Permaculture Design

Regenerating Life Together

Permaculture Design Process

Design for Your Home

How Teachers Share Design Process

How Pattern Languages Inform Design

The Real Deal on Stewardship

What We Learned from Standing Rock

Maximize Your Annual Garden

PermacultureDesignMagazine.com

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EVENTS

Permaculture Design Course
Ireland

Dates: August 11-21
Location: Cloughjordan Ecovillage, Cloughjordan, IRELAND
Description: This 10-day course is organized by Cultivate, hosted in association with Cloughjordan Community Farm, and fully accredited by the Permaculture Association. This 10 day immersive course is set in Cloughjordan Ecovillage, one of Ireland's leading examples of an ecosystem of innovation. Through a balanced mix of theory and practice, participants will learn how to apply the principles of permaculture to many aspects of their own lives and that of their community. The Cloughjordan course includes focused sessions on natural building, local economics, forest gardening, renewable energy, ponds and aquaculture, and ecovillage and bio-regional design, along with specialist knowledge from our local expert on digitial fabrication, permafacture and open source distributed production. The indoor sessions are held in one of Ireland's only FabLabs.
Every year we invite special guest tutors to share their expertise. In 2017 we have Albert Bates of The Farm, Tennessee; and Aranya, author of *Permaculture Design: A Step by Step Guide*.
Instructors: Aranya (hosting online session), Albert Bates, and our ecovillage resident tutors
Cost: €550.00 includes a hearty lunch each day. Accommo dation options available from €45 camping /€165 hostel and other B&B
Contact: PDC@cultivate.ie
Philippa +353 505 56060
www.cultivate.ie

Permaculture Teacher Training
India

Dates: October 21-30
Location: Polam Farm, Manthoor Village, Telangana, INDIA
Description: One-week Permaculture Teacher Training: Empower yourself to advocate for change through whole systems design and teaching! This Permaculture Teacher Training course will improve and expand your abilities and make you a more versatile, engaging, and effective educator. In this dynamic and interactive course, you will learn significant teaching techniques to communicate permaculture principles and strategies in a wide variety of educational settings. Our goal is to encourage and inspire your unique strengths and talents by demonstrating diverse teaching modalities such as lecture, facilitating class discussions, storytelling, and using visual aids. In this setting of active learning, you will experience essential hands-on practice by preparing and co-teaching several presentations. Prerequisite: Permaculture Design Course Certificate or instructor's approval.
Instructors: Jude Hobbs, Robyn Francis, Rico Zook
Cost: $ 1,000. Includes course materials, camping or shared dormitory, & three delicious local meals a day, Scholarships available.
Contact: Roman, ttipcindia@permaculturein dia.org; http://ipcindia2017.org

13th International Permaculture Conference and Convergence
India

Dates: November 25-December 13
Location: Polam Farm, Manthoor Village, Telangana, INDIA
Description: TOWARDS HEALTHY SOCIETIES/Subtheme—Women as Change Agents
CONFERENCE: November 25-26, 2017 @ Hyderabad, Telangana
CONVERGENCE: November 27-December 2, 2017 @ Medak district, Telangana
IPCC will guide and inspire more than 1,200 participants from 100 countries and also give a significant impetus to the permaculture movement in India and around the world. Individuals, farmers, policy makers, researchers, academia sharing a strong interest in sustainable farming practices like permaculture, natural and ecological farming as well as in other kind of initiatives contributing to sustainable livelihood will come together to think, share, innovate, learn, and dialogue in a diverse and engaging programme.

