

POST-OIL GROCERIES

**A VERMONT FIRM
PREPARES FOR
FUEL SCARCITY
WITH INTENSIVE
FARMING.**

BY ADAM REGN ARVIDSON, ASLA



ABOVE

At its research farm in Vermont, Whole Systems Design is discovering ways of returning land to productivity in anticipation of peak oil. These two rice paddies will satisfy the grain needs of a family of four for a year.

IMAGE CREDIT

Courtesy Whole Systems Design

Ben Falk is growing rice in Vermont. Last fall he carved two flat paddies into a hillside above the Mad River Valley, then excavated a small pond at the top of the hill. The pond catches rain and meltwater from the upper part of his 10 acres. His three ducks, which provide eggs and eat the slugs that would otherwise overwhelm his vegetables, often use this pond as their bathroom, so the water is rich in nutrients. It also gets a lot of sun, so it's warm, like bathwater. A simple garden hose brings the water downslope to the rice paddies, keeping them wet and mucky.

Last July, the rice was bright green, obviously thriving. Falk says he'll get about 150 pounds of brown rice from these two paddies, enough to take care of the grain needs of a family of four for a year. He also has berry bushes, fruit trees,

vegetables irrigated with rainwater, and natural fences of black locust that can be cut for firewood. Portobello and shiitake mushrooms grow on downed trees in the woods, and sheep graze just about everywhere, herded from field to field with portable wire fencing.

The complex is reminiscent of a wilderness homestead, from a time when there weren't grocery stores down the road and a family needed to survive on what they could grow, gather, and store. And that's exactly the point. Falk is founder of Whole Systems Design (WSD), a landscape consulting firm that is master planning and implementing projects for a post peak oil society.

Falk and his clients believe there is a fundamental change coming: that oil is dwindling and will begin to skyrocket

in price. That would have a profound effect on society—on our ability to heat our homes, to fertilize our vast industrial monocultures of corn and beans, and to transport out-of-season produce to the local grocery store. To many, this kind of thinking is radically leftist, apocalyptic even, but there are certainly glimmers of this coming reality. Rises in oil prices have far outpaced inflation over the past decade. In some countries, such as Yemen and Qatar, reserves are drying up. And tapping the remaining, less accessible reserves is, in light of the recent Gulf of Mexico catastrophe, looking increasingly risky. Even if peak oil is still decades away, the Middle East, which accounts for half of the world's oil reserves, is becoming increasingly unstable, with uprisings in Tunisia, Egypt, and Yemen this year. Imagine

**RESEARCH
FARM**



**HOW CAN WE PREPARE FOR
WHEN GAS IS \$10 PER GALLON?
MAKE LAND PRODUCTIVE AGAIN,
SO FOOD DOESN'T HAVE TO
COME FROM SO FAR AWAY.**

ABOVE
WSD's design studio sits on the edge of a pond flanked by food crops and native vegetation.

INSET
Ben Falk, WSD's founder, harvests a half dozen types of berries, including blueberries, hardy kiwi, and Siberian seaberry, from his 10 acres, in addition to tree nuts, grains, and mushrooms.

IMAGE CREDITS
Courtesy Whole Systems Design

the effect on oil prices if Saudi Arabia's government collapsed.

But what does peak oil have to do with landscape design? "Now is the time to do restoration," says Falk, "because we can still go to the grocery store for food. We have a window." He says we need to ask ourselves what we can do now to prepare for when gas is \$10 per gallon. His answer is to make land productive again, so that food doesn't have to come from so far away. Falk's complex of rice paddies and berry patches and orchards in the Mad River Valley is a testing ground. He learns here, on the landscape where he lives, so he can apply specific principles to other projects—projects like Teal Farm.

