly. Provincial governments in northern China are raising water prices in small increments to discourage waste. A higher water price affects all water users, encouraging investment in more water-efficient irrigation technologies, industrial processes, and household appliances. (30)

What is needed now is a new mindset, a new way of thinking about water use. For example, shifting to more water-efficient crops wherever possible boosts water productivity. Rice

of Water Resources and Water Availability in the World," Report for the Comprehensive Assessment of the Freshwater Resources of the World (St. Petersburg, Russia: State Hydrological Inst., 1998), cited in Peter H. Gleick, *The World's Water 2000/2001* (Washington: Island Press, 2000), p. 53.

19. Sandra Postel and Amy Vickers, "Boosting Water Productivity," in Worldwatch Inst., *State of the World 2004* (New York: W. W. Norton & Company, 2004), pp. 51-52.

20. Wang Shucheng, discussion with author, Beijing, May 2004.

21. FAO, op. cit. note 17, p. 17; Alain Vidal, Aline Comeau, and Hervé Plusquellec, *Case Studies on Water Conservation in the Mediterranean Region* (Rome: FAO, 2001), p. vii.

22. FAO, op. cit. note 17, p. 17; Vidal, Comeau, and Plusquellec, op. cit. note 21, p. vii.

23. Postel and Vickers, op. cit. note 19, p. 53.

24. Sandra Postel et al., "Drip Irrigation for Small Farmers: A New Initiative to Alleviate Hunger and Poverty," *Water Intl.*, March 2001, pp. 3-13.

production is being phased out around Beijing because rice is such a thirsty crop. Similarly, Egypt restricts rice production in favor of wheat. (31)

Any measures that raise crop yields on irrigated land also raise the productivity of

industrial processes and using more water-efficient household appliances. Recycling urban water supplies is another obvious step to consider in countries facing acute water shortages.

protein more efficiently. With some 37% (about 740 million tons) of the world grain harvest used to produce animal protein, even a modest gain in efficiency can save a large quantity of grain. (33)

World meat consumption increased from 44 million tons in 1950 to 240 million tons in 2005, more than doubling consumption per person from 17 kg to 39 kg (86 lbs). Consumption of milk and eggs has also risen. In every society where incomes have risen, meat consumption has too, perhaps reflecting a taste that evolved over four million years of hunting and gathering. (34)

As both the oceanic fish catch and the production of beef on rangelands have leveled off, the world has shifted to grain-based production of animal protein to expand output. And as the demand for meat climbs, consumers are shifting from beef and pork to poultry and fish, sources that convert grain into protein most efficiently. Health concerns among industrial-country consumers are reinforcing this shift.

Mounting pressures on land and water resources have led to the evolution of some promising new animal protein production systems that are based on roughage rather than grain . . .

irrigation water. Similarly, any measures that convert grain into animal protein more efficiently in effect increase water productivity.

For people consuming unhealthy amounts of livestock products, moving down the food chain reduces water use. In the United States, where annual consumption of grain as food and feed averages some 800 kilograms (four-fifths of a ton) per person, a modest reduction in the consumption of meat, milk, and eggs could easily cut grain use per person by 100 kilograms. For 300 million Americans, such a reduction would cut grain use by 30 million tons and irrigation water use by 30 billion tons. (32)

Reducing water use to the sustainable yield of aquifers and rivers worldwide involves a wide range of measures not only in agriculture but throughout the economy. The more obvious steps, in addition to more water-efficient irrigation practices and more water-efficient crops, include adopting more water-efficient

Producing protein more efficiently

Another way to raise both land and water productivity is to produce animal



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25. Ibid.

26. "Punjab's Depleting Groundwater Stagnates Agricultural Growth," *Down to Earth*, vol. 16, no. 5 (30 July 2007).

27. For more information on water users associations, see R. Maria Saleth and Ariel Dinar, *Water Challenge and Institutional Response: A Cross-Country Perspective* (Washington, DC: World Bank, 1999), p. 26.

28. Ibid., p. 6.

29. World Bank and Swiss Agency for Development and Cooperation, Summary Report, Middle East and North Africa Regional Water Initiative Workshop on Sustainable Groundwater Management, Sana'a, Yemen, 25/28 June 2000, p. 19.

30. Peter Wonacott, "To Save Water, China Lifts Price," *Wall Street Journal*, 14 June 2004.

31. USDA, op. cit. note 1; USDA, Foreign Agricultural Service (FAS), "Egyptian Rice Acreage Continues to Exceed Government-Designated Limitations," *Foreign Countries' Policies and Programs*, FASonline, viewed 28 September 2007; "Rice Cropped for Water," *China Daily*, 9 January 2002.

32. UN Population Division, op. cit. note 5; grain consumption from USDA, op. cit. note 1;

The efficiency with which various animals convert grain into protein varies widely. With cattle in feedlots, it takes roughly seven kilograms of grain to produce a one-kilogram gain in live weight. For pork, the figure is over three kilograms of grain per kilogram of weight gain, for poultry it is just over two, and for herbivorous species of farmed fish (such as carp, tilapia, and catfish), it is less than two. As the market shifts production to the more grain-efficient products, it raises the productivity of both land and water. (35)

Global beef production, most of which comes from rangelands, grew less than 1% a year from 1990 to 2006. Growth in the number of cattle feedlots was minimal. Pork production grew by 2.6% annually, and poultry by nearly 5%. The rapid growth in poultry production, going from 41 million tons in 1990 to 83 million tons in 2006 enabled poultry to eclipse beef in 1995, moving it into second place behind pork. World pork production, half of it now in China, overtook beef production in 1979 and has continued to widen the lead since then. (36)

Fast-growing, highly grain-efficient fish farm output may also overtake beef production within the next decade or so. In fact, aquaculture has been the fastest-growing source of animal protein since 1990, largely because herbivorous fish convert feed into protein so efficiently. Aquacultural output expanded from 13 million tons in 1990 to 48 million tons in 2005, growing by more than 9% a year. (37)

Public attention has focused on aquacultural operations that are environmentally inefficient or disruptive, such as the farming of salmon, a carnivorous species, and shrimp. These operations account for 4.7 million tons of output, less than 10% of the global farmed fish total, but they are growing fast. Salmon are inefficient in that they are fed other fish, usually as fishmeal, which comes either from fish processing wastes or from low-value fish caught specifically for this purpose. Shrimp farming often involves the destruction of coastal mangrove forests to create areas for the shrimp. (38)

Worldwide, aquaculture is dominated by herbivorous species—mainly carp in China and India, but also catfish in the United States and tilapia in several countries—and shellfish. This is where the great growth potential for efficient animal protein production lies.

China, the world's leading producer, accounts for an astounding two-thirds of global fish farm output. Aquacultural production in China is dominated by finfish (mostly carp), which are produced inland in freshwater ponds, lakes, reservoirs, and rice paddies, and by shellfish (mostly oysters, clams, and mussels), which are produced mostly in coastal regions. (39)

Over time, China has also developed a fish polyculture using four types of carp that feed at different levels of the food chain, in effect emulating natural aquatic ecosystems. Silver carp and bighead carp are filter feeders, eating phytoplankton and zooplankton respectively. The grass carp, as its name implies, feeds largely on vegetation, while the common carp is a bottom feeder, living on detritus. These four species thus form a small ecosystem, with each filling a particular niche. This multi-species system, which converts feed into high-quality protein with remarkable efficiency, allowed China to produce some 14 million tons of carp in 2005. (40)

The new reality is that the Ministry of Energy may have a greater influence on future food security than the Ministry of Agriculture.

While poultry production has grown rapidly in China, as in other developing countries, it has been dwarfed by the phenomenal growth of aquaculture. Today aquacultural output in China—at 30 million tons—is double that of poultry, making it the first major country where fish farming has eclipsed poultry farming. (41)

China's aquaculture is often integrated with agriculture, enabling farmers to use agricultural wastes, such as pig or duck manure, to fertilize ponds, thus stimulating the growth of plankton on which the fish feed. Fish polyculture, which commonly boosts pond productivity over that of monocultures at least half, is widely practiced in both China and India. (42)

With incomes now rising in densely populated Asia, other countries are following China's aquacultural lead. Among them are Thailand and Viet Nam. Viet Nam, for example, devised a plan in 2001 of developing 700,000 hectares of land in the Mekong Delta for aquaculture, which now produces more than

water calculation based on 1,000 tons of water for 1 ton of grain from FAO, op. cit. note 18.

33. USDA, op. cit. note 1.

34. FAO, FAOSTAT, electronic database at faostat.fao.org, updated 30 June 2007; 1950 data from Worldwatch Inst., op. cit. note 4.

35. Feed-to-poultry conversion ratio derived from data in Robert V. Bishop et al., *The World Poultry Market-Government Intervention and Multilateral Policy Reform* (Washington: USDA, 1990); conversion ratio of grain to beef based on Allen Baker, Feed Situation and Outlook staff,

ERS, USDA, discussion with author, 27 April 1992; pork data from Leland Southard, Livestock and Poultry Situation and Outlook staff, ERS, USDA, discussion with author, 27 April 1992; fish from Rosamond L. Naylor et al., "Effect of Aquaculture on World Fish Supplies," *Nature*, vol. 405 (29 June 2000), pp. 1017/24.

36. USDA, op. cit. note 1.

37. FAO, FISHSTAT Plus, electronic database, at www.fao.org, updated March 2007; Naylor et al., op. cit. note 35.

38. Naylor et al., op. cit. note 35; FAO, op. cit. note 37; Taija-Riitta

million tons of fish and shrimp. (43)

In the United States, catfish, which require less than 2 kilograms of feed per kilogram of live weight, is the leading aquacultural product. US annual catfish production of 600 million lbs. (about two lbs. per person) is concentrated in the South. Mississippi, with easily 60% of US output, is the catfish capital of the world. (44)

When we think of soybeans in our daily diet, it is typically as tofu, veggie burgers, or other meat substitutes. But most of the world's fast-growing soybean harvest is consumed indirectly in the beef, pork, poultry, milk, eggs, and farmed fish that we eat. Although not a visible part of our diets, the incorporation of soybean meal into feed rations has revolutionized the world feed industry, greatly increasing the efficiency with which grain is converted into animal protein. (45)

In 2007, the world's farmers produced 222 million tons of soybeans—one ton for every nine tons of grain produced. Of this, some 20 million tons were consumed directly as tofu or meat

substitutes. The bulk of the remaining 202 million tons, after some was saved for seed, was crushed in order to extract 37 million tons of soybean oil, separating it from the highly valued, high-protein meal. (46)

The 160 million or so tons of protein-rich soybean meal that remain after the oil is extracted is fed to cattle, pigs, chicken, and fish. Combining soybean meal with grain in roughly one part meal to four parts grain dramatically boosts the efficiency with which grain is converted into animal protein, sometimes nearly doubling it. (47)

The world's three largest meat producers—China, the United States, and Brazil—now all rely heavily on soybean meal as a protein supplement in feed rations. (48)

The use of soybean meal in livestock feed, poultry, and fish both replaces some grain in feed and increases the efficiency with which the remaining grain is converted into livestock products. This helps explain why the share of the world grain harvest used for feed has not increased over the last 20 years even though

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Tuominen and Maren Esmark, *Food for Thought: The Use of Marine Resources in Fish Feed* (Oslo: WWF-Norway, 2003).

39. FAO, op. cit. note 37.

40. S.F. Li, "Aquaculture Research and Its Relation to Development in China," in World Fish Center, *Agricultural Development and the Opportunities for Aquatic Resources Research in China* (Penang, Malaysia: 2001), p. 26; FAO, op. cit. note 37.

41. FAO, op. cit. note 37; FAO, op. cit. note 34.

42. Naylor et al., op. cit. note 35; W. C. Nandeeshia et al., "Breeding of

Carp with Oviprim," in *Indian Branch, Asian Fisheries Society, India, Special Publication No. 4* (Mangalore, India: 1990), p. 1.

43. "Mekong Delta to Become Biggest Aquatic Producer in Vietnam," *Vietnam News Agency*, 3 August 2004; "The Mekong Delta Goes Ahead with the WTO," *Vietnam Economic News Online*, 8 June 2007; FAO, op. cit. note 37.

44. Naylor et al., op. cit. note 35; US catfish production data from USDA, NASS, *Catfish Production* (Washington: February 2003), p. 5.

45. USDA, op. cit. note 1; Suzi Fraser Dominy, "Soy's Growing

production of meat, milk, eggs, and farmed fish has climbed. It also explains why world soybean production has increased nearly 14-fold since 1950. (49)

Mounting pressures on land and water resources have led to the evolution of some promising new animal protein production systems that are based on roughage rather than grain, such as milk production in India. Since 1970, India's milk production has increased more than fourfold, jumping from 21 million to 96 million tons. In 1997 India overtook the United States to become the world's leading producer of milk and other dairy products. (50)

The spark for this explosive growth came in 1965 when an enterprising young Indian, Dr. Verghese Kurien, organized the National Dairy Development Board, an umbrella organization of dairy cooperatives. The dairy coop's principal purpose was to market the milk from tiny herds that typically averaged two to three cows each, providing the link between the growing market for dairy products and the millions of village families who had only a small marketable surplus. (51)

Creating the market for milk spurred the fourfold growth in output. In a country where protein shortages stunt the growth of so many children, expanding the milk supply from less than half a cup per person a day 30 years ago to one cup today represents a major advance. (52)

What is so remarkable is that India has built the world's largest dairy industry almost entirely on roughage—wheat straw, rice straw, corn stalks, and grass gathered from the roadside. Even so, the value of the milk produced each year now exceeds that of the rice harvest. (53)

A second new protein production model, one that also relies on ruminants and roughage, has evolved in four provinces in eastern China—Hebei, Shangdong, Henan, and Anhui—where double cropping of winter wheat and corn is common. Although wheat straw and cornstalks are often used as fuel for cooking, villagers are shifting to other sources of energy for this, which lets them feed the straw and cornstalks to cattle. Supplementing this roughage with small amounts of nitrogen in the form of urea allows the microflora in the complex four-stomach digestive system of cattle to convert roughage into animal protein more efficiently. (54)

These four crop-producing provinces in China, dubbed the Beef Belt by officials, use crop residues to produce much more beef than the vast grazing provinces in the northwest do. The use of crop residues to produce milk in India and beef in China lets farmers reap a second harvest from the original grain crop, thus boosting both land and water productivity. (55)

Although these new protein models have evolved in India and China, both densely populated countries, similar systems can be adopted in other countries as population pressures intensify, as demand for meat and milk increases, and as farmers seek new ways to convert plant products into animal protein.