Be part of us and grab this unique opportunity to meet and connect with people passionate about permaculture and sustainable living in general. IPC offers you a rare experience to gain access to the whole philosophy of permaculture, acquire new technical skills from experienced and renowned practitioners, showcase your work, learn and revive ancient Indian agricultural practices, and bolster a positive global movement already underway.
Contact: http://ipcindia2017.org/registerpage.php

Permaculture Design Course
Finland

Dates: August 26-September 7
Location: Elontila, Lahti, FINLAND
Instructors: George Sobol
Contact: www.permacourses.com

Permaculture Design Course
India

Dates: November 3-22
Location: Polam Farm, Manthoor Village, Telangana, INDIA
Description: Happening in the year of the 30th anniversary of the first ever PDC in India that was conducted by Bill Mollison and Robyn Francis in 1987 at the University of Hyderabad, this course is a first of its kind, introducing a new, expanded course format over 20 days with a total of over 100 hours of curriculum and hands-on work: Expanded 72+ hour PDC program – Four focus streams to choose from: Agriculture, Water and Earthworks, Urban, Social.
Instructors: Robyn Francis, Rico Zook, Clea Chandmal, Govinda Sharma, Gopi Sankarasubramani, Narsanna Koppula, Starhawk, Roshan P Rai, Jude Hobbs, Hui-i Chiang, and local guests.
Contact: http://ipcindia2017.org

Send Event and Calendar Listings for Issue #105 (August 2017)
Plant Breeding
by the June 1st deadline
events@permaculturedesignmagazine.com

Permaculture Teacher Training
Hawai'i

Dates: June 18-23
Location: Hawai'i
Description: Permaculture teachers empower people with actionable tools for problem solving in a way that respects nature and the flow of life.

Attendees will practice:
Student teaching
Class exercises and critiques
Teaching an assigned section and a section of your choosing from the PDC course
Laughing and having fun in a supportive and inspiring setting

Larry Santoyo and Scott Pittman are the first generation of permaculture teachers to have worked with and have taught alongside Bill Mollison. They have extensively taught Permaculture Design for the last three decades, in over four continents, and are now offering a course mentoring the next generation of great instructors.

Contact:www.permacultureacademy.com

Permaculture Design Course
British Columbia

Dates: June 4-17 OR August 13-26
Location: Winlaw, BC
Description: This is our 16th annual two week intensive pdc held at Spiral Farm (established in 1993) home of Kootenay Permaculture Institute. Many hands-on activities, design exercise, local guest speakers and field trip are included in this course.
Instructors: Gregoire Lamoureux & guests
Cost: CAN$990/1090
Contact: Kootenay Pc Institute
spiralfarm@yahoo.com
www.kootenaypermaculture.ca

Permaculture Design Course
Ontario

Dates: July 16-29
Location: Caledon, ON
Description: Our 7th annual pdc held at Whole Village Ecovillage and Farm. Many hands-on activities, design exercise, local guest speakers and field trip are included in this course.
Instructors: Gregoire Lamoureux, Brenda Dolling.
Guest speakers: Jane Hayes, Richard Griffith
Contact: Brenda Dolling
bdolling@wholevillage.org
519-942-4010
http://www.wholevillage.org/

Permaculture Teacher Training
Oregon

Dates: August 1-8 **Location:** Wilson Creek Gardens, Cottage Grove, Oregon
Description: In this dynamic and interactive course, you learn significant teaching techniques to communicate and apply Permaculture principles and strategies to a wide variety of audiences and educational settings. Our goal is to encourage and inspire your unique strengths and abilities by demonstrating diverse teaching modalities including effective use of lecture, storytelling, class discussions, interactive experiential activities, visual aids and hands-on skills.

As a group we facilitate a safe setting of active learning, building confidence by experiencing essential practice via preparing and co-teaching multiple presentations. We appreciate the unique skills and experiences of those attending and cultivate networking for future connections and support. A core part of Jude's work is inspiring and training the next generation of Permaculture advocates. This is a Certificate Course offered by the Cascadia Permaculture Institute with Permaculture Institute of North America Instructors. Prerequisite: Permaculture Design Course Certificate or instructor's approval.