The first major project of the Living Future Foundation, a nonprofit working toward a truly sustainable human society, Teal Farm is 1,600 acres of woods and pasture not far from WSD's research farm. WSD began work there in 2004 on a master plan that charts the next 100 years of the project site. Living Future worked with Birdseye Building Company, a Vermont-based

design/build firm, to remake several existing farm buildings as efficient, extremely low-consumption facilities, then brought WSD in to remake the landscape as a productive, low-input agricultural site. Falk refers to the site as an agricultural ecosystem.

"Everything that's created here," says Living Future's founder and executive director, Melissa Hoffman, "would enhance the living systems of the region: animals, birds, insects, soil biota." The site goes beyond organic farming to a type of farming that does not use outside inputs at all. WSD spent a year getting to know the site and producing initial master plans. The next year, the firm continued planning but began to plant the site. Another year of planting followed.

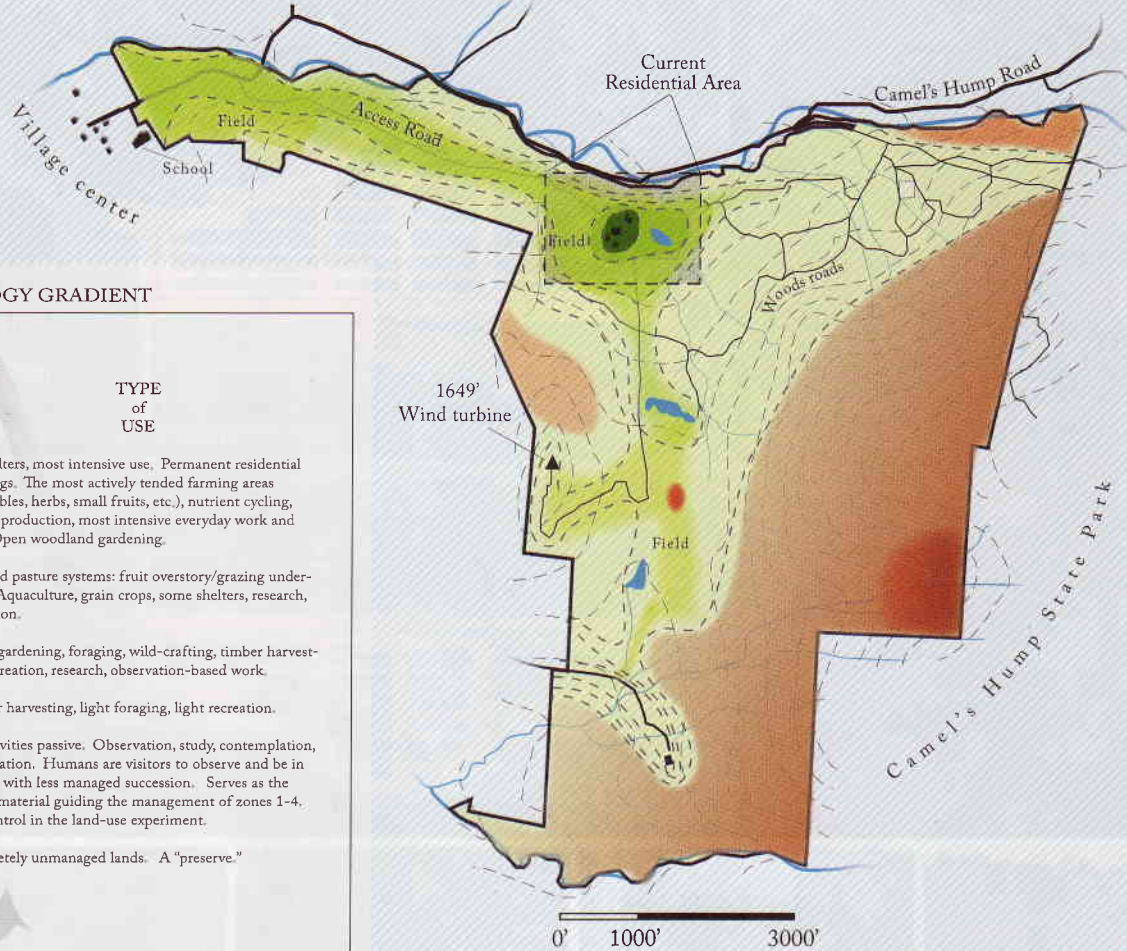
The site is harsh with winter mountain winds, so WSD designed a system of windbreaks. The land was resculpted to create sheltered garden and orchard pockets, which are home to fruit and nut trees, fuelwood trees, nectar flowers, perennial vegetables, and medicinal herbs. Eight acres have been planted to date, with more than 2,500 plants of 250 different species, including unexpected food crops like