The world desperately needs more new protein production techniques such as these. Meat consumption is growing twice as fast as population, egg consumption is growing nearly three times as fast, and growth in the demand for fish—both from the oceans and from fish farms—is also outpacing that of population. (56)

While the world has had many years of experience in feeding an additional 70 million people each year, it has no experience with some five billion people striving to move up the food chain at the same time. For a sense of what this translates into, consider what has happened in China, where record economic growth has in effect telescoped history, showing how diets change when incomes rise rapidly. As recently as 1978, meat consumption in China consisted mostly of modest amounts of pork. Since then, consumption of meat—pork, beef, poultry, and mutton—has climbed severalfold, pushing China's total meat consumption far above that of the United States. (57)

While diversifying diets has dramatically improved nutrition in China, in most of the developing world nutritional disorders remain. For example, half the women in the developing world suffer from anemia, the world's most common nutritional deficiency. Diets high in starchy food and low in iron-rich foods such as leafy green vegetables, shellfish, nuts, and red meat, lead to insufficient iron in the diet, which in turn leads to low birthweights and high infant and maternal mortality. (58)

Encouragingly, a decade of research by the Canadian-based Micronutrient Initiative has succeeded in fortifying salt with iodine and iron together. Just as iodine fortification of salt eliminated iodine deficiency diseases, so, too, can the addition of iron eliminate iron deficiency diseases. This double-fortified salt is being introduced initially in India, Kenya, and Nigeria. The prospect of eliminating iron deficiency disorders at an annual cost of 20¢ per person is one of the most exciting new options for improving the human condition in this new century. (59)

Moving down the food chain

One of the questions I am most often asked is, "How many people can the earth support?" I answer with another question: "At what level of food consumption?" Using round numbers, at the US level of 800 kilograms of grain per person annually for food and feed, the 2-billion-ton annual world harvest of grain

Importance," *World Grain*, 13 April 2004.

46. USDA, FAS, *Oilseeds: World Markets and Trade* (Washington: Aug. 2007).

47. USDA, op. cit. note 1.

48. Ibid.

49. Historical statistics in *Worldwatch Inst.*, op. cit. note 4; USDA, op. cit. note 1.

50. FAO, op. cit. note 34.

51. S. C. Dhall and Meena Dhall, "Dairy Industry—India's Strength in

Its Livestock," *Business Line*, Internet Edition of *Financial Daily* from The Hindu group of publications, 7 November 1997; see also Surinder Sud, "India Is Now World's Largest Milk Producer," *India Perspective* May 1999, pp. 25/26; A. Banerjee, "Dairying Systems in India," *World Animal Review*, vol. 79, no. 2 (1994).

52. USDA, op. cit. note 1; UN Population Division, op. cit. note 5.

53. Dhall and Dhall, op. cit. note 51; Banerjee, op. cit. note 51; FAO op. cit. note 34.

54. Wade, Branson, and Xiang, op. cit. note 10; China's crop residue

would support 2.5 billion people. At the Italian level of consumption of close to 400 kilograms, the current harvest would support five billion people. At the 200 kilograms of grain consumed by the average Indian, it would support a population of 10 billion. (60)

In every society where incomes rise, people move up the food chain, eating more animal protein as beef, pork, poultry, milk, eggs, and seafood. The mix of animal products varies with geography and culture, but the shift to more livestock products as purchasing power increases appears to be universal.

As consumption of livestock products, poultry, and farmed fish rises, grain use per person also rises. Of the roughly 800 kilograms of grain consumed per person each year in the United States, about 100 kilograms is eaten directly as bread, pasta, and breakfast cereals, while the bulk of the grain is consumed indirectly in the form of livestock and poultry products. By contrast, in India, where people consume just under 200 kilograms of grain per year, or roughly a pound per day, nearly all grain is eaten directly to satisfy basic food energy needs. Little is available for conversion into livestock products. (61)

Of the three countries just cited, life expectancy is highest in Italy even though US medical expenditures per person are much higher. People who live very low or very high on the food chain do not live as long as those in an intermediate position. Those consuming a Mediterranean type diet that includes meat, cheese, and seafood, but all in moderation, are healthier and live longer. People living high on the food chain, such as Americans or Canadians, can improve their health by moving down the food chain. For those who live in low-income countries like India, where a starchy staple such as rice can supply 60% or more of total caloric

intake, eating more protein-rich foods can improve health and raise life expectancy. (62)

In agriculture we often look at how climate affects the food supply but not at

how what we eat affects climate. While we understand rather well the link between climate change and the fuel efficiency of the cars we buy, we do not have a comparable understanding of the



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production and use from Gao Tengyun, "Treatment and Utilization of Crop Straw and Stover in China," *Livestock Research for Rural Development*, Feb. 2000.

55. USDA, ERS, "China's Beef Economy: Production, Marketing, Consumption, and Foreign Trade," *International Agriculture and Trade Reports: China* (Washington: July 1998), p. 28.

56. FAO, op. cit. note 34; UN Population Division, op. cit. note 5.

57. China's economic growth from International Monetary Fund (IMF), World Economic Outlook Database, at www.imf.org/external/pubs/ft/weo, updated 11 April 2007; UN Population Division, op. cit. note 5; FAO, op. cit. note 34.

58. Micronutrient Initiative, *Double*

Fortification of Salt: A Technical Breakthrough to Alleviate Iron and Iodine Deficiency Disorders Around the World (Ottawa, Canada: 2005); Alan Berg, former World Bank nutrition program manager, discussion with author, 13 March 2007.

59. Ibid.

60. Author's calculations from USDA, op. cit. note 1; UN Population Division, op. cit. note 5.

climate effect of various dietary options. Gidon Eshel and Pamela A. Martin of the University of Chicago have addressed this issue. They begin by noting that the energy used in the food economy to provide the typical American diet and that used for personal transportation are roughly the same. In fact, the range between the more and less carbon-intensive transportation options and dietary options is each about four to one. With cars, the Toyota Prius, a gas-electric hybrid, uses scarcely one-fourth as much fuel as a Chevrolet Suburban SUV. Similarly with diets, a plant-based diet requires roughly one fourth as much energy as a diet rich in red meat. Shifting from a diet rich in red meat to a plant-based diet cuts greenhouse gas emissions as much as shifting from a Suburban SUV to a Prius. (63)

The inclusion of soybean meal in feed rations to convert grain into animal protein more efficiently, the shift by consumers to more grain-efficient forms of animal protein, and the movement of consumers down the food chain all can help reduce the demand for land, water, and fertilizer. This reduces carbon emissions and thus helps to stabilize climate as well.

Action on many fronts

At this writing in early October 2007, the food prospect does not look particularly promising. Grain prices in recent days have reached historic highs. Wheat has gone over \$9 a bushel for the first time in history—more than double the figure a year earlier. International food aid flows are being slashed as rising grain prices collide with fixed budgets. (64)

If we continue with business as usual, the number of hungry people will soar. More and more, those on the lower rungs of the global economic ladder are losing their tenuous grip and are beginning to fall off. Cheap food may now be history.

Historically, the responsibility for food security rested largely with the Ministry of Agriculture. During the last half of the last century, ensuring adequate supplies of grain in the world market at a time of surplus production capacity was a relatively simple matter. Whenever the world grain harvest fell short and prices started to rise, the US Department of Agriculture would return to production the cropland that had been idled under commodity-supply management programs, thus boosting output and stabilizing prices. This era ended in 1996 when the United States discontinued its annual cropland set-aside program. (65)

Now in our overpopulated, climate-changing, water-scarce world, food security is a matter for the entire society and for all government ministries. Since hunger is almost always the result of poverty, eradicating hunger depends on eradicating poverty.

And where populations are outrunning their land and water resources, eradicating hunger also depends on stabilizing population. Our Plan B goal is to stabilize world population by 2040 at the eight-billion level. This will not be easy, but the alternative may be a halt in population growth because of rising mortality.

The new reality is that the Ministry of Energy may have a greater influence on future food security than the Ministry of Agriculture. The principal threat to food security today is climate-change from the burning of fossil fuels. It is the Ministry of Energy's responsibility to minimize crop-withering heat waves, to prevent the melting of the glaciers that feed Asia's major rivers during the dry season, and to prevent the ice sheet melting that would inundate the river deltas and floodplains that produce much of the Asian rice harvest.

And where water is often a more serious constraint on expanding food production than land, it will be up to the Ministry of Water Resources to do everything possible to raise the efficiency of water use. With water, as with energy, the principal opportunities now are on the demand side in increasing water-use efficiency, not on expanding the supply.

In a world where cropland is scarce and becoming more so, decisions made in the Ministry of Transportation on whether to develop auto-centered systems or more-diversified transport systems that are less land-intensive, including light rail, buses, and bicycles, will directly affect world food security. Transportation policies that diversify transport systems and reduce fossil fuel use will also help stabilize climate.

Decisions made by governments on the production of crop-based automotive fuels are already affecting grain supplies and prices. Given the turmoil in world grain markets in late 2007, it is time for the US government to place a moratorium on the licensing of any more grain-based ethanol distilleries.

And finally, we have a role to play as individuals. Whether we bike or drive to work will affect carbon emissions, climate change, and food security. The size of the car we drive to the supermarket may affect the size of the bill at the supermarket checkout counter. If we are living high on the food chain, we can move down, improving our health while helping to stabilize climate. Food security is something in which we all have a stake—and a responsibility.

Excerpted from Plan B: 3.0 by Lester R. Brown, reprinted with permission. Full book downloadable free of charge at www.earthpolicy.org.

61. USDA, op. cit. note 1; UN Population Division, op. cit. note 5; FAO, op. cit. note 34.

62. Organisation for Economic Co-operation and Development, "Total Expenditure on Health Per Capita, US\$ PPP," table, OECD Health Data 2007-Frequently Requested Data, at www.oecd.org, July 2007; FAO, op. cit. note 34.

63. Gidon Eshel and Pamela A. Martin, "Diet, Energy, and Global Warming," *Earth Interactions*, vol. 10, no. 9 (April 2006), pp. 1/17; USDA, op. cit. note 1; UN Population Division, op. cit. note 5.

64. Pearson and Rossingh, op. cit. note 3; Chicago Board of Trade, "Market Commentaries," at www.cbot.com, various dates; IMF, *International Financial Statistics* (Washington, DC: 2007); Missy Ryan, "Commodity Boom Eats Into Aid for World's Hungry," *Reuters*, 5 Sept. 2007.

65. USDA, ERS, Natural Resources and Environment Division, *Agricultural Resources and Environmental Indicators, 1996/1997, Agricultural Handbook No. 712* (Washington: 1997).

Reviews

Peak Planning Review by Erica Etelson

DANIEL LERCH
Post Carbon Cities: Planning for Energy and Climate Uncertainty
Post Carbon Press, 2007

Spend a few minutes surfing most of the peak oil websites, and you will quickly arrive at the grim conclusion that civilization is doomed, or worse—we oil-addicted humans are all going to die of starvation or be killed in the violence of a society in its death throes. Time to close your web browser and open *Post Carbon Cities*, a reference manual that offers a cautiously optimistic and pragmatic assessment of the looming twin crises of peak oil and climate change.

Post Carbon Cities is about what local governments, in the void left by derelict

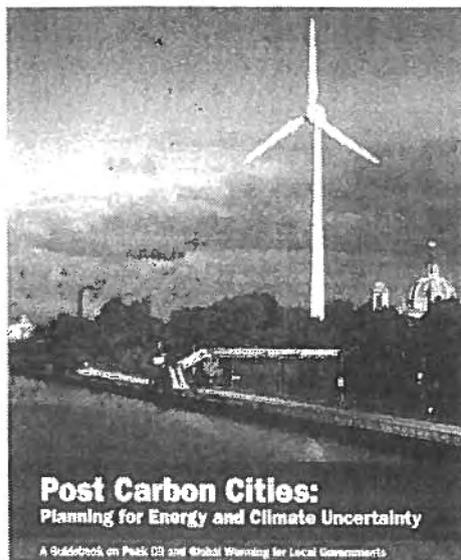
“This is the fundamental—perhaps even defining—issue or series of issues over the next 50 years.”

federal and state officials, can do to mitigate the impacts of anticipated fossil fuel shortages and climate uncertainty. In two succinct chapters, the book explains why we're at the end of the era of cheap oil and gas and why this is a big problem—namely, that our economic and agricultural systems are premised on the availability of cheap fossil fuels.

Author Daniel Lerch is the program manager of the Post Carbon Institute's Post Carbon Cities program. Lerch's background in urban land use and

planning for the relatively progressive city of Portland, Oregon is in evidence throughout this guidebook. Lerch knows his audience—city officials and bureaucrats who need a push but will not welcome a shove. Accordingly, he strikes a tone of urgency without hitting the alarmist notes that many peak oil activists strum so incessantly.

Lerch focuses on issues any city official would be concerned about—transportation, energy, and local



economies. The doubling of asphalt prices may not be the most scintillating subject for the average citizen, but for city officials overseeing limited budgets; it's anecdotes like these that make the book a page turner. (Asphalt is a petroleum byproduct, and prices for crude oil are soaring. Already, some cities have to sell bonds to raise money to resurface their streets—imagine the fix they'll be in when crude oil hits triple digits).

The book then steers readers toward taking action to rejig their cities for oil independence, and fast. This section of the book opens with an urgent message from Beverly O'Neil, the mayor of Long Beach and president of the US Conference of Mayors: “We know that aggressive action is necessary to turn this tide, and we are taking the lead in addressing the nation's energy challenges to reduce our dependency on foreign oil. We cannot wait on the federal government; we must do what mayors do best and act now.”

Lerch uses case studies of the handful of US and Canadian cities that have established peak oil task forces charged with assessing local vulnerability to fossil fuel scarcity. From Portland, Oregon to the small towns of Willits and Sebastopol, California, a growing number of jurisdictions are responding vigorously. They are looking at issues like local food production, water access, urban redesign, mass transit improvements, local manufacturing, renewable energy purchasing, emergency preparedness, and the city's ability to provide social services in the context of high unemployment and decreased tax revenues. But it's not just west coast hippy towns that are jumping on the peak oil bandwagon—other leaders include Denver, CO; Hamilton, Ontario; Bloomington, IN; and Franklin, NY, along with usual suspects like San Francisco and Oakland.

Permaculturists will be glad to know that Lerch mentions climate-resilient ecosystem management techniques like tree planting, bioswales, and wetland restoration as well as the overall concept of local, sustainable economies. I would have been thrilled to see reference to grey water and rainwater harvesting, but the

***Post Carbon Cities* is about what local governments, in the void left by derelict federal and state officials, can do**

point of the book isn't to dictate specific solutions so much as to prompt officials to craft their own, locally-appropriate plan. As Providence city council member Cliff Wood put it, “I think locally you just talk about anything and everything you can—I don't know that there's a magic bullet for it [energy uncertainty]. This is the fundamental—perhaps even defining—issue or series of issues over the next 50 years.”