Instructors: Jude Hobbs, with guests Andrew Millison, Tao Orion, & Abel Kloster
Cost: $1,050.00 materials, camping, meals. Early Registration discount of $50 by July 3.
Contact: cascadiapc@gmail.com; cascadiapermaculture.com

Permaculture Design Course
Oregon

Dates: August 6-September 16. **Location:** Aprovecho Educ. Ctr., Cottage Grove, OR
Description: Join us for 6 weeks of empowering and practical solutions at Aprovecho, a site renowned for over 30 years of work in permaculture and sustainable development, while learning from an assemblage of many of the best teachers throughout the Pacific Northwest. Teachers for this course include Jude Hobbs, Marisha Auerbach, Rick Valley, Andrew Millison, Tao Orion, Chris Foraker, Abel Kloster, and Mike Hatfield.

Aprovecho's Sustainable Living Skills Immersion is the oldest program of its kind in the Northwest and includes hands-on training in appropriate technology, sustainable forestry, natural building, water harvesting, sustainable agriculture, and permaculture.

The Permaculture Design curriculum is woven throughout the program, leaving students with a framework for integrating the learned strategies and techniques into cohesive designs for sustainable human settlement. The internationally recognized certificate in Permaculture Design is presented at the end of the program. While a typical Permaculture Design Course runs for two weeks, this course contains 200+ hours of classroom and hands-on time.

Instructors: Jude Hobbs, Marisha Auerbach, Abel Kloster
Cost: Early Bird; sliding scale $1,800-2,400 before 6/1; $1,900-2,400 after. Course tuition does not include room and board, which is optional. Interest-free tuition financing available.
Contact: Maryam Mathieu; maryam@aprovecho.net; http://www.aprovecho.net

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8-Week Permaculture Practicum in Water and Forestry Systems
Oregon

Dates: Sept. 24-Nov. 11 **Location:** Aprovecho Education Ctr. ,Cottage Grove, OR
Description: Join us for eight weeks of applied hands-on education as we explore the regenerative power of trees and water to restore landscapes, increase farm resilience, and increase economic health. This course is designed for farmers, land owners, contractors, and students seeking to deepen their on-the-ground permaculture skill-set at a level that empowers them to design and install regenerative forest and water systems on their land and within their communities. This program is suitable for either someone new to permaculture or someone with prior education and experience wanting to take the next step in their permaculture studies.

This program embeds students within three integrated focus areas: agroforestry and perennial food systems, timber-based forest management, and water harvesting.

An array of hands-on projects empowers students to take an active role in the development and stewardship of the landscapes they work in.

Cost: Early Bird tuition is on a sliding scale from $2,400-2,800 before 7/1; $2,500 -3,800 after. Course tuition does not include room and board which is optional. Interest-free tuition financing is available.
Contact: Maryam Mathieu; maryam@aprovecho.net; http://www.aprovecho.net

Advanced Course:

Optical Surveying for Earthworks & Water

Oregon

Dates: June 25-30
Location: Ashland, OR
Description: Basic surveying and layout are essential skillsets for every farmer, homesteader, designer, and consultant. This course will teach the use of many types of analog (non-battery operated) surveying tools, along with advanced skills in keyline, pond and swale layout, mapping, and other core knowledge necessary for design and execution of permaculture projects.

Students will become familiar with swale, terrace, ditch and pond layout, profile cross-section drawing, keyline and trail system locating, solar assessment, small cabin orientation and pad layout, staking, note taking, and compass and map reading. We will use hand tools such as sight levels, compasses, pocket transits, builders levels, A-frames, rods, and measuring tapes and wheels. This is the 10th time we've offered the course, and lots of additional information is available including reviews, advanced reading, and more through the Siskiyou Permaculture website at siskiyoupermaculture.com.

Instructors: Tom Ward and guests
Cost: $525 by 5/25; $625 after
Contact: Melanie Mindlin
541-482-7909
siskiyoupermaculture@gmail.com
http://siskiyoupermaculture.com

Advanced Course: *Botany*

Oregon

Dates: May 7-12
Location: Ashland, OR
Description: This botany course is a 6-day field intensive designed to be an essential part of training for stewards of earth repair, practitioners of social forestry or simply an opportunity to delve into the world of plants. We will look at plants within their ecological and ethnobotanical contexts, honing observational skills through storytelling, drawing, plant walks, discussion, and botanical survey.