Chilean mango, yucca, Siberian seaberry, and Korean bush cherry. These intense gardens constitute one end of a gradient of land use WSD established for the site, at the other end of which is untouched forest.

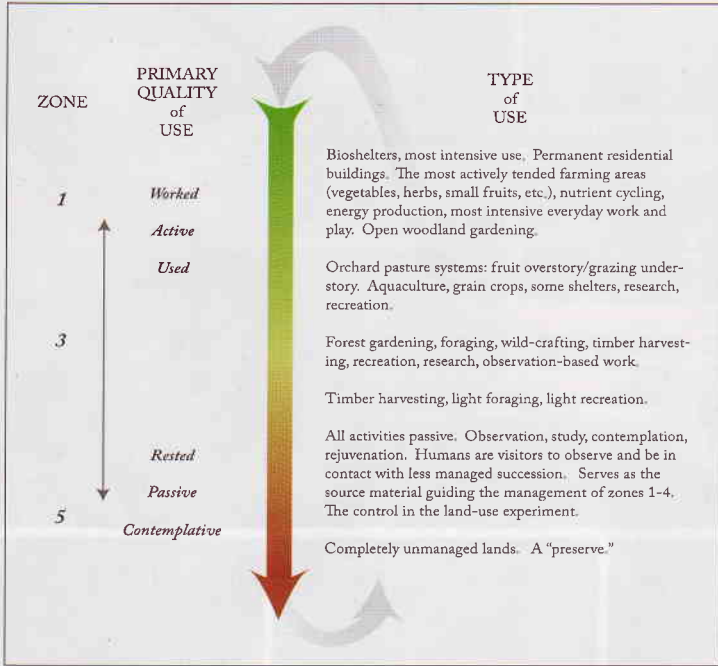
The regrading of the site demonstrates the "cheap oil now" principle Falk applies to his own farm. All the earth was being moved anyway to create a new basement for one of the barns. So the oil (much of it biodiesel) used to recontour the land ensures that far less oil will be needed later. Making the microclimate warmer and better controlling water will allow a more diverse array of crops to thrive. This will increase what Falk describes as the amount of nutrition per acre—a key to feeding more people with less energy.

WSD's principles find perhaps their fullest expression in another project in the Mad River Valley, its proposal for the Warren Common. "This is what a New England village center could be after peak oil and global financial insolvency," says Falk. WSD's master plan was produced for a private client interested in giving something back to the community. It would include a suite of

TEAL FARM LAND USE GRADIENT



HUMAN ECOLOGY GRADIENT



THE TEAL FARM SITE GOES BEYOND ORGANIC FARMING TO A TYPE OF FARMING THAT DOES NOT USE OUTSIDE INPUTS AT ALL.