Though the target audience of this book is local government, it is also an invaluable tool for citizen activists. Oil Independent Berkeley bought thirty copies of the book and is distributing them to every city council member and board and commission chair as part of its campaign to convince Berkeley to start powering down. The appendix of the book has

pointers on how to get a local oil depletion resolution passed and includes the text of San Francisco's resolution. Another appendix offers advice on the composition of a peak oil task force and on how it should conduct itself.

If you're worried about peak oil, you should be. But don't waste your time ordering peak oil survival kits off the

internet. Get this book, and share it with your local officials. We've all got a lot of work of to do.

Erica Etelson is a journalist, permaculture student and founder of Oil Independent Berkeley (www.relocalize.net/groups/oilindependentberkeley).

Money Without Greed Review by Peter Bane

VINCENT GAILLARD &
JEROME POLIDOR

La Double Face de la Monnaie
(*The Two Faces of Money*)

TINA Films: La Mare aux canards.
Paris. 2006.

www.lamare.org. DVD. 54 min.
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Discussion of the nature of money puts most people to sleep, yet it is one of the most important subjects in any discussion of a sustainable future. The authors of this film assemble a prominent group of alternative bankers and economists—Bernard Lietaer, Michael Linton, and Margrit Kennedy among them—to peel back some of the layers of mystery surrounding finance and exchange.

The film draws primarily on European examples to make its points about the various types of complementary currencies, so-called because they are understood to complement and not to compete with national currencies. Beginning with a brief discussion of money's three functions: as a unit of measure, a medium of exchange (to facilitate trade), and a store of value over time, the film goes on to examine three prominent types of community-based currencies: circulating trade currencies, time currencies, and account-based LETS systems. All of these have in common that social values are pre-eminent in the design of each currency.

The first of these, Chiemgauer, is a trading currency issued by a Waldorf high



school in Bavaria for its surrounding, relatively wealthy region. The chiemgauer consist of notes in denominations similar to the euro and held at a par value to it. The local notes, however, are only accepted within the region surrounding the Chiemsee, a large southern German lake. Although handsomely printed in multiple colors (by the high school students using a laser printer), the chiemgauer differ from euros in one very important aspect. Each note expires three months after issue unless the bearer (at that time) pays a 2% fee at the office to receive a stamp revalidating the note. In this way, the system encourages holders of chiemgauer to spend their currency rather than save it; the small fees, called demurrage, help to support the administration of the system, printing and issuance of notes, etc. Demurrage is an important technical tool for ensuring the circulation of trading notes. It explicitly penalizes hoarding.

We see footage of the tidy, well-kept streets of the region, watch the highschool

students printing the notes, and hear testimony from small-scale industrialists and shop owners who enthuse about the worth of the system. Twenty-five thousand euro equivalent of chiemgauer are in circulation, and it is estimated that they move three times faster than euros through the local economy, creating more wealth. They seem to be widely useful at a variety of outlets, so that people have come to appreciate having them. The dairy plant owner pays his workers' vacation pay in chiemgauer; he also buys his milk with them from local farmers. The worker at the dairy buys her wardrobe at a local sports shop using chiemgauer. The corner grocery takes them. The high school teacher who helped originate the project explains that they help fill a gap in the local economy at the same time that they keep local wealth from flowing away to larger, metropolitan areas of the country.

In the second example, we visit the Gloucester region of southwest England where a time currency system is in place. This operates with a funded office where two staffers help to develop the system and organize trades between participants. The emphasis is on social service, such that elder people are able to get credits in the system for visiting friends. One chap hires himself out for odd jobs in exchange for credits, and people seem able to turn around and hire other services that they need, such as redecorating. No goods are exchanged in this system, and all hours worked are valued the same. The primary social value of the system seems to be its ability to help mobilize and re-value the time and knowledge of the marginal members of society: the elderly, the unemployed, those between jobs or retired, who nonetheless need to remain active and make a contribution. This is seen to require a paid facilitator, however.

and though it is underplayed, it seems the scheme is probably supported by government as a means to defray other welfare expenses.

The third example turns to a LETS (or SEL in French) system in Paris, where many people are using this trading scheme to meet their needs for clothing, mending, services, tutoring, music, etc. No currency is involved, but an office keeps track of debits and credits, which are created with each trade and documented with a simple form like a check, only in three parts: one each goes to the buyer, the seller, and the accounts office. The SEL sponsors regular markets or swap-meets where participants can display and view wares, make deals, and generally socialize. The scheme also publishes a newsletter listing offerings and requests. People trade housing, both long- and short-term tenancies, and most durable goods and services. A complaint about the system is the paucity of food and drink available, but the users seem quite happy and enthusiastic about what they can buy and sell with it. Apparently no one quite understands how to price cheese and bread in alternate currency units. Why this might be is not explained—perhaps because the merchants must buy the food from farmers living outside the system.

The film draws primarily on European examples to make its points about the various types of complementary currencies. . .

A final segment takes us briefly to Argentina where the rise (and fall) of the *credito*, an alternative currency that emerged during the peso crisis of 2001 and was used by some six million people, is offered as a cautionary note about the folly of using alternative currency like national money. The *credito* was not meant to be hoarded. When people held onto the notes too long, it went out of circulation, lost value and the whole system collapsed from a national scale into a few small remnant trading communities.

The film's on-site footage about working money systems is interspersed with short clips from the economists and bankers (all looking decidedly more relaxed than most in their professions). Michael Linton, Canadian inventor of the LETS system, and Margrit Kennedy, Permaculture teacher and ecovillage founder of Lebensgarten, speak in English. The other five luminaries are Belgian or French using their native language. Narration of the other parts of the film is in the language chosen by the viewer among the four offered. Subtitles provide guidance to the French, English, and German dialog. I was briefly dismayed when I tried to select the English version of the film using the on-screen prompts, and it refused to play, but my DVD player, when programmed to run dialog and subtitles in English, took on this seemingly very French film with no difficulties and delivered a

quite satisfactory viewing and listening experience.

The elements presented in this award-winning film are correct and the examples represent a spread of, though not all possible alternate currency types, however, I wanted a more articulate explanation of the principles behind the various kinds of trading and other systems, as well as their reasons for adoption. Perhaps because of the multi-lingual format, and perhaps because the writing could simply have been better, the film lacks a certain punch that I had hoped to find in it. Nor, apart from the Argentine

The authors of this film assemble a prominent group of alternative bankers and economists. . .

example, do we get much sense of the problems possible with alternate currencies: why some succeed and others fail; which types are most appropriate in which situations.

Film seems such a promising and accessible medium for displaying systems that are abstract and thus difficult for many people to grasp, yet the information content of this film is thinner than I had hoped for. Still, this is a good first step toward making complementary currencies better known, and should not put anyone off, but rather pique curiosity and lend credence to a movement of social experiment that we shall very much need more of in the coming decades.

Recommended for permaculture teachers and community organizers when supported by additional materials and methods.

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Of Doomers and Fixers Review by Albert Bates

DMITRY ORLOV

Re-inventing Collapse: The Soviet Example and American Prospects

New Society Publishers.
256 pp. paper \$18.95.

There is an on-going theme in the peak oil and climate change communities—the difference of opinion between the doomers and the fixers. Increasingly, as the fixers realize the full scope of the challenge and watch in disbelief how little is being done, they eventually gravitate more towards the doomer position.

Hard-core doomers think in terms of die-off, and see the process as a violent struggle that will envelop the world in brutality. James Lovelock, for the climate doomers, believes humanity will devolve to a few struggling tribes in the very high latitudes. Matt Savinar, heir apparent to Mike Ruppert on the peak oil doomer side, sees wilderness bunkers stocked with food, water, and ammo.

He brings a wry, sardonic humor to his descriptions and predictions that helps the medicine go down.

Soft-landers, such as myself, have a tough sell.

In an odd kind of way, Dmitry Orlov has helped me out with a new book, *Reinventing Collapse: The Soviet Example and American Prospects*. For those who have read Naomi Klein's recent work, *The Shock Doctrine: The Rise of Disaster Capitalism*, the collapse and aftermath of the Former Soviet Union will be familiar territory. Orlov came to the US as a teenager and traveled back to Russia

during its transformation of the late 1980s and early 1990s. He brings a wry, sardonic humor to his descriptions and predictions that helps the medicine go down:

Orlov wants to get us to ask fundamental questions about all aspects of our daily existence—food, housing,

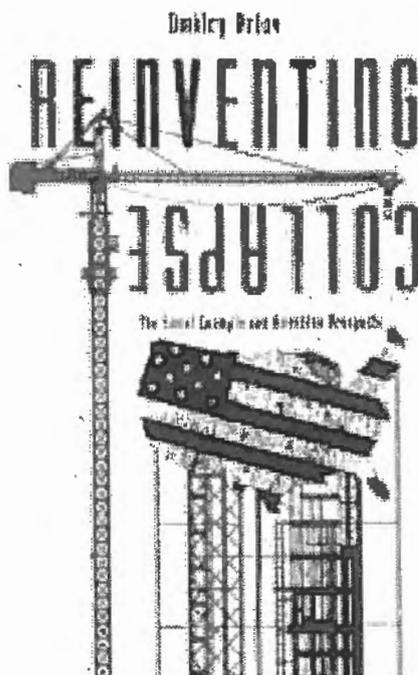
trade for things you will need. Think of consumer necessities that require high technology and have a long shelf life. Here are some suggestions to get you started: drugs (over-the-counter and prescription), razor blades, condoms. Toiletries, such as good soap, will be luxury items."

To this short shopping list I would add seed. When the tractors run dry, we will once more become a world of small farmers. As everyone plows up their suburban yards and rushes to the store to buy seed for potatoes, onions, carrots and beans (a nice Irish stew, that), they may discover that the shelves have already been picked clean. That happened in Russia. So, put seed packets in a shoebox in your closet, and be sure to rotate through to keep them fresh. Although germination diminishes with time spent in storage, a few seeds always seem to get through. On second thought, something more mouse-proof than a shoebox might be a good idea.

There are many seed banks in the world today. Some are governmental or intergovernmental. Some are private or commercial. Seed Savers Exchange, started by Diane Ott and Kent Whealy in 1975, has gone viral. In 2008, the Global Crop Diversity Trust will spend \$260 million to stock the backup's backup, hoarding 4.5 million samples from other banks on the Norwegian island of Spitsbergen, in the Arctic Circle. According to press accounts, there are only two reasons a seed would ever leave this vault: (1) to be replaced by a fresh sample or (2) to reseed a crop that's been wiped off the earth. The Gates Foundation is the biggest donor, making a 2-to-1 grant with the Norwegian government.

Stored at the temperature of the earth on Spitsbergen, corn will store about 1,125 years, wheat 1,700, sorghum about 20,000.

Given what we now know about sudden astrophysical or geomorphic calamities that have ended epochs and begun new ones on our fragile planet, having a seed backup backup is a great idea. It would have been nice if we had a backup for the atmosphere or our energy future, but we didn't, so what comes next will be very different and unsettling.



energy, transportation, communication, savings, medical—that betray an underlying sense of hope. His two central questions are, "Is it collapse-proof?" and, if it is not, "What can I do to make it collapse-proof?" He writes, "If, for a given thing, the answers turn out to be 'No' and 'Nothing,' then the very important follow-up question should be: 'How can I live without it?'"

Learning to do without all "the stuff" opens the door to a much better life, whether we are to experience peak oil and climate change, or not (and who thinks "not" is very likely, now?)

Orlov scorns the archetype of the American Survivalist, holed up in the hills with a bomb shelter, tins of spam, and an assortment of guns and ammo "with which to fight off neighbors from further downhill" in favor of a more pragmatic approach.

"It's not a bad idea to own a few of everything you will need, but you should also invest in things you will be able to

It need not be brutal, however. As Robert Anton Wilson said, "the best antidote to stupidity is a strong counter-game." We should be seeding peace, justice, pacifism, and non-violent conflict resolution the same way we plant a

garden. This is not an impossible dream. Just in the way that Naomi Klein said the neo-con/neo-liberal think tanks (those who have the tanks do the thinking) laid their elaborate plans, and natural or other

disasters provided the opportunities, the peace and justice community has the ability to organize, inspire, and put forward its own plans when crisis strikes. People get ready.

A Note Left Behind Review by Rob Archangel

CHUCK BURR
Culturequake:
Your Children's Real Future
Trafford Publishing. 2007.
295 pp. paper. \$23.

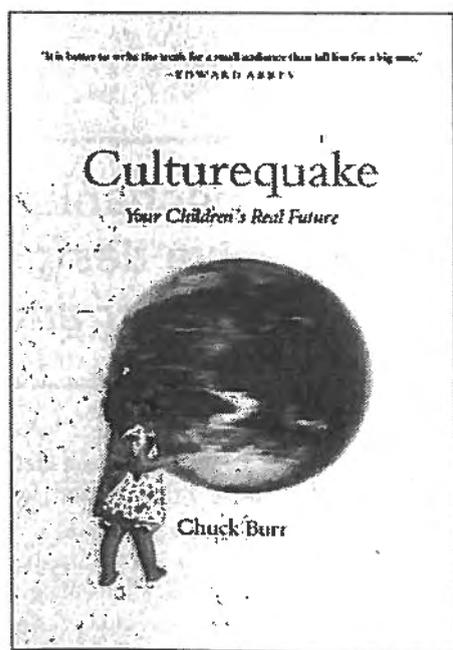
Culturequake serves as an excellent primer about the state of the world, with an honest assessment of our current predicament, and how we arrived here. In many ways, it reminds me of *What a Way to Go: Life at the End of Empire* in its accessibility for a lay audience, but happily diverges from the latter with its fuller discussion of possible directions to move toward.

The book is chiefly informed by the work of Daniel Quinn, notable author of the *Ishmael* trilogy, and progenitor of the "Taker/ Leaver" distinction. This distinction provides a framework for Burr to discuss the broad issues of sustainability and human society in this volume. It's organized into three sections; the first is an overview of what we know about life before and outside of empire/civilization/Mother Culture. The second is a summary of the "Perfect Storm" of factors that put this culture on the brink of collapse, from population explosion and overshoot, to peak oil, to ecosystemic degradation to the spectacular loss of biodiversity we're in the midst of. The book's concluding section is focused on solutions, emphasizing the need for a new vision and new story to learn to live in, with numerous practical ideas about ways to begin the process in our own lives, from natural building materials, to bioregional living, to local food systems (gardening, hunting and gathering), to establishing parallel structures on the community level to those of the dominant system.

The third section seemed the strongest to me. I like the groundedness of the suggestions, and the importance placed on individual family and community empowerment. I like the encouragement of experimentation in new ways to eat, play, and relate to one another while the dominant system remains in place to provide some sort of safety net. Plastics aren't an infinite resource, but why not use them for greenhouses now? Why not plant lots of different seeds, and construct alternate forms of shelter, while we can still lean on the resources of "the system" in case these experiments don't work out as planned. In my view, this is precisely what we ought to do: help ourselves get set up and disentangled both materially and psychically from empire so that we can stay out of its way as it descends the

related issues—maybe a discussion of the continuum concept and non-coercive child-rearing practices as another contrast between Leaver and Taker cultures, maybe more about the Taker means of birthing and infant development as contrasted with indigenous, "old-growth"

... help ourselves get set up and disentangled both materially and psychically from empire so that we can stay out of its way as it descends the energy mountain.



energy mountain.