Instructors: Tom Ward, Mulysa Melco
Cost: $625 before 4/7; $725 after
Contact: Melanie Mindlin
541-482-7909
siskiyoupermaculture@gmail.com
http://siskiyoupermaculture.com

Advanced Design Course

Orcas Island, Washington

Dates: August 19-26
Location: Bullock's Pc. Homestead
Description: This course is an excellent follow-up to a Permaculture Design Course. Join the team of Terra Phoenix Design and the Bullock's Permaculture Homestead for this excellent follow-up to your Permaculture Design Course. During this course, you can expect to run through the design process several times to build competence and confidence. We will also have "choose-your-own-adventure" sessions where you select an educational pathway that matches your specific interests. Examples of sessions include: software for design, the business end of running a design consultancy, plant species deep-dive, a landscape graphics primer, etc. Topic specific design sessions will go deep on water systems, shops and work areas, and nurseries. There will also be open studio time for you to get feedback on your own designs. Finally, real-world design project walkthroughs from the Terra Phoenix portfolio will allow you to see what finished designs look like and how to assemble a quality package of deliverables for your client.

Instructors: Douglas Bullock, Samuel Bullock, Dave Boehnlein, & Paul Kearsley
Cost: $1,200 ($1,100 paid-in-full by May 1st). A $250 non-refundable deposit required
Contact: Dave Boehnlein
360-840-8483
info@permacultureportal.com
http://permacultureportal.com

Thank you for your support!
Let us and others know how you like this issue of the magazine... share what's working for you... share something with your community.

Please send letters to the editor to: editor@permaculturedesignmagazine.com

Permaculture Design Course

Orcas Island, Washington

Dates: July 15-29
Location: Bullock's Pc. Homestead
Description: A two-week certificate design course on the Bullock's 35 year-old permaculture homestead. Well over 72 hours of classroom and hands-on education including design methodologies, observation skill-building, whole systems design, annual and perennial foods, water/energy/waste management, appropriate construction, plant propagation and culture, fertility, aquaculture, and more.

Instructors: Douglas & Samuel Bullock, John Valenzuela, Dave Boehnlein, & more.
Cost: $1,500 ($1,400 paid-in-full by May 1st). A $250 non-refundable deposit is required for registration.
Contact: Dave Boehnlein
360-840-8483
info@permacultureportal.com
http://permacultureportal.com

International Focus

Permaculture Design Course

California

Dates: May 21-June 4
Location: Quail Springs, Maricopa, CA
Description: This course equips people working in international development and grassroots projects with the perspectives and skills needed to engage with communities in partnership to incorporate elements into the design of communities, smallholder farms, and land with household agricultural production which are holistic, appropriate, strategic, effective, and diverse, as well as ecologically and economically sound. This course includes the 72-hr Permaculture Design Certification through the Permaculture Research Institute.

This course is designed for people who work with non-government organizations (NGOs) or governments, or who are community organizers. The teaching is directly relevant for international development practitioners, including the technical teams from agency headquarters and field teams engaged in implementation.

Instructors: Warren Brush, Lindsay Allen, Brenton Kelly, Pandora Thomas, Rafter Sass Ferguson
Cost: $1,650—check our site for discounts
Contact: 805-886-7239
quailsprings.org

Have you been saving seed and propagating new varieties? Tell us!
Plant Breeding-Due June 1
editor@permaculturedesignmagazine.com

31st Annual

Permaculture Design Course

Colorado

Dates: August
Location: CRMPI
Basalt, CO
Description: Join us for the 31st annual PDC held on site at a 30-year-old food forest and permaculture homestead. Witness firsthand the regenerative and transformative power of a long running permaculture design in action. Study with a diverse, experienced, and committed teaching team who offer insights into consultation, practical application, greenhouses, community, right livelihoods, and more! Camping in the fresh mountain air and three square meals a day featuring local and organic food. Inquire now for details.
Instructors: Adam Brock, Stephanie Syson, Avery Ellis, Jerome Osentowski, and guests.
Cost: $1,875, discounts available credit cards accepted
Contact: CRMPI, Jerome Osentowski
jerome@crmpi.org