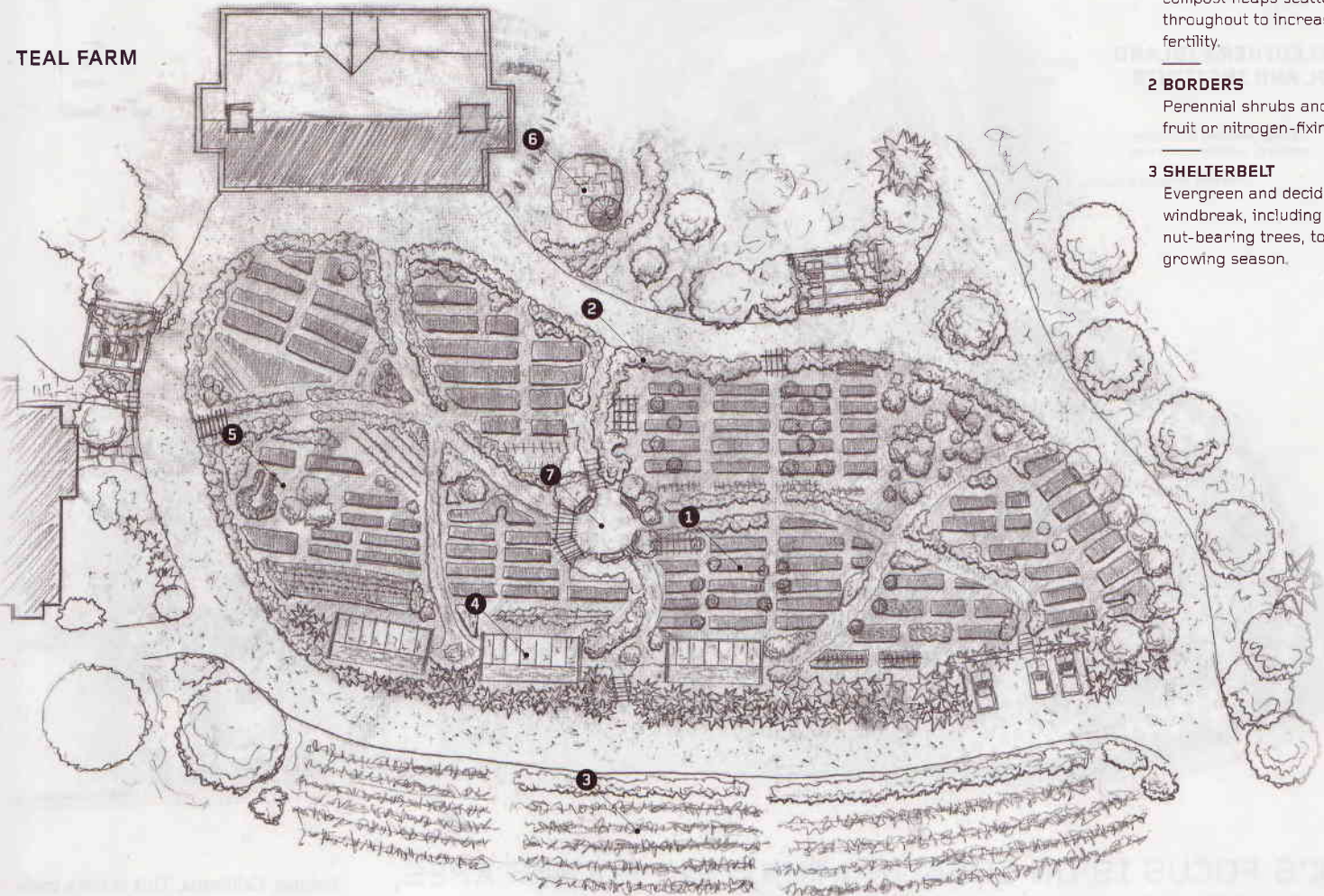


LEFT
In the cultivated garden area at Teal Farm, WSD created a sheltered microclimate to extend growing seasons—an investment of fuel now for increased productivity later.

ABOVE
For its largest design project to date, Teal Farm, WSD spent nearly a year analyzing the site and creating a gradient of use intensity, ranging from highly cultivated (green) to untouched (red).

IMAGE CREDITS
Courtesy Whole Systems Design

TEAL FARM



1 INTENSIVE GARDENS

High-yield annual and perennial food crops with compost heaps scattered throughout to increase fertility.

2 BORDERS

Perennial shrubs and dwarf fruit or nitrogen-fixing trees.