I would criticize the book for failing to develop the "child's real future" component of its subtitle. I would have liked to see more about child and family-

cultures. William Kötke does a good job of this in *The Final Empire*. Burr could have done more here.

Culturequake is explicitly intended to be an introduction to the End-of-Empire milieu. It provides a new story that we can imagine ourselves within, a story that incorporates but supercedes the history of the world as we know it, and provides a new framework for that information. It's also intended as an introduction to some of the key authors of this milieu by means of direct quotation, rather than paraphrasing. However, this was inconsistently done, and at times it was unclear whether Burr was speaking or citing one of his chosen authors. These inconsistencies coupled with a handful of distracting typographical errors, left me wondering whether I might be reading an uncorrected proof.

Unfortunately, I get the sense that Burr is not very deeply engaged or consistently thoughtful about these issues. At the

conclusion of his chapter, "Peak Oil and Energy Descent," he cites an M. King Hubbert quote advocating that society develop social technologies, (voluntarily) reduce population and resources use, and develop a steady state economy, using the techniques available from the current culture. I was left a bit befuddled.

Elsewhere in the text Burr discusses the inherently problematic and unsustainable nature of this culture, the impossibility of a technological solution to this mess, and the incredible unlikelihood of any sort of concerted society-wide change. I agree, and in my mind, that's precisely the basis of the small-scale, non-mass-oriented

actions he recommends; why then would he unproblematically cite such a statement? This failure to engage with such apparent contradiction implies an overall greater failure to engage critically with the material. And while he seems to "get it right" for the most part, it's still vital to maintain one's critical faculties when writing (or reading), and to deal directly with conflict and contradiction. Those faculties will certainly be needed as we try to form the new tribal aftercultures he speaks of.

Despite the criticisms, I do think Burr's volume is a worthwhile, accessible

introduction. Slim and readable, I can imagine it being passed to family and friends unfamiliar with this information. Everyone starts somewhere in their coming to terms with the crises, and work like this make it easier to begin the journey. Though much of the readership of this magazine will be familiar with *Culturequake's* material, let us never forget that those asleep to the mounting catastrophe far outnumber those of us already attuned to it. And so *Culturequake* offers one more message in a bottle tossed into the angry sea, maybe to be found by some folks ready to hear.

From the Regions

Permaculture Thrives in the Northeast

Steve Gabriel

This past year saw a significant jump in permaculture activity around the Northeast, characterized by the addition of seven new certificate courses, the growth of several organizations, and a significant increase in media attention given to permaculture events and projects. A major highlight for many was attending the 2007 Northeastern Permaculture Convergence, hosted by the Finger Lakes Permaculture Institute (FLPCI) in Ithaca, NY, last summer. Participants spent three days exploring the movement, building relationships, and cultivating new ideas. The beautiful hills, gorges, and forests of the Finger Lakes region provided the perfect backdrop for the weekend.

FLPCI was founded in 2005 by Karryn-Olson Ramanujan, Michael Burns, and Steve Gabriel and has held four Permaculture Design Courses and hosted several wonderful teachers, including a keyline workshop with Darren Doherty and an advanced design course with Jono Neiger. Our students have assisted us in developing a schematic design for the 130+ acre Cayuga Nature Center, with which we partnered in 2006.

Our mission for the 2007 NEPC Convergence was to stimulate the network of local and regional connections, to share resources, and to define the structure, function, and organization of the group. We wanted to create "an open and inclusive atmosphere with a balanced schedule of interactive presentation, roundtable discussion, and skill-sharing mixed with healthy local food, music, and ample social time."

All these mechanisms were the result of a cohesive design process formed in the light of clear and common goals.

Viewing the event as a "container," which empowered participants to become involved in all aspects, we recognized that our purpose was to design the structure to support the natural inclinations of our guests to network, share information, and socialize.

Saturday's program included a series of introductory work-shops which outlined the history, principles, and applications of permaculture to newcomers. These were taught by teachers from all over the region. Those with more experience enjoyed discussions about the links between social justice and sustainability, the steps toward creating an educational organization from scratch, and the links between music, art, and permaculture. These sessions were all facilitator initiated, as we had requested session proposals along with our online registration process.

Participants were offered free admission if they took a shift with children. The kids learned many things, including origami, natural cordage, and forest walks. This allowed parents to attend more sessions and gave the kids an enjoyable experience of their own.

A resource hub with several computer and Internet stations was provided for the sharing of information, projects, and programs. Participants were encouraged to assemble exhibits of their designs and sites which were posted on the walls.

The organizing team felt that it was important provide a lot of time for information sharing, balanced with plenty of open time to socialize and play. In the spirit of permaculture design courses, we hosted a talent show as an icebreaker on Friday night, enjoying the gifts of beatboxers, musicians, and storytellers.

On Saturday evening we experimented with the group facilitation model of Open Space. Open space is a group organizing tool where, according to openspaceworld.org, "participants create and manage their own agenda of parallel working sessions around a central theme of strategic importance" We explored several topic areas that would help us to better define the structure, function, and organization of our regional network. You can view the results on FLPCI's website.

Sunday was a completely open format. Participants learned about rocket stoves, traditional woodworking, and veggie cars while others packed up, took a nap, or networked further.

All these mechanisms were the result of a cohesive design process formed in the light of clear and common goals. The weekend left us energized and with the sense of a growing family spreading its wings in the Northeast. We passed the organizing torch to the Massachusetts permaculturists and look forward to attending the 2008 gathering next summer. For more information: www.fingerlakespermaculture.org or www.northeasternpermaculture.wikispaces.com

Steve Gabriel serves as program coordinator for the FLPCI and is currently facilitating the development and implementation of an overall land-use plan that will incorporate agriculture, forestry, habitat, and interpretive elements for the Cayuga Nature Center in Ithaca, NY. He can be reached at steve@fingerlakespermaculture.org



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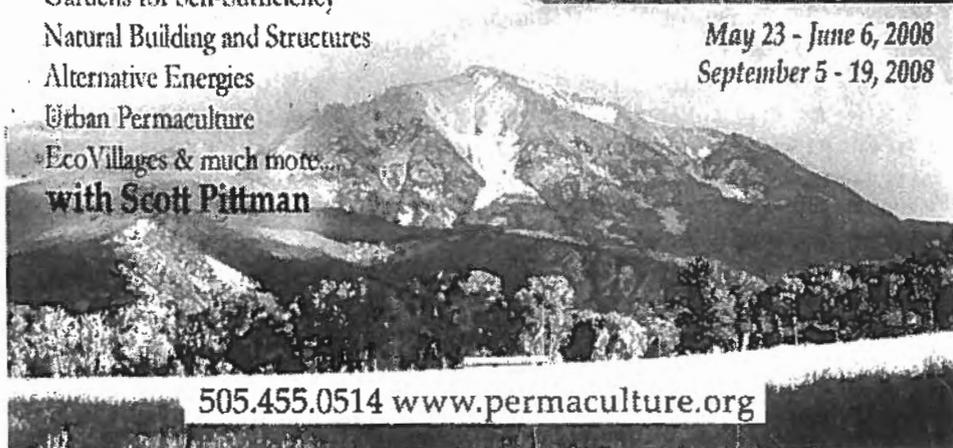
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Peak Oil Activists Planning for Hard Times, Will Lead the Way

Megan Quinn Bachman

Yellow Springs, Ohio, Fall 2007 — Former professor and author David Korten told close to 300 applauding peak oil activists that they are not a fringe minority but the leading edge of a super-majority “and it’s time we start acting like it.”

Korten issued his rallying call in October at the Fourth US Conference on Peak Oil and Community Solutions where activists from more than 30 states discussed ways to respond to declining oil production and other coming planetary woes. Korten joined a dozen other speakers in “Planning for Hard Times,” the theme of the three-day conference sponsored by Community Solution at Antioch College.

“The day of reckoning for our profligate ways has arrived,” Korten said. “Peak oil, climate chaos, exhaustion of freshwater, species extinction, financial collapse, and social disintegration are causing a great unraveling.” Now is the time, Korten said, for a great turning from a 5,000-year history of empire, driven today by a suicidal competition over the earth’s remaining resources, to a cooperative earth community which shares resources to maintain healthy communities, families, and natural systems.

Korten, author of *The Great Turning: From Empire to Earth Community*, said that empire “elevates the most power-hungry and ethically challenged to the highest positions of power.” And the former Harvard University business professor, also author of *When Corporations Rule the World*, said that corporations perpetuate this empire system in acting as a “gigantic pool of money with an artificial personality required by law to behave like a sociopath.”

Korten cited opinion polls showing 90% of Americans believe that large corporations have too much power and more than 80% believe that children, family, communities, and a healthy environment must be a greater priority.

Other speakers promoted cooperation and community to create local sustainable businesses, turn millions of Americans into local farmers, and find ways to reduce energy use in housing, transportation and food production.

“It’s about creating a new society, and it begins with us,” said Pat Murphy, Executive Director of Community Solution, which organizes the annual conference. This need for a societal transition was a continuing conference theme.

“During the lifetime of the boomer generation, roughly half the world’s important non-renewable resources will have been used up... forever,” said Richard Heinberg, a leading peak oil educator and author of *The Party’s Over*, *Powerdown*, and more recently *Peak Everything*. Heinberg said this will lead to less available energy, more labor needed in agriculture, widespread relocation of people, and a massive replacement of infrastructure. And he asked: “How do we accomplish this enormous societal reorganization without chaotic breakdown?”

Start with personal solutions, Heinberg said, adding, “Adjust your own oxygen mask before helping others.” He suggested

working locally and regionally because “higher levels of administration may not be in a position to help much with local needs.” But, he warned, without national and international agreements, irreversible ecosystem collapse is likely.

“There is no hope for a soft landing, business as usual... normal life as we’ve come to know it,” Heinberg said. “So get ready for hard times,” he said. “If it’s not too late,” Heinberg concluded, “what we do now will determine whether the outcome is desirable or merely survivable.”

Homeowner Larry Halpern’s personal account of dramatically curtailing his energy use illustrated this potential. “I don’t wish to see other people suffer because I was unwilling to be

“Adjust your own oxygen mask before helping others.”

inconvenienced and I don’t wish to suffer later because I didn’t have the time for an inconvenience now,” he said.

After learning about peak oil in 2004 and being disillusioned with traditional activism, Larry said he and his wife, Gail, decided to “take a time out from trying to change the world, and focus a little more on trying to change ourselves.”

Thanks mostly to behavior changes and do-it-yourself projects in their Springfield, Ohio home, over the next four years they reduced electricity use from around 400 kilowatt hours per month to 36 kWh, cut natural gas use by a third, and lowered water use by a factor of five.

Halpern observed “no electricity days” and removed his energy-guzzling air conditioner and refrigerator. He then replaced some of his appliances with low-energy alternatives, including a solar cooker, an LED reading light, solar battery re-chargers, and a composting toilet.

The couple, both professional musicians, also ate exclusively from their own garden, a Community Supported Agriculture subscription farm, the local farmers’ market and a food cooperative.

“When people are presented with the big picture of peak oil they often get overwhelmed and close off,” Halpern said. “I’ve decided to focus less on trying to get people to see things my way and more on just trying to help them live more sustainably and cooperatively.”

Another speaker with a post-peak oil way of life was Judy Wicks, a restaurant owner and founder of the Business Alliance

for Local Living Economies and the Sustainable Business Network of Philadelphia. Her Philadelphia restaurant, The White Dog Cafe, is a model for just, local, sustainable business.

The cafe sources all produce in season from local organic family farms, uses only humanely raised meat and poultry and gets all fish and seafood from sustainable fisheries. Wind power generates much of the cafe's electricity, the first business in Pennsylvania to do so. Entry-level employees make a minimum living wage.



Participants fill the auditorium at the 2007 Peak Oil Conference in Yellow Springs, Ohio.

"Business is about relationships with everyone we buy from, sell to, and work with, and about our relationship with Earth itself," Wicks said. "We've become disconnected from each other and from our places and without direct relationships, few of us think about the consequences of our economic transactions."

Wicks said that "business has been corrupted as an instrument of greed rather than one of service to the common good. Yet we know that business is beautiful when we put our creativity and care into producing a product or service needed by our community."

Sharon Astyk, author of the forthcoming book *A Nation of Farmers*, shared Wicks' vision of creating sustainable local food economies. She said the United States needs 50 million farmers and 200 million home cooks. "We need to get everyone back in the kitchen," Astyk said, citing statistics that show one out of every three meals in the U.S. is from a fast food place and only 80% of Americans own a frying pan.

Murphy, from Community Solution, also went on to emphasize eating a low-energy diet, including less grain-fed meat and manufactured foods, where 15 to 30 calories of fossil fuel energy are used to produce each calorie of food energy.

Among the other detrimental effects of our industrial food system, according to Murphy, are poor health, tortured animals, lack of crop diversity, deteriorating soil, poisoned waterways, and the drawdown of "fossil" water. He compared this to a more agrarian country, China, where 38% of the people are in

agriculture, and where they generate six times the amount of calories per acre compared to the US while conserving their soil.

Murphy also discussed lifestyle changes in transportation and housing, pointing out that Americans annually generate 20 tons of carbon dioxide per person while the International Panel on Climate Change estimates the limit should be one ton per capita.

Bob Steinbach, a Dayton-area transportation planner shared ways to reduce transportation fuel through ridesharing while Linda Wigington of Affordable Comfort, Inc. explained how to reduce the energy use of existing buildings.

With suburbia's low population density, motor vehicles are the most viable short-term transportation option, Steinbach said. He added that Community Solution's "Smart Jitney" proposal, a ride-sharing scheme using cell phones, is important because, "fuller cars mean fewer cars, which means less oil is needed."

Steinbach discussed the biggest obstacle to the success of ride-sharing programs—willing passengers. "The mindset has to change," said Steinbach, noting that the privacy and flexibility of driving alone currently trump the environmental and financial benefits of sharing rides.

Wigington discussed "deep retrofit" strategies for existing homes to cut their energy use by 80%, using a standard called the "Passive House." The principles of this German-based model include tight, super-insulated homes, with a thick building "envelope" and high performance windows and doors.

"Our housing is facing a crisis of obsolescence," Wigington said, "and we have the lion's share of existing houses that need to be dealt with to reduce energy in the near term."

Wigington said home energy use is not just a function of appliances or the structure. "How a family lives in a house has a major impact on it," she said.

Another speaker who emphasized a fundamental societal change was Thomas Princen, author of *The Logic of Sufficiency*. "One of the dominant principles of our economy, efficiency, is not up to the task of dealing with peak oil and climate change," he said.