3 SHELTERBELT

Evergreen and deciduous windbreak, including some nut-bearing trees, to lengthen growing season.

4 PLANNED GREENHOUSES

Space for seed starts, plant propagation, and experiments with new species.

5 DEMONSTRATION GARDEN

Showcase of methods for small space cultivation, including trellised and espaliered fruits, fruiting vines, grafted trees, and container-grown crops.

6 OUTDOOR EATING AREA

Buffered from prevailing winds and featuring edible shrubs and trees.

7 CENTRAL GATHERING AREA

The heart of the garden, where workers and visitors can relax, talk, and socialize.

IMAGE CREDIT

Courtesy Whole Systems Design

agricultural practices used elsewhere in the world, but not regularly practiced in the United States, such as edible windbreaks, agroforestry (where crops are grown among productive trees), and wet cropping for rice and watercress. There would be traditional community vegetable gardens and orchards, but also areas managed for fuelwood and charcoal production. Seasons would be extended with greenhouses and cold frames. Soil would be enriched with a method called keylining and intensive rotational grazing, which involves creating a series of shallow ditches along a slope, then using animals to repeatedly remove cover crop biomass. In this method, water stays on the slope longer. This increases plant vigor, which in turn

improves the soil through accumulation of leaves and stems above and deeper penetration of roots below.

This is a technique Falk is using on another hillside on his own farm. This slope is dry and degraded, with shallow soil over fractured bedrock. Falk spent an afternoon on his tractor last spring digging a series of shallow ditches. The excavated soil was piled immediately downslope, creating a berm into which he planted Siberian seaberry, a nitrogen-fixing, cold-hardy shrub with easily harvested orange berries that are high in vitamin C. The ditches bring rainwater from the high ground and move it slowly along the slope, letting it sink into the ground. He left a portion

of the slope alone, as a control. Last July, the keylined slope was thick with clover and perennial flowers, and Falk said he had already scythed it twice that year. An unscythed patch came up to Falk's stomach and was thick with pollinating insects. The unaltered slope was mostly bare sandy soil with a bit of struggling vegetation. That simple solution had, in less than a year, improved the productivity of a marginal piece of land.

The search for actual solutions is what brought Falk to where he is today. He grew up in Vermont and spent his early adult life leading wilderness trips and spending extended periods of time in the backcountry. He attended the University of Vermont and developed an



FALK'S FOCUS IS ON CREATING THRIVING FOODSCAPES, NOT ON OTHER LANDSCAPE DESIGN PRINCIPLES.

ABOVE

A key principle of the master plan for the Cape Eleuthera Island School and Institute in the Bahamas is the re-creation of soil on the limestone hardpan through successive plantings of native vegetation.

IMAGE CREDIT

Courtesy Whole Systems Design

interest in ecological design through studying there with John Todd, a pioneer in the design of ecological wastewater treatment systems. After his graduation in 2001, Falk went to the Bahamas where he worked at the Island School, a nature-based high school. While there, he redesigned the campus, a project he considers to be Whole Systems Design's first.

After two years he moved back to Vermont and settled into the building trades, before attending Norwich University to study architecture. He quit after one semester, unable to stomach the focus on art rather than ecological design. He later spent a year at the Conway School of Landscape Design in