Princen described efficiency as the basis of an economic order where raw materials are extracted rapidly and thoroughly, converted into products people buy, and disposed of in the least costly and visible manner possible.

In contrast to claims that we can "grow our economy with green products and pollute more efficiently" Princen said that efficiency too easily leads to more consumption, not less, and sufficiency, which is geared toward curtailing excess, would be more useful.

Participants returned to their communities with both a framework for widespread change and the practical strategies to reduce their personal and local energy use. "This has become a special core community to serve the formation of the new world that's being created next in the midst of total breakdown and crisis around us," said participant Peter Jones of nearby Dayton.

Eric Morrison of Battle Creek, Michigan, said, "Now I have a path to take and...to show others the way too."

For more information on Community Solution go to <http://www.communitysolution.org/07confdvds.html>.

Movement Musings

Back Off

Joel Salatin

Parents, back off! That means you. Quit looking around. I'm talking to you. I'm talking to all the meddling, micromanaging parents out there who can't understand that if you don't remove the old mulch, new seedlings can never get started.

Giving your children wiggle room should not be risky. The reason parents can't give wiggle room, for the most part, is because they haven't created an environment that allows the children to establish their credibility. Without credibility, trust cannot occur, and without trust, freedom is a pipedream.

One of the things people in our community marveled about when Dad passed away 13 years ago was how smoothly the farm weathered the transition. By the time of his death, Dad was working for me, not me for him. I don't want that to sound irreverent, but it illustrated perhaps his greatest single trait. He really loved to see his students successful.

In his accounting business, his greatest joy (besides reducing a client's taxes) was to teach a skill to a bookkeeper, or a farmer, that would reduce his accounting time. When a client took an idea and reduced Dad's time in half, that just made Dad's day. He could then take that time and teach someone else. Nothing pleased him more on the farm than to watch me read the books on his shelf, to learn from him, and to implement those ideas. Indeed, he loved to back off, to let his children get the glory. I have come more and more to appreciate not only how difficult that is, but how important it is to making kids love the farm.

Part of this is simply the skill of delegation. Good leaders know how to delegate. Insecurity, in both the boss and the underling, creates the dynamics leading to a meddling relationship. I know parents who live in mortal fear of their children. "What will they do next?" is the question nagging at their subconscious.

Instead of a quiet, steadfast knowledge of their children's solid values, these parents are always in a state of anxiety about tomorrow's shocking discovery. When the children are extremely small, we as parents are the instruments God uses to shape their value system. Once the children are bigger than we are, if they aren't coming to us for advice, we're not going to help the situation by smothering them with it unsolicited.

I know this is the temptation because being older and wiser we can see the result of the direction they are headed, and we want desperately to have a different outcome. But once the children are in their late teens and early 20s, our coercion options narrow significantly. Anyone who grows plants or animals knows the value of a good start. Those first few days in the brooder set the stage for the entire life's performance of a broiler chick. In

the garden, a good seedbed, proper moisture, and temperature are critical for the performance of any vegetable.

If you plant green beans just before a week of cold, nasty weather, those stunted plants will never perform as well as the ones planted two weeks afterward when all the conditions are perfect.

I see struggling young couples all the time opting for day care with their little ones, and my heart breaks for these families. They will fight ear infections, runny noses, additional bad habits, and a divided loyalty. I've watched other parents make the decision to

The second asset offered by division of responsibility is a climate more conducive to maintaining romance.

downscale their living standards, put the socio-economic climb on hold, and invest that time and energy in their children. In a short ten years, you can see clearly which family opted for which lifestyle. I would like to say religion plays the key role here, but in my experience, it has virtually nothing to do with the parent-child bond and trust. New Age cosmic worshippers, Muslims, Christians—if the infants and parents spend time, the chances for happy, balanced, responsible children increase astronomically.

Gradually backing off gives the children the freedom to explore, and gives the parents accountability opportunities. If we don't begin backing off early, we can never test our progress.

Delegation creates an efficient farm operation. Beyond delegation, division of responsibility accomplishes two important things. First, twice as many decisions can be made in the same amount of time. If you have two division managers, each controlling his own area of expertise, each can make simultaneous decisions, thereby accomplishing twice as many things.

Many people have a love affair with business by committee. While I appreciate the importance of planning in any enterprise, we can also emphasize planning to the exclusion of getting anything done. When we embark on a new venture, I always say: "Well, at least we'll know a lot more in a few minutes." If you wait to start until after you have everything figured out, you'll probably never start the project.

The planning session is necessary to formulate the mission statement, the broad direction. That's where the generals all sit around and agree on a strategy. But once they are all dismissed to their various assignments, the general in charge of the infantry doesn't try to tell the general in charge of the food what to pack in the lunchboxes.

I've watched families involved in today's popular consensus-building movements completely bogged down because everybody wants to be involved in everyone else's decisions. With everyone sharing in the minutiae, few decisions can be crammed into the day. Initially, everyone feels great about identifying with each other, being a team, and moving as a unit. Then a couple of months down the road, they realize they are getting further and further behind in their work. The bills keep coming in and their fuzzy feelings don't put cash in the bank.

Children must feel secure in their areas of responsibility. If they see Mom and Dad secure in their domain, each trusting the other to make good decisions, then they will feel responsible when delegated parts of the farm enterprise. But if Mom and Dad are constantly micromanaging each other, the kids will never feel they have autonomy in their domain. The climate for family responsibility and its first cousin, accountability, is established by the way Mom and Dad interact on a daily basis.

The second asset offered by division of responsibility is a climate more conducive to maintaining romance. Every asset creates its own liability. The home-based family business offers the wonderful asset of everyone working together, spending copious amounts of time together, building deep and powerful family ties. That sounds great, especially to families spread hither and yon.

But the liability of this asset is that all this togetherness tends to move family members toward disrespect. "Absence makes the heart grow fonder" holds real truth. When a strong and functional family comes together in the evening after being apart all day, everyone is full of conversation about their day. Newsworthy details, feelings, and good-natured teasing along with advice flow freely in the nest that has been vacant all day.

In the home-based family farm or business, the togetherness can often create contempt. A marriage that was rock solid when husband and wife were apart for at least half of every day now suddenly suffers the destruction that comes with familiarity.

This is why backing off from the other person's domain is critical to maintain romance in the marriage and the family. At the end of the day, my wife Teresa can show me how many quarts of applesauce she canned, and I can express my genuine appreciation. Then I can tell her about the fence we built and the cows that calved. Maintaining mutual interest and respect in the other's domain keeps the mystery alive.

I certainly don't know how she so perfectly functions in her world, and she doesn't know how I function in mine. That creates a sense of mystery for each other, and that encourages romance. A fundamental part of romance is the discovery process. A marriage without mystery and imagination is one without much romance. Backing off preserves my ignorance, and hence fascination and ability to discover.

Turf wars can plague family businesses. Only pettiness and selfishness create the covetousness that expresses itself in superior or inferior self-worth relative to job description. We all have different roles. When a policeman stops you for speeding, you don't feel like he's worth more than you. He has a role—enforcement of the law. You have a role—obedient driver. One is not a better person than the other. Each is simply filling a

different role.

So it is in the family-friendly farm and the home. Just because I run the outside of the house and Teresa runs the inside doesn't make one more important than the other. Indeed, encouraging this divided ministry creates an environment of mutual respect. I know this is not a politically correct notion in our modern world, but I believe destroying lines of responsibility creates chaos rather than order. An ordered family farm is one in which each individual enjoys being in charge of something.

In early childhood, the domain may be feeding the cat. But how the child discharges that seemingly mundane responsibility is exactly how bigger and more exciting responsibilities will be executed later in life. Backing off from each other's realm of responsibility preserves the sense of ownership and the personal accountability accompanying the role. At any time, the owner can ask for help from others. In fact, we should encourage that. Too much individuality makes a person egotistical.

That is what has happened in modern America with hyper democratization and worship of the individual. In our culture, we've stressed the individual to the point of irresponsible community behavior. In our family-friendly farms, we must strike a balance by encouraging personal domains that thrive in community. A good illustration is the autonomous Amish farm hosting a barn raising. The individual finances, locates, and designs the barn, but the entire community comes together to build it.

Unless we preserve certain roles and responsibilities, our home-based enterprises can easily fall into anarchy and chaos.

Each of us needs a private place. Not all the time, and not even much of the time. But backing off preserves that sense of space and maintains a balance within the context of daily togetherness. At the end of the day, each family member can excitedly debrief the others on the accomplishments and problems from each domain. That preserves respect, discovery, and romantic mystery.

Don't forget those hugs and the "I love you." Principles to maintain romance are no different for the farm than anywhere else. But I do believe that it takes extra effort when you're together 24 hours a day.

The family-friendly farm puts attention on maintaining the romance between all members. The cornerstone of this policy is granting responsibility to individual members. While the enterprise may look like one smooth-running operation to an outsider, the family members know that what makes it work are individual domains overseen by autonomous lords and ladies. The older the children get, the more important this principle becomes. Backing off from each other's sphere of control carries ramifications far beyond business efficiency. It has a direct bearing on marriage health and the feeling of ownership among the children.

In his wonderful book *You Can't Fire me I'm Your Father!* Neil Koeinig has some fascinating things to say about the values that bring out the best in people. He has this to say about two of them:

"Responsibility: This is the number one motivator. Nothing motivates people like responsibility. People, whether little or big,

are much more likely to excel when they are given responsibility for something from beginning to end. This is in contrast to simple obedience, where people, whether little or big, take no ownership for carrying through: 'It's not my responsibility. I was just doing what I was told.'

"Accountability: This has to do with consequences—positive consequences for good performance (thank-yous, recognition, praise, and tangible rewards), negative consequences for poor performers, non-performers, and subtracting performers (the hot seat of explanation and learning for improvement, correction, coaching, goal setting, withholding of recognition and reward, or, when all else fails, dismissal). In thirty years of experience working with families, I have concluded that accountability is the least practiced value of all. Parents, executive leaders, managers, and supervisors are simply reluctant to mete out consequences, either positive or negative."

How can we establish accountability without offering responsibility to our children? How can we offer responsibility without backing off? They go hand in hand. Looked at another way, how will the children feel a sense of accomplishment and gain in self confidence if we don't back off?

By the way, Koenig offers other values that he has found bring out the best in people. They are:

- The Golden Rule
- Honesty
- Trustworthiness
- Respect
- Knowledge/Learning
- Work Ethic
- Cooperation/Independence
- Excellence (not perfectionism)
- Kindness/Compassion
- Optimism
- Money as Morally Neutral
- Forgiveness
- Fun/Laughter/Play

Koenig's book is the best I've ever read on the elements of successful family businesses. Others offer advice on trusts, foundations, and financial contracts, but this one deals with the relationships, the real dirt-under-the-fingernails stuff. And as we come to the conclusion of this entire section about helping your children like the farm, I'd like to quote his section on "Getting Permission to Succeed." I had prepared my 10 Commandments several years ago, and when I ran across this freshly published section during the flurry of cramming that always proceeds writing a book, I was amazed, and gratified, to see how closely our lists agreed. Koenig offers this synopsis:

"There are truly blessed people who get permission to succeed at home from an early age. Their parents do such things as: take genuine interest in their children's interests; listen carefully to their children's thoughts, feelings, imaginations and dreams; applaud their achievements; read to their children, and listen to them read; take a keen and active interest in their school

experience; expose their children to life's incredible variety; give age-appropriate responsibility and decision-making opportunities; set high but reasonable and age-appropriate standards and expectations; correct mistakes without hurting feelings; give plenty of latitude for trying things; show understanding and

How can we establish accountability without offering responsibility to our children? How can we offer responsibility without backing off?

forgiveness for mistakes; stick to appropriate consequences for irresponsibility, set an example of optimism about the future; and speak well of work and its possibilities and rewards."

Isn't that a wonderful list? If all families could do these in correct balance, we'd live in a different world. None of us gets them all just right. But we can certainly strive for the balance, and we can appreciate our own shortcomings if we contemplate these ideas.

Few things bring joyful tears to my eyes faster than watching an enthusiastic parent-child team work together. How many do you know? I'll wager you know more that don't than do. When they work, they're beautiful. But when they don't, they're ugly beyond description. I sincerely hope that this section dealing with helping your kids love the farm will challenge us all afresh to rise to this most fundamental of human tasks. The responsibility for loving the children into our farm rests with parents, not children. Parents, are we up to the task?

Jole Salatin is a fourth generation farmer and co-founder of Polyface Farm, Inc., whose mission is to develop emotionally, economically, and environmentally enhancing agricultural enterprises, and to facilitate their duplication throughout the world. He is the author of Salad Bar Beef, You Can Farm, Pastured Poultry Profit\$, and Everything I Want to Do Is Illegal.

This chapter was originally published in Family Friendly Farming: A Multi-generational Home-Based Testament by Joel Salatin, Chelsea Green Publishing, 2001. Excerpt reprinted here with permission.

EVENTS

Permaculture Design Course Central America

Dates: March 10-23

Location: Maya Mtn. Research Farm
Southern Belize

Description: Travel far south to the back of beyond to a remote valley accessible only by dugout canoe. Study permaculture surrounded by a lush, productive forest of edibles, medicinals, and tropical hardwoods. Sleep in dorms powered by renewable energy. Bathe in a sparkling pure river. Learn theory in the classroom and see living examples on the farm. Local guest speakers will enrich the evenings. Come to the land of cacao and vanilla, and absorb information with every pore.

Instructors: Andrew Goodheart Brown, Albert Bates, Maria Ros, and Christopher Nesbitt.

Cost: \$1,200.

Contact: Maya Mtn. Research Farm
info@mmrfbz.org
www.mmrfbz.org

5th Annual

Permaculture Design Course Central America

Dates: February 10-25

Location: Project Bona Fide, Isla
Ometepe, NICARAGUA

Description: Join our fully bilingual, simultaneously translated, 100-hour Permaculture Design Course. Project Bona Fide, the 26-acre demonstration site, is a non-profit dedicated to the communities of the Maderas volcano region through workshops, seed banks, multi-use trees for agroforestry, regenerative food production systems, natural building, off-the-grid living, and appropriate technologies such as: ferrocement, drip irrigation, on-site metal working, bamboo crafts, and innovative water pumping/storage solutions. Participants will be living and learning in a rural setting where most folk are subsistence farmers. This course will be taught through the language of the land, the culture of the place, and its living systems.

Instructors: Chris Shanks, Michael Judd, Andrea Calfuquir, Katherine Young, Hannah Roessler. Interpreter: Christopher Fallas.

Cost: \$1250.