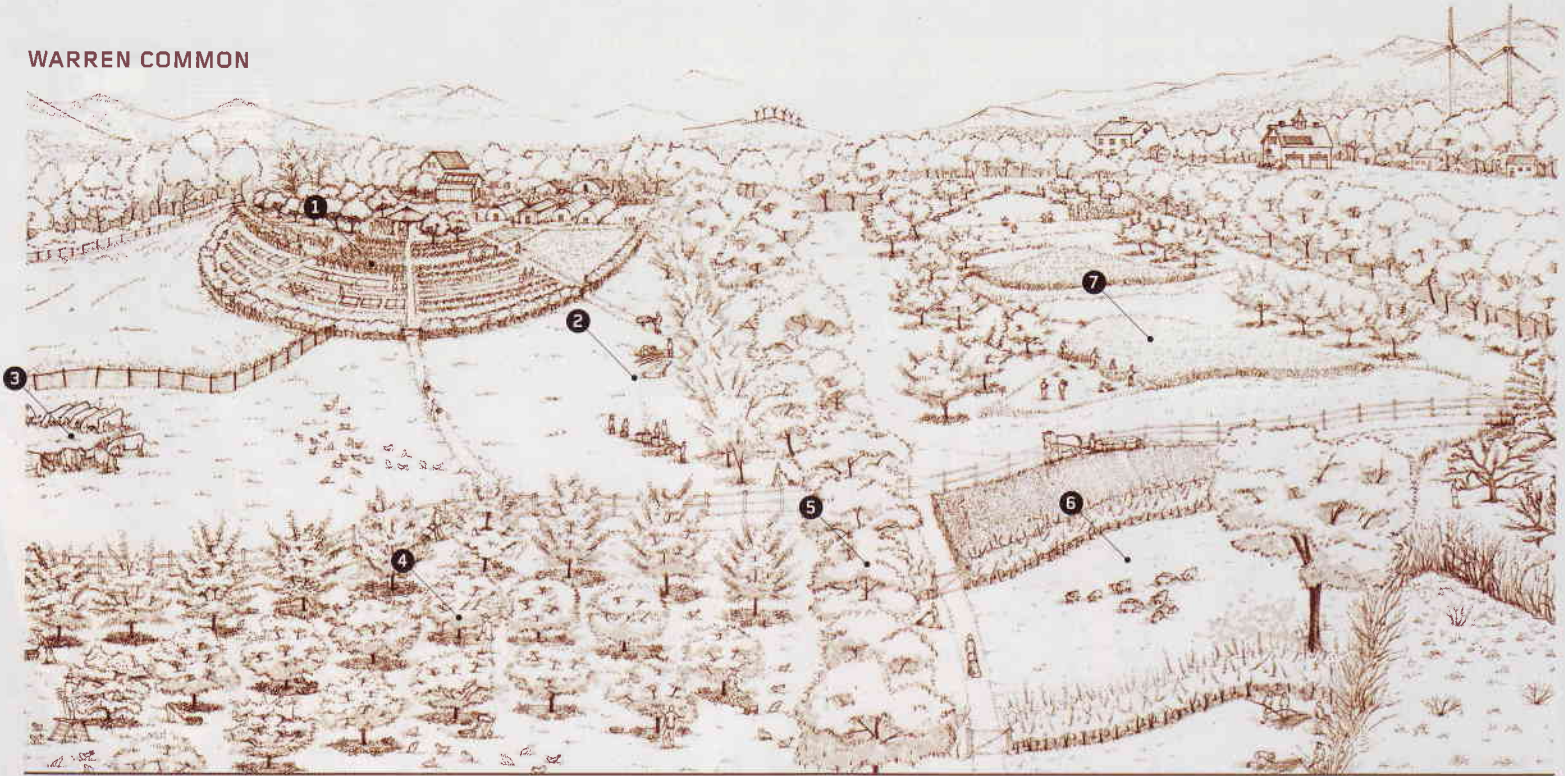
Massachusetts (see "Ten Months, One Quantum Leap," *LAM*, March 2007). Then he officially started Whole Systems Design out of his house on that 10 acres in the Mad River Valley. Early projects included a sauna and bathhouse and some small residential landscapes. About two years ago he built the two-story studio that sits at the head of the large pond on the property.

Whole Systems Design consists of just a few full-time employees, one of whom is Falk's partner, the educator Kristen Getler. Another is Cornelius Murphy, who holds a landscape architecture degree from Temple University and a permaculture design certificate from the Regenerative Design Institute in

Bolinas, California. This is not a traditional studio environment, however, given that some of Falk's, Getler's, and Murphy's work includes tending the 10-acre research farm. Murphy also spends unpaid time "apprenticing" on the farm. Falk also brings in several "apprentices" (recent college graduates) several days a week to, he describes, "learn by immersion in ecosystem agriculture." Paid help is brought in from time to time for more laborious tasks.

For his design work, Falk regularly calls on a wide-ranging network of collaborators (who are listed in the "who we are" section of the WSD web site but function more like subconsultants on call). Besides landscape design and master planning, WSD is creating lesson plans paired with educational landscapes and last February launched Whole Systems Skills, a

WARREN COMMON



1 COMMUNITY GARDENS

Annual and perennial food crops for local residents.

2 FUELWOOD PRODUCTION

Coppiced hedges of black locust and speckled alder cut regularly for fuel, and scraps turned into charcoal for soil amendment.

3 ROTATIONAL GRAZING

Animals moved frequently between paddocks to promote vegetation growth.

4 ORCHARDS

Multiple species of fruit trees.

5 EDIBLE WINDBREAKS

Nut-bearing trees and shrubs as food source and shelterbelt.

6 AGROFORESTRY

Multiple species of row crops grown amid nitrogen-fixing and fuelwood trees.

7 WET CROPS

Rice, watercress, and medicinal herbs inundated by on-site stormwater.

IMAGE CREDIT

Courtesy Whole Systems Design

series of workshops and seminars centered on WSD's methods for making land productive. WSD has been featured in *Northern Woodlands*, *Mother Earth News*, and *Fast Company*—the last suggests WSD's appeal even beyond the stereotypically crunchy Vermont ecocrowd.

A major question remains, though. Is this landscape architecture or agriculture? Permaculture, the idea of creating human systems that mimic natural ones, is certainly on the minds and tongues of some academics and practitioners. But to say that the placement of rice paddies, keyline ditches, and berry patches is landscape architecture suggests that industrial farmers practice landscape architecture every spring when they decide which acres will be corn and which will be beans.

WSD's research farm isn't conventionally pretty. There aren't walkways or patios. There are wire fences to awkwardly step over from one zone of the

farm to another. Materials waiting to be used or turned into firewood are scattered everywhere. Hoses to move water from collecting ponds to crops snake through the unmowed grass. Everything smacks of practicality, except the studio and the sauna, which are beautifully designed and built wood structures with stone stairways. Teal Farm is more organized, with low stone walls providing some structure to the landscape. But Falk's focus really is on creating thriving foodscapes, not on other landscape design principles, like the creation of definable spaces, entry experiences, or landscape progressions.

Falk actually rebels against the notion of the designer's prerogative. "We're not trying to get to a solution just from our heads," he says. "We're trying to let the place and the conditions bring the process to its solutions. We try not to ask a lot of design or solution-based questions for the first few weeks or months of a project." It is true that WSD's site analysis is exceptional. The

master plans for Teal Farm, Warren Common, the Island School, and every other project on view in the firm's studio include page after page of detailed maps, sections, existing species lists, and other background information. He believes this is the catalyst for proper site solutions and that the designer's hand should be subordinate.

"That's why most design has failed us: We jump to solutions," he laments. "It's ego based. The designer comes in and says, 'Here's what the entrance needs to look like.' Right at the beginning, [designers] think they see the solution. That's really driven the field of landscape architecture, without an understanding of who inhabits the place—not just people, but the soil, the plants, the water." ●

ADAM REGN ARVIDSON, ASLA, IS A FREELANCE WRITER IN MINNEAPOLIS AND FOUNDER OF TREELINE, A DESIGN/WRITING CONSULTANCY. HE CONTRIBUTES REGULARLY TO LAM AND FOR A FEW YEARS HAS BEEN CULTIVATING AN INCREASINGLY PRODUCTIVE 200 SQUARE FEET OF POOR CLAY CITY SOIL.