Contact: Chris Shanks
ch_shanks@hotmail.com
www.silentdust.com/bonafide
www.permaculturenow.com
www.projectbonafide.com

9th Intl. Permaculture Conference (IPC 9) Southern Africa

Dates: April 2009

Location: Southern Africa

Description: International Permaculture Design Course (March 29-April 11 in Zimbabwe); Conference (April 15-17 in South Africa); Permaculture Convergence (April 21-24 in Malawi).

Instructors: Speakers from all over the world.

Contact: IPC-9 Secretariat
c/o The Regional Schools
and Colleges Permaculture
(RESCOPE) Programme
P.O. Box 32280
Chichiri, Blantyre 3
Malawi, Africa
+2651 831373
+2651 831363
secretariat@ipcon.org
www.ipcon.org
sbpcnet@silcom.com

Permaculture Design Course Western Canada

Dates: May 25-June 7

Location: Winlaw, British Columbia

Description: This 72-hour permaculture design course combines theory with practical hands-on learning. Topics include: permaculture design techniques & principles, site analysis, soil fertility, organic gardening techniques, herbs & medicinal plants, fruit & nut trees, water uses, and ecological buildings.

Instructors: Gregoire Lamoureux and guests.

Cost: Cdn\$900 before 4/25,
Cdn\$975 after.

Contact: Gregoire Lamoureux
Kootenay Pc Institute
Winlaw, BC, Canada
V0G 2J0
250-226-7302
spiralfarm@yahoo.com
www3.telus.net/permaculture

Permaculture Fundamentals Central Canada

Dates: July 20-27

Location: Ecology Retreat Centre,
Orangeville, Ontario

Description: This intensive course combines theory with practical hands-on learning. Topics include: permaculture design techniques & principles, site analysis, soil fertility, organic gardening techniques, herbs & medicinal plants, fruit & nut trees, water uses, and ecological buildings.

Instructors: Gregoire Lamoureux,
Richard Griffith, and guests.

Contact: True Source Seminars
Russell Scott
519-942-8339

info@TrueSourceSeminars.com
www.TrueSourceSeminars.com

Permaculture Practicum Central Canada

Dates: July 28-August 3

Location: Ecology Retreat Centre,
Orangeville, Ontario

Description: This course focuses on design exercises integrating hands-on activities. It completes the Permaculture Design Certificate Course for those who have taken the Fundamentals of Permaculture Course. The topics covered include observation, client interview, site analysis, Permaculture Design Principles, Zones & Sectors Planning, The Design Process, Concept Plan, Pattern Language, Ecological Design Principles. Also included in the course: the role of a permaculture consultant and designer.

Instructors: Gregoire Lamoureux,
Richard Griffith, and guests.

Contact: True Source Seminars
Russell Scott
Orangeville, Ontario
519-942-8339

info@TrueSourceSeminars.com
www.TrueSourceSeminars.com

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www.permacultureactivist.net

Permaculture Design Course Northwest USA

Dates: July 13-August 3

Location: Orcas Island, WA

Description: A three week certificate design course on the Bullock's 25 year-old permaculture homestead. Approximately 144 hours of classroom and hands-on education including design methodologies, observation skill-building, whole systems design, annual and perennial foods, water/energy/waste management, appropriate construction, plant propagation and culture, outdoor mushroom cultivation, herbs, and natural fiber use. Parents: Call for info on concurrent youth camp (you can take the course while your kids learn wilderness awareness, Permaculture, & community building)!

Instructors: Douglas, Joseph & Samuel Bullock, John Valenzuela, and guests.

Cost: \$1700 (\$1600 paid-in-full by June 1st). A \$250 non-refundable deposit is required for registration.

Contact: Dave Boehnlein
360-840-8483

permaculture.dave@gmail.com
www.permacultureportal.com

Permaculture Teacher Training Northwest USA

Dates: August 10-17

Location: Orcas Island, WA

Description: Being excited about Permaculture is a good place to start, but pulling off a great Permaculture course in your community takes good planning, a bit of homework, and some sharing of ideas. Mornings will be spent in educational theory and group dynamics. After lunch groups will be developing a Course Design Matrix, recipe cards for new teachers to take back to their communities. Afternoons will be spent honing and developing personal skills on a 20-year Permaculture homestead. Evenings will focus on resources to help your course take shape. Our final day we will be delivering a one-day Permaculture workshop to a group of college students. Students will leave with many tools to put to use as Permaculture educators.

Instructors: Michael Becker, Dave Boehnlein, Doug & Sam Bullock.

Prerequisite: PDC Certificate or equivalent experience.

Cost: \$800 (\$750 if paid-in-full by June 1st). A \$250 deposit required.

Contact: Dave Boehnlein
360-840-8483

permaculture.dave@gmail.com
www.permacultureportal.com

7th Annual Permaculture Teacher Training Northwest USA

Dates: June 17-23

Location: Little Applegate, OR

Description: Empower yourself to advocate Whole Systems Design. In this dynamic, interactive, and fun course, learn significant teaching techniques to communicate permaculture principles and strategies in a wide variety of settings. Jude and Tom have a combined experience of over 40 years of teaching and in the design field. Their commitment to encouraging diverse learning styles inspires you to build upon your unique strengths and talents. They model various teaching and learning styles including lecture, discussions, lesson planning, visual aids and storytelling. Each participant will be offering several presentations which provides essential hands-on experience.

Instructors: Jude Hobbs and Tom Ward.

Cost: \$675-\$750 includes course materials, organic meals, and camping.

Contact: Cascadia Pc Institute
541-342 1160

permaculturerocks@yahoo.com
tomward@mind.net
cascadiapermaculture.com

Permaculture Design Course Northern California

Dates: March 15-28

Location: Occidental, CA

Description: Two-week certificate course in land-use design based on permaculture. Students will enjoy our 80-acre site with its 30-year history as a cutting edge learning institution. Topics to be covered include permaculture theory, food diversity, soil enrichment, water use, erosion control, natural building, organic gardening, forest farming, and more.

Instructors: Brock Dolman and others.

Cost: \$1,350 includes lodging and meals. \$1250 if registered ahead two weeks.

Contact: Occidental Arts and Ecology Center (OAEC)
15290 Coleman Valley Rd.
Occidental, CA 95465
707-874-1557 x201
707-874-1558 fx
oaec@oaec.org

Ecovillage and Permaculture Program Northwest USA

Dates: June 16-August 8

Location: Dexter, OR

Description: This holistic experience includes a permaculture design course and an immersion into the ecovillage movement with a focus on intentional communities and social permaculture. Living at Lost Valley, a heart-centered intentional community, you will develop skills that will help you foster communities that are more ecologically regenerative, socially cooperative, and personally satisfying. Hands-on projects and field trips allow for a deeper integration of topics including eco-building, appropriate technology, site analysis and design, organic agriculture, natural cycles and pattern recognition, soil building, edible landscaping, agroforestry, forest gardening, and mushroom cultivation. Lost Valley is located in the foothills of the Cascades, on 87 acres of forests and meadows, with organic gardens, hiking trails, pond, and a creek. There are mountains, old growth, and hot springs nearby.

Instructors: Marc Tobin, Rick Valley, Jude Hobbs, and guests.

Cost: \$2315-\$3685 sliding scale, includes accommodations, prepared organic meals, materials, and field trips.

Contact: 541-937 3351 ext 112
www.lostvalley.org/epcp

13th Annual Permaculture Design Course Southwest USA

Dates: February 9-10, 16-17;
Mar 1-2, 15-16, 22-23

Location: Tucson, AZ

Description: One of the oldest

Permaculture design courses held continuously each year, it has become a Tucson and Southwest Tradition. With a strong emphasis on core Permaculture topics like integrated design, patterning, and ethics, our teaching team also offers years of experience in working with Southwest Drylands.

Cost: \$595.

Contact: Dan Dorsey
520-624-8030

dorsey@dakotacom.net
www.sonoranpermaculture.org

Send Event and Calendar Listings to:
pcaeditor@earthlink.net

Permaculture Design Course and Watershed Restoration Southwest USA

Dates: April 25-May 17

Location: nr. Las Vegas, NM

Description: This practical permaculture and land restoration training is a three-week long program designed for people wishing to gain practical experience and theoretical understanding of sustainable design, land restoration and other key aspects of sustainable living including food forests and gardens in drylands. The program consists of two integrated modules: Permaculture Design Certificate Course, and Applied Watershed Restoration Course. Program modules can be taken together, or separately.

Instructors: Scott Pittman and Craig Sponholtz.

Cost: \$1500 for both programs. \$1200 for PDC module and \$600 for Watershed module. \$300 deposit required for both. Scholarships available.

Contact: Permaculture Institute
POB 3702,
Pojoaque NM, 87501
505-455-0514
505-455-2003
info@permaculture.org
www.permaculture.org

Permaculture Design Course Central Rocky Mountains

Dates: May 23-June 6
September 5-19

Location: Sustainable Settings,
Carbondale, CO

Description: Both sessions of the PDC curriculum are enriched by additional modules on Naka-Ima—The Practice of Honesty in Group Dynamics; Culture and Society; Land Arts and Community Activism; CSA Strategies for an Alternative Nation.

Contact: Permaculture Institute
(see above)
info@permaculture.org
www.permaculture.org

R.U.S.T. Radical Urban Sustainability Training Texas

Dates: March 29-30
April 12-13

Location: Austin, TX

Description: Creating autonomous communities with the tools of permaculture and social activism. An intensive seminar in urban ecological survival skills

Contact:
www.rhizomecollective.org/rust.html

Permaculture Design Course Colorado Front Range

Dates: April 18-November 16
3rd weekend of each month

Location: Colorado Springs, CO

Description: This eight-weekend certification course presents the principles and ethics of permaculture, design techniques, hands-on projects, natural building basics, forest gardening, and sustainable living skills. The eight weeks will provide the ability to observe nature in various stages and follows the seasons till harvest. Students will participate in actual on-site planning and design. The course provides an engaging atmosphere with community spirit and a variety of locations to give a well rounded diverse permaculture experience.

Instructors: Sandy Cruz, Becky Elder, Marco Chung-Shu Lam, John Cruickshank, and guests.

Cost: \$1,100. Work study and scholarships available.

Contact: Becky Elder
719-685-0290
rselder@comcast.net
Robin Shankman
719-685-6372
rlstenergy@msn.com
www.pikespeakpermaculture.org

22nd Annual

Permaculture Design Course Central Rocky Mountains

Dates: September 22-October 6

Location: Basalt, CO

Description: North America's longest running annual design course taught brings together a stellar team of national, international, and top Colorado talent. The 7200' elevation site of Central Rocky Mountain Permaculture Institute hosts mature and expanding forest gardens, passive solar housing and energy capture, rainwater harvesting, aquaculture, cottage industry, sophisticated plant systems, determined re-use of salvage and waste materials, small animals, cutting edge greenhouses including a major redesign/reconstruction following fire, composting toilets, and a wealth of experiential knowledge. Learn from the masters.

Instructors: Peter Bane, Jerome Osentowski, Becky Elder, Travis Beck, Andrew Goodheart Brown, Kelly Simmons.

Cost: \$1,250.

Contact: Jerome Osentowski
970-927-4158
PO Box 631
Basalt, CO 81621
jerome@crmpi.org
www.crmpi.org

Permaculture Design Course Colorado Front Range

Dates: March 8-October 12
One weekend per month.

Location: Boulder, CO

Description: This eight-weekend design certification provides an opportunity to watch the year unfold, giving depth and perspective to design work. Designed in conjunction with the Boulder County Going Local project, the course will engage participants in a hands-on process of creating resilient local designs and taking tangible steps towards sustainable food, shelter, energy, and community. The extended length of the course allows participants time to digest course material and work on seasonal projects, and creates a foundation for future community projects. Primarily intended for local inhabitants, the course can accommodate a limited number of visiting community organizers, activists, and stray gardeners.

Instructors: Sandy Cruz, Becky Elder, Marco Chung-Shu Lam, Jerome Osentowski, and guests.

Cost: \$1,100. Some work/study scholarships available.

Contact: Sandy Cruz
303-459-3494

Permaculture Teacher Training and Internship Program Colorado Front Range

Dates: February 9, 16, 23; & July
26, plus two days assisting
at spring workshops.

Location: Boulder, CO

Description: This locally-based course for Permaculture Teacher Certification provides opportunities to assist experienced Permaculture instructors at workshops, and gives ongoing support for new teachers. Winter classroom work will focus on developing teaching and organizational skills, with hands-on exercises that build confidence and ease in teaching. Participants will then assist at diverse Permaculture workshops offered to the Boulder community, and have an individual conference with the instructor. The closing day of the course in summer will focus on future collaboration among participants by developing teaching teams and designing a local workshop curriculum for Fall 2008 and 2009. Course is limited to 12 participants. Prerequisite: Permaculture Design Course Certification.

Instructors: Sandy Cruz, Becky Elder, and Marco Chung-Shu Lam.

Cost: \$450.

Contact: Sandy Cruz
303-459-3494

Permaculture Design Course Southwest Colorado

Dates: April 12-November 9
2nd weekend each month.

Location: Durango, CO

Description: This eight-weekend design certificate course will allow you to watch the seasons change in southwest Colorado and so expand your perspective. The course will be taught at locations in Durango and at farms located in SE and NW LaPlata County, McElmo Canyon in Montezuma County, and West of Telluride in San Miguel County at elevations from 5000 to 9000 feet, and climates from high desert to mountains.

Instructors: Tom Riesing, Christie Berven, Kris Holstrom, and guests.

Cost: \$950 by 3/21, \$1100 after.

Contact: Tom Riesing
or Christie Berven
970-259-5445
tom@oakhavenpc.org
<http://oakhavenpc.org/>

6th Annual

Permaculture Design Course Western Massachusetts

Dates: July 15-30

Location: Shutesbury, MA

Description: Learn design by doing design: the core of this participatory certificate course is learning permaculture through real-life design projects and hands-on practical skills. We also use other diverse techniques to meet students' learning styles, including participatory classes, exercises, team projects, field trips, presentations, and more. The Sirius Community provides examples of orchards, perennial and annual gardens, natural building, appropriate technologies, and community interaction for study. Join us for a paradigm-shifting journey towards whole systems sustainability!

Instructors: Jono Neiger, Kay Cafasso, Ethan Roland, and guests.

Cost: \$1000 for 112 course hours, food, and campsite.

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www.livingroutes.org

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Advanced Permaculture Design Central Rocky Mountains

Dates: September 15-19

Location: Basalt, CO

Description: Provides a professional orientation to permaculture design work for graduates of the 72-hr. course. Participants will deepen their land analysis, learn to read and interpret maps, and learn how to design earthworks and manage equipment for bioengineering. We will examine typical design challenges and responses across a range of landscape scales and types of projects, emphasizing core principles and pattern language literacy. The course will prepare designers to select and focus their work strategically, adopt appropriate tools, and market their skills.

Instructors: Peter Bane and Andrew Goodheart Brown.

Cost: \$550

Contact: Jerome Osentowski
CRMPI
PO Box 631
Basalt, CO 81621
jerome@crmpi.org
crmpi.org

Permaculture Training and Skill Building Michigan

Dates: May 15-17

Location: Traverse City, MI

Description: This training and skill-sharing will focus on: Food, Water, Shelter, and Community, with an introduction of Permaculture's basic and ancient wisdom. We'll integrate Permi-Arts through storytelling and music-making; Build a Community Garden and Identify Community Carbon; Wander in the Woods fine-tuning our Nature Awareness and Primitive Skills; and, offer Simple Permaculture How-to's—ways in which to apply and practice these skills in easy hands-on demonstrations, for children, youth, and adults. We will explore simple ways to take action in becoming a Community of Permaculturists through hands-on projects, discussion, slide shows, skill-sharing, field trips, and a fun, family-friendly mini-design projects.

Instructors: Little Artshram Staff.

Cost: sliding-scale \$90-\$50/day.

We accept 100% BayBucks, local currency, and work-trade/volunteers.

Contact: Little Artshram
PO Box 844
Traverse City, MI 49685
231-510-3491
penny@littleartshram.org
www.littleartshram.org

Permaculture Design Course Central Ohio

Dates: February 22-24, Feb. 29-
March 2, Mar. 14-16, 28-30, April 11-13

Location: Columbus, OH

Description: Over five weekends, we will present the Pc design curriculum with special emphasis on urban applications, strategies for changing climate, and building local networks of support. The class will implement at least one of the design projects by rehabilitating an old orchard as a forest garden.

Instructors: Peter Bane, Rhonda Baird, and guests.

Cost: \$895 incl. lunches and materials. \$150 deposit required.

Contact: Assn. for Regenerative Cltr.
PO Box 5516
Bloomington, IN 47407
courses@ARCulture.org
ARCulture.org

Permaculture for Kids Summer Art-Farm Camp Michigan

Dates: June 16-20, Apprentice (13 years and older); June 23-27, July 7-11, 21-25, August 4-8, 11-15 Beehive Camps (1st-6th grade) and Permi-Patch Camps (Pre-School-Kindergarten); August 18-22, Girls OUTLOUD! Art-Farm Camp; July 30-Aug 3, Boys OUTLOUD! Art-Farm Camp.

Location: Traverse City, MI

Description: Traverse City Little Artshram is in its fourth summer of Beehive Art-Farm Camps under a maple tree near the old garage building at the Community Gardens and the Historic Cathedral Barns. We are attempting to re-vitalize community gardening and are offering quality art and environmental education, which includes learning sustainable, organic gardening practices, and experiencing the wild places on the nearby Munson Trails. We offer hands-on exploration and practice the fine-art of observation, and pattern language. We focus skill-building in three main areas: art and music; community gardening and permaculture for kids; and wandering in the woods.

Instructors: Penny Krebiehl, Dede Alderman, Matt Miller, and other staff

Cost: Kids Camps (5-days): \$120. Apprentice (5-days): \$250-150 sliding scale. We accept 100% BayBucks, local currency, and work-trade/volunteers.

Contact: Little Artshram
PO Box 844
Traverse City, MI 49685
231-510-3491
penny@littleartshram.org
www.littleartshram.org

Forest Garden Design Course Hudson River Valley

Dates: April 24-27

Location: High Falls, NY

Description: Join us for this 4-day intensive training in the co-creation of perennial abundance! Participants collaborate to learn the principles & practices of edible forest garden design and implementation. Through info-rich presentations, design exercises, and hands-on practical activities, we will explore polyculture guild design, mycorrhizal symbioses, low-tech propagation, coppice establishment, planting patterns, forest garden techniques, sheet mulching, ecosystem mimicry, bioregional research, and community-supported food forestry. Course culminates with the plant-out of a mega-diverse one+ acre multilayered forest garden.

Instructors: Ethan Roland, Alisha-Mai Frank, and guest Dave Jacke.

Contact: Ethan Roland
eroland@gmail.com

www.appleseedpermaculture.com

Permaculture in Action Hudson River Valley

Dates: February-June

One weekend per month.

Location: SUNY Ulster
and High Falls, NY

Description: A smorgasbord of ecological design and practice! Join us for a six-month series of practical permaculture-based workshops, integrating classroom experiences with hands-on activities at local sites. Each two-day session dives into the nitty-gritty of a particular facet of permaculture, facilitated by local permaculture activists at the cutting edge of their disciplines. Topics include: Global Challenges, Personal Solutions (Feb. 1-2) Seedsaving; Reclaiming Biodiversity (Feb. 29-Mar. 1) Living Soil & No-till Gardening (Apr. 4-5) Forest Gardening & Agroforestry (May 9-10) Natural Building & Home Design (May 30-31) Liberation Ecology: Social and Ecological Health (June 27-28) Participants get a taste for whole systems sustainable design and discover opportunities for support and continued connection with local communities. Come for one session or the whole course!

Instructors: Ethan Roland, Andrew Jones, Ken Greene, David Travis, Sarah Williford, Kevin Svorak, Steve Gabriel, Kay Cafasso, Rafter Sass, and guests.

Contact: Ethan Roland
eroland@gmail.com

www.appleseedpermaculture.com

Permaculture Kids Camp Southeast USA

Dates: June 22-28 (7-11 yr. olds)

July 7-19 (11-15 yr. olds)

Location: Camp Lapahio, Raleigh NC

Description: Camp Katuah is a co-ed, summer-resident camp program designed to introduce children 7-15 to the basics of permaculture. Through exciting hands-on projects and exploration, campers learn about natural building, native plants and wildlife, energy and alternative technologies, soil science, and more.

Cost: \$450 (June), \$900 (July)

Contact: www.campkatuah.org

Ecovillage Design Course and Practicum Australia

Dates: March 15-July 15

Location: Crystal Waters Ecovillage,
Queensland, Australia

Instructors: Max Lindegger and guests.

Cost: AUD \$7000 includes food, accommodation, tuition, tours, extensive course notes.

Instructors: Max Lindegger

Contact: EcoLogical Solutions
59 Crystal Waters,
65 Kilcoy Lane,
Conondale Qld 4552,
Australia
+61 (0)7 5494 4741
fax: +61 (0)7 5494 4578

info@ecologicalsolutions.com.au
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Ecovillage Forming

Ecovillage in Portland, Oregon. We are a forming cohousing group with 3.75ac of land, a permaculture farm, an existing common house and an apartment complex. We hope to be ready to move in fall 2008. We are on a major bus route, and 30 minutes by bike to downtown. info@columbiaecovillage.com or see www.columbiaecovillage.com.

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Call Global Innovations at 303-434-4519 for cutting-edge fair trade. www.gifft.org.

Land For Sale

Central West Virginia bioshelter/villa with incipient permaculture on 78.59ac of forested hillside and bottom. See www.spectrumz.com/villa.

For Sale: Remote 55ac, 8-year old Permaculture Farm/Ranch. Four houses, caretaker, it's paradise. Nr. Pavones, Costa Rica. <http://gregorio.batcave.net/>.

Position Available

Garden Manager & Education Program Coordinator - Vancouver Island. Need high level of expertise in organic food production, facilitation, and organizational skills. Have own business on-site too? Negotiable. info@ourecovillage.org.

Professional Services

Joyce Higgins, MA, LMFT. Licensed Marriage Family Therapist. Clinical hypnosis, medical and life issues. Santa Rosa, CA area. Call 707-522-0402.

Situation Offered

Lease, work exchange to young couple with a passion for income productive gardening—A small house on 60ac in rural Arkansas. Seeking a few like minded people for independent, cooperative, aesthetic, permaculture projects. Poor soil, rocks, timber, clay, portable saw mill. Anderson, 3 Hopkins Ln, Conway, AR 72032. permaculture@sbcglobal.net.

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 II, 3 Aug. '86 2nd Int'l PC Conf.
 III, 4 Nov. '86 Fukuoka, Keyline, Genetic Conserv'n, City Farms, Oceanic PC
 III, 1 Feb. '87 Networking, Natural Farming, D-Q Univ., Children's PC
 III, 2 May '87 PC Restoration of Wild Lands, Design for Sacramento Farm
 III, 3 Aug. '87 Annual Planting Cycle
 IV, 1 Feb. '88 Marketing PC Products, Bamboo, Home Wastewater Treatment
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 #23 May '91 Politics of Diversity: Greenhouse Market Gdn; PC in Nepal.
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 #27* Aug '92 Integrating Pc: Deconstructing Utopia, Grassroots Organizing, Garden Polyculture, Pattern Learning, Living Fences
 #28* Feb. '93 Structures: Comnty Dsgn, LETS, Industry, Strawbale/Timber-frame Bldgs.
 #29/30* July '93 Networks: Special Media Rvw, Rural Reconst'n, Leaf Conc., Comnty Food Initiatives, Pc in Palestine, Do-Nothing Educ., Feng Shui, Pc Acad.
 #31* May '94 Forest Gdng: Energy & Pc, Mushm Cultiv, Robt. Hart's F.G., Spp for N. Cal., Alders, Agroforestry in Belize & China, Honeylocust, N-fixers.
 #32* April '95 Animals & Aquaculture: Animal Polyculture, Small-scale Cattle, Goat Dairy, Keyline, Feral Chickens, Bee Plants, Constructed Wetlands
 #33 Dec. '95 Cities & Their Regions: Green Cities, LA Eco-Village, MAGIC Gardens, CoHousing, Micro-Enterprise Lending, Suburban Conversion.
 #34 June '96 Useful Plants: Bamboo Polyculture, Medicinals, Pest Control, Root Crops, Oaks, R. Hart's For. Gdn, Russian Plants, Regl. Plants, Sources
 #35 Nov. '96 Village Design: Pattern Language, Consensus Democracy, Conflict, Historic & New Villages, Planning for Tribe, Vill. Economics
 #36 Mar. '97 Climate & Microclimate: Climate Change, Windbreaks, Low-Tech Sun Locator, Drylands, Cool Slopes, Straw-Clay Bldg, Round Beehive, Water Catch.
 #37 Sept. '97 Tools & Appropriate Technology: Dowsing, Workbikes, New Energy, Scythes, Japanese Saws, Nursery, Ferrocement, Greywater, A-frame & Bunyip Levels, Ram Pump, Solar Toilet, Log Yoke, Cookstoves...
 #38* Feb. '98 Economic Transformation: Speculative Economy, No Middle Class Worker-Owned Coops, WWOOF, No Money!, Global Warming, What Profits?, Holistic Financial Planning, Land Use, Adopt-A-Hive
 #39 July '98 Knowledge, Pattern & Design: Pc: A Way of Seeing, Sand Dunes, Native Conservation., Language Worldview & Gender, Patterning as Process, Land-Use Planning, Teaching Pc, Vietnam, Holmgren on Pc
 #40* Dec. '98 New Forestry: Regl. Devlpmt., Horselogging, Menominee Reserv'n, Forest Investing, Restoration, Old Growth, Homestead Tenure, Forest Soils, Forest Farming, Woody Agric., Rainforests, Windbreaks, Coppice
 #41* May. '99 Natural Building: Oregon Cob, Cordwood, Bamboo, Thatch, Ethics, High Winds, Origins of Conflict, Greenhouses, Ponds, Adobe, Road-Building, MicroHydro, Bldgs. That Live, Under \$20K Houses, Dreams
 #42 Dec. '99 Self-Reliance & Community Cooperation: Co-Intelligence & Self-Orgn., Archetype Design, Sovereignty, Samoa, Mondragon, Natural Housing, Comm. Gdns., Zone Zero, Solar Electric Tractor, Beekeeping
 #43 June '00 Food & Fiber: Hunger, Ferments, Seasons Salads, Heirlooms, Fencing, Self-Fertile Gdns, Rice Revolution, Cold-climate Food, Edible Insects, Chillies, Food Origins, Garlic, Ethnobotany, Wild Food, Bamboo, Hemp
 #44 Nov. '00 Earthworks & Energy: Spreader Drain, Horse Swales, Earth Dams, Machinery, Carpet-lined Ponds, Constr. Wetlands, Biogas, Windmills...
 #45 Mar. '01 Medicine & Health: World & Self, Healthy Home, Designing Care, Ayurveda, Agents of Decay, Comm. Health Centres, Women Trad. Med 4th World Apothecary, Healing Weeds, Medicinal Crops, Hawaiian Bot'ls.
 #46 July '01 Good Work & Right Livelihood: Pc Golf Course, Downsize Cost of Living, New Forest Economy, Energy Currency, Buddhist Mktng., End Wage Slavery, What's Surplus?, Urban Community, Enterprise Facil'n.
 #47 June '02 Watersheds: Water as Commodity, Basins of Relations, Beavers Watershed Development, Skywater Center, Urban Stormwater Gabions, Conservation Investments, Peat Bogs, Rabbits.
 #48 Sept. '02 Making Changes: Co-Intelligent Activism, Webs of Power, Urban Food, How to Change, Teaching for Change, Global Transformation, City Repair, Escaping the Job Trap, Argentine Recovery, Costa Rica Pc
 #49 Dec. '02 Where is Permaculture? Land-Rent Reform; 10 N. American sites plus Cuban Agric.; Beauty+Sustainability in NZ; Cacti/Succulent Plants; Animal Self-Medication; Challenge to Pc Movement
 #50 May '03 Ecosystems: Holmgren on Pc Mvmt; E. Hazelip & Synrg. Agric. Chestnuts/Pigeons; Oak Savannas; Root Crop Polycults.; Alders Fungal Ecosys.; Humans & Wildn; Indoor Ecos.; Humid Tropics.
 #51 Jan '04 Traditional Knowledge & Regeneration: Bates on Cataclysm& Collective Memory; Shepard's Wisdom of the Genome; Waru Waru; Biosculpture; Inuit Medicine; Fermented Stimulants.
 #52 May '04 Aquaculture: Ecological Aquaculture; Fish for Health; Dowsing; Designing Ponds; Greywater Biotreatment; N. Amer. Polyculture; Managing for Native Species; Integrated Village Fisheries; Vietnam.
 #53 Aug. '04 Education: Life-long Learning; Edge-ucation; The Albany Free School; Indigenous Education & Ecology; Ecocentric Pedagogy; School Gdn and Dances; Ecology of Learning; Brain Gym.
 #54 Nov. '04 Fire & Catastrophe: Designing Beyond Disaster; Opportunity; Rise of Globalization; Invasion Biology; Street Orchards as Security; Community Food Security; Water Rising; Disrupted Climates.
 #55 Feb. '05 Learning from Our Mistakes: Petroleum Dependence; Village Design; Aust. Hard-Won Lessons; Read the @!#!@ Manual; Trial&Error; Experiments in Forestry; Owner-Builder; Ten Mistaken Ideas in Pc.
 #56 May '05 Tree Crops, Tree Guilds: History of Pine Nuts; Tree Vegetables; Acorns; Restoring American Chestnut; Honeylocust as Silvopasture; Broadscale Agroforestry; Bamboo; Wondrous Willow; Social Forestry.
 #57 Aug. '05 20th Anniversary Issue: Challenges; Remembrance; Pc in USA; Hawaii Retrospective; Pc Changes; Permaculture; Pc's Soft Edge; PINC; Gaia University; Oil Depletion; IPC-7; Retrofitting Suburbs.
 #58 Nov. '05 Urban Permaculture: Urban/Rural Futures; City Zones & Sectors; Growing Food; Detroit Visionaries; Rebuilding New Orleans & Everytown; Transformation of a Military Base; Workers Co-op; Energy Descent.
 #59 Feb. '06 Peak Oil: Peak Oil & Pc; Ecological Collapse & Trauma Theory; Thom Hartmann; Pathways for Energy Descent; How Cuba Survived; Oil & Food; Biofuels; Cultivating Algae for Fuel; Relocalize.
 #60 May '06 Land Use Past & Present: Sust. Ag an Oxymoron?; Negev's Bedouin; Eastern Woodlands Agroforestry; Pc Heals in India; Arcosanti Land Planning; Pop. Growth/Land Hunger; Mexican Reforest; Rocky Mtns.
 #61 Aug. '06 Unseen Kin-doms: Observation as Design Tool; Soil Food Web; Bees; Mycelial Internet; D-I-Y Mycorrhizal Inoculum; Cover Crops as Bee Forage; Earth Energies; Local Currencies; Dead Zones; Birds at Risk.
 #62 Nov. '06 The Art of Permaculture: Painting, Writing & Pc; Ecoartists; Art, Activism & Cmty; Street Theatre; Art & Bioremediation; Living Willow; Body as Zone 0; Art of the Found; Water Magic; Pc in Pop Culture.
 #63 Feb. '07 Building & Technology: How to Dwell?; Natural Bldg & Legal; Meeting Code; Strawbale in China; Mr. Cob in Armenia; Integrated Solar Heating, Cooking, Pumping; Self-Build; Nation-Scale Pc in Brazil.
 #64 May '07 Waste = Food: Throwaway Economy; Strategy of Salvage; Peak Soil; Pigs & Intgrd. Waste Mgmt.; Bicycles, Soil, & Garbage; Farm as Organism; Opportunistic Plants?; Simple Biodigester; Waters of Spain; Vermiculture.
 #65 Aug. '07 Climate Change: Shrinking Seas; Forests' Role in Climate; Urban Forest; Making Trees Pay; Rainwater Harvesting; Indoor Gardens; Water Filtration; Changing Human Climate; De-Stabilizing Climate.
 #66 Nov. '07 Animals in Design: Jumbo Shrimp; Pawpaw Patch; Alpaca; Insects as Food; Bees; Integrated NH Farm; Pastured Poultry and Rabbits; Urban Livestock; Predator Restoration; Complementary Animals; Agrichar.

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Permaculture Videos

See catalog insert or website.

www.permacultureactivist.net

CALENDAR

January 26-March 29. Austin, TX. Permaculture Design Course. Austin Area Permaculture Group. 512-619-5363. www.permie.us.

Feb 9, Feb 16, Feb 23, and July 26, 2008.

Boulder, CO. Permaculture Teaching Training and Internship Program. Sandy Cruz, 303-459-3494.

February 9-10, 16-17; March 1-2, 15-16, 22-23. Tucson, AZ. Permaculture Design Course. Dan Dorsey. 520-624-8030.

dorsey@dakotacom.net, www.sonoranpermaculture.org.

February 10-25. NICARAGUA.

Permaculture Design Course. Chris Shanks. ch_shanks@hotmail.com,

www.permaculturenow.com, www.projectionafide.com.

February 11-15. Loveland, OH.

Permaculture Teacher Training. Assn. for Regen. Culture, PO Box 5516, Bloomington, IN 47407. 812-335-0383. www.ARCulture.org.

February 24-26, Feb. 29-Mar. 2, Mar 14-16, 28-30, April 11-13. Cincinnati, OH.

Permaculture Design Course. ARC. PO Box 5516. Bloomington, IN 47407. 812-335-0383.

courses@ARCulture.org, ARCulture.org.

February 28-29. Milwaukee, WI. SPIN Cities: Farming Where We Live. Roxanne Christensen, 610-505-9189. www.spinfarming.com.

rchristensen@infocommercegroup.com, <http://growurban.org/schedule>.

March 8-October 12. Boulder, CO.

Permaculture Design Course.

Sandy Cruz. 303-459-3494.

March 10-11. Bryson City, NC. Barrel

Aquaponics Workshop. Aquaculture

International, Inc., 405 Union Street,

Murfreesboro, NC 27855.

www.aquacultureinternational.org.

March 10-23. BELIZE. Permaculture

Design Course. Maya Mountain Research

Farm. info@mmrfbz.org, www.mmrfbz.org.

March 12-14. Bryson City, NC. Aquaponics

Conference. Aquaculture International, Inc.

www.aquacultureinternational.org.

March 15-28. Occidental, CA. Permaculture

Design Course. Occidental Arts and Ecology

Center. 15290 Coleman Valley Rd., Occidental,

CA 95465. 707-874-1557 x201.

[fx/707-874-1558](tel:707-874-1558), oaec@oaec.org.

March 15-July 15. AUSTRALIA. Ecovillage

Design Course and Practicum. EcoLogical

Solutions, info@ecologicalsolutions.com.au,

www.ecologicalsolutions.com.

March 29-30. Austin, TX. R.U.S.T. Radical

Urban Sustainability Training.

www.rhizomecollective.org/rust.html.

April-October. Asheville, NC. Urban

Permaculture Design Course. 828-669-7552.

permaculture@earthaven.org,

www.patriciaallison.net.

April-Oct. nr. Asheville, NC. Rural Perma-

culture Design Course. Earthaven Ecovillage.

828-669-7552. permaculture@earthaven.org,

www.patriciaallison.net.

April 12-13. Austin, TX. R.U.S.T. Radical

Urban Sustainability Training.

www.rhizomecollective.org/rust.html.

April 12-November 9. Durango, CO.

Permaculture Design Course. Tom Riesing or

Christie Berven, 970-259-5445.

tom@oakhavenpc.org, <http://oakhavenpc.org/>.

April 18-November 16. Colorado Springs,

CO. Permaculture Design Course. Becky

Elder, 719-685-0290. rselder@comcast.net.

Robin Shankman, 719-685-6372.

rsltenergy@msn.com.

www.pikespeakpermaculture.org.

April 21-June 15. nr. Asheville, NC. Sustain-

able Life Skills Internships. Earthaven Eco-

village. 828-669-7552. www.patriciaallison.net.

permaculture@earthaven.org, **April 24-27.**

High Falls, NY. Forest Garden Design Course.

Ethan Roland. eroland@gmail.com,

www.appleseedpermaculture.com.

April 25-May 17. nr. Las Vegas, NM.

Permaculture Design Course and Watershed

Restoration. Permaculture Institute. POB

3702, Pojoaque NM. 87501. 505-455-0514.

505-455-2003. info@permaculture.org,

www.permaculture.org.

April 25-26. Chestnut Ridge, NY.

Introduction to Organic Beekeeping

Workshop. Pfeiffer Center. Carol Rosenberg.

845-352-5020 x20. info@pfeiffercenter.org,

www.pfeiffercenter.org.

May 15-17. Traverse City, MI. Permaculture

Training and Skill Building. Little Artshram,

P.O. Box 844, Traverse City, MI 49685. 231-

510-3491. penny@littleartshram.org,

www.littleartshram.org.

May 23-June 6. Carbondale, CO.

Permaculture Design Course. Permaculture

Institute. 505-455-0514, 505-455-2003.

info@permaculture.org, www.permaculture.org.

May 25-June 7. British Columbia,

CANADA. Permaculture Design Course.

Gregoire Lamoureux, Kootenay Permaculture

Institute, Winlaw, BC, Canada V0G 2J0. 250-

226-7302. spiralfarm@yahoo.com,

www3.telus.net/permaculture.

June 16-August 8. Dexter, OR. Ecovillage

and Permaculture Program. Lost Valley

Educational Center. 541-937 3351 x112.

www.lostvalley.org/epcp.

June 16-20. Traverse City, MI. Permaculture

for Kids Summer Art-Farm Camp. Little

Artshram. penny@littleartshram.org,

www.littleartshram.org.

June 17-23. Southern OR. Permaculture,

Teacher Training. Cascadia Permaculture

Institute. 541-342-1160. tomward@mind.net,

permaculturereocks@yahoo.com,

cascadiapermaculture.com.

June 23-27, July 7-11, July 21-25, August 4-

8, August 11-15. Traverse City, MI.

Permaculture for Kids Summer Art-Farm

Camp. Little Artshram. penny@littleartshram.org,

www.littleartshram.org.

July 13-August 3. Orcas Island, WA.

Permaculture Design Course. Dave

Boehnlein. 360-840-8483.

permaculture.dave@gmail.com,

www.permacultureportal.com.

July 15-30. Shutesbury, MA. Permaculture

Design Course. Living Routes. 888-515-7333.

413-529-0025 x1256. www.livingroutes.org.

July 20-27. Ontario, CANADA.

Fundamentals of Permaculture Design. True

Source Seminars. Russell Scott, 519-942-8339.

info@TrueSourceSeminars.com,

www.TrueSourceSeminars.com.

July 28-August 3. Orangeville, Ontario,

CANADA. Permaculture Practicum. True

Source Seminars. Russell Scott, 519-942-8339.

info@TrueSourceSeminars.com,

www.TrueSourceSeminars.com.

July 30-Aug 3. Traverse City, MI.

Permaculture for Kids Summer Art-Farm

Camp. Little Artshram. penny@littleartshram.org,

www.littleartshram.org.

August 10-17. Orcas Island, WA. Perma-

culture Teacher Training. Dave Boehnlein.

360-840-8483. permaculture.dave@gmail.com,

www.permacultureportal.com.

August 18-22. Traverse City, MI.

Permaculture for Kids Summer Art-Farm

Camp. Little Artshram. penny@littleartshram.org,

www.littleartshram.org.

September 1-November 8. nr. Asheville, NC.

Sustainable Life Skills Internships.

Earthaven Ecovillage. 828-669-7552.

permaculture@earthaven.org,

www.patriciaallison.net.

September 15-19. Basalt, CO. Advanced

Permaculture Design. Jerome Osentowski.

jerome@crmpi.org. 970-927-4158.

September 22-October 6. Basalt, CO. 22nd

Ann. Permaculture Design Course.

jerome@crmpi.org. 970-927-4158.

March 29-April 11, 2009. ZIMBABWE.

Permaculture Design Course (IPC 9).

April 15-17, 2009. SOUTH AFRICA.

Permaculture Conference (IPC 9)

April 21-24, 2009. MALAWI. Permaculture

Convergence (IPC 9). IPC-9 Secretariat, c/o

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Box 32280. Chichiri, Blantyre 3. Malawi,

Africa. +2651 831373. +2651 831363.

secretariat@ipcon.org, www.ipcon.org.

LETTERBOX



Kudos and Comments

Hey Peter,

The Autumn *Pc Activist* finally made it from Pittsboro to me, and I have been enjoying the many articles. Loved Gilberts "If only gay sex..." and the greenhouse articles, especially.

I have some comments on the review of the Joel Salatin article. He has done an amazing job of adapting his production system to his environment over the past several decades. He articulates the problems and his solutions, but his work is so site specific that there is a problem with using his books as cookbooks rather than as guides. While elegantly suited to growing trees and grass, the last I knew there were no field crops being raised on Polyface Farm. Rotational grazing suits the environment of Polyface and increases the organic matter in the soil, along with a host of other environmental benefits as well as benefits to the health of the livestock and people involved. But this will not work country-wide since most of the rest of the country is not the mountains of Virginia. Also, we do not live by meat alone. Someone has to be raising the other crops that supply us with our food and fiber. We also need to be clear that the Polyface model is not self-sustainable. Grain must be bought for the pigs and poultry and while he has selected a beef herd well suited

for his habitat, the poultry is brought in from the Industry. I think he may by now be raising his own swine and rabbit breeding stock.

This is not to disparage the great work Joel has done nor the legion of farmers he has motivated to try some new ideas, it is just that there are many more answers yet to be discovered.

Hope all is well with you.

Yours in conservation,

Don

Donald E. Bixby, DVM

Technical Programs Manager

American Livestock Breeds Conservancy

Next Issue: #68

Plants on the Move

Deadline: March 1

editor@permacultureactivist.net

Celebrating 30 Years of Protecting Livestock Genetic Diversity

Congratulations and thank you to the American Livestock Breeds Conservancy. Founded in 1977, the ALBC is the pioneer organization in the U.S. working to conserve historic breeds and genetic diversity in livestock.

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American Livestock Breeds Conservancy,
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Issue #67

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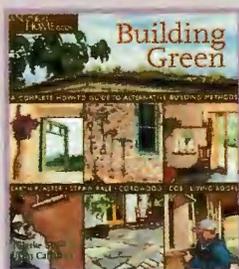
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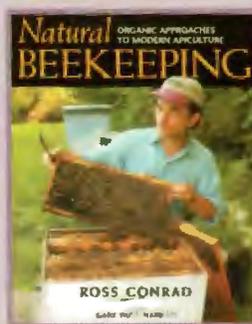
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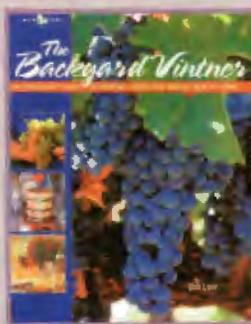
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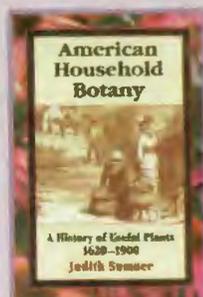
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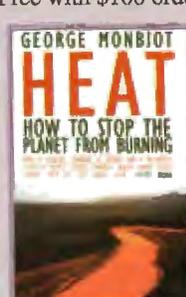
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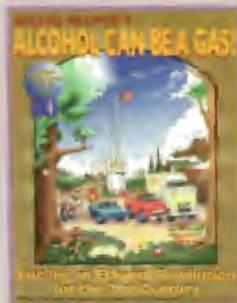
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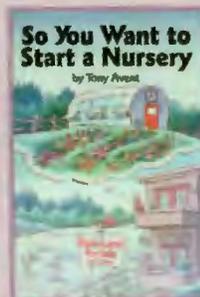
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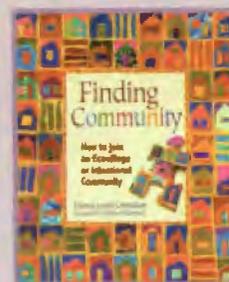
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