Workshop

Plants in Permaculture

Wisconsin

Dates: June 1-4
Location: Kinstone, Fountain City, WI
Description: In this intensive 4-day class, you will learn techniques to help you identify and use local trees and plants, come to an understanding of their significance in the landscape and practice using plants for food, medicine and utility. You will identify and harvest plants in the wild; then study, process and transform them. You will make tinctures, decoctions, infusions, teas, ferments, salads and more. Through observation we identify methods to employ plants as windbreaks, shelter belts, habitat for animals, and companions for other plants that contribute to health and increased yields. We will cover the basics of plant propagation, grafting, seed saving and more. We will observe, study and interact with the 4-year old restored Kinstone Prairie. We will explore prairie, woodland, savanna, pasture, gardens, farm fields, and other ecosystems found at or near Kinstone. Children ages 13-17 may register with a registered adult. No prerequisites.
Instructors: Wayne Weiseman
Cost: $400
Contact: Kristine Beck
kristine@kinstonecircle.com
www.kinstonecircle.com

Permaculture Academy

Colorado

Dates: July
Location: CRMPI, Basalt, CO
Description: Join us for and intensive course on how to design, install, and maintain both outdoor forest gardens and indoor greenhouse forest gardens. Learn what it takes to design and manage greenhouses, how to create forest gardens, and integrate greywater systems. Each subject is it's own module - pick and choose your courses. Courses will be held on site at a thirty year old food forest and permaculture homestead featuring five different greenhouses. Witness firsthand the regenerative and transformative power of a long running permaculture design in action.
Instructors: Stephanie Syson, Avery Ellis, Jerome Osentowski
Cost: $1,875, discounts available
Contact: CRMPI, Jerome Osentowski
jerome@crmpi.org

Advanced Design Course

Wisconsin

Dates: Spring Course: May 24-28
Autumn Course: Oct 4-8
Location: Kinstone, Fountain City, WI
Description: This 5-day advanced, applied Permaculture design course is for anyone looking to study Permaculture design at a deeper level beyond the PDC. Students focus on a detailed design project of their choosing. This course is an in-depth practicum of the process and concept of designing; it is not a how-to technical drawing course. Gain the skills and confidence needed to take your Permaculture design skills beyond your own backyard. Forest gardening, landscape design techniques, professional Permaculture design & consulting, site assessments, urban and rural design projects, project presentation and other topics covered in this course offer a life-changing experience and provide enhanced skills for ecological design. Most students in this course design with pencil and paper; however, those skilled in design software are welcome to use such software that they have available to bring with them on their own computer. Pre-requisite: PDC Certificate or equivalent experience. Course size is limited to 15 students. Limited onsite camping avail.
Instructors: Wayne Weiseman
Cost: $750
Contact: Kristine Beck
kristine@kinstonecircle.com
www.kinstonecircle.com

Transition US Gathering

Minnesota

Dates: July 28-30
Location: St. Paul, MN
Description: The first-ever Transition US National Gathering, "Growing a Movement for Resilient Communities: Broadening, Deepening, and Scaling Up," to be held July 27-30 at Macalester College in St. Paul, Minnesota.

We expect around 250 community resilience builders from across the country to gather, build connections, share skills and knowledge, and generate new ideas for how to collectively move toward our shared vision of a resilient future of connected, localized communities free from dependence on fossil fuels. This dynamic event will be inspiring, informative, participatory, and fun!
Contact: TransitionUS.org

Permaculture Design Course

Indiana

Dates: June 4-18
Location: Bloomington, IN
Description: Join this soulful dive into permaculture design through one of the longest-running university-sponsored residential courses. Top-notch instructors use various methods to help you effectively engage with permaculture design while also supporting your journey as a practitioner of permaculture. Topics and discussion range from ecological design to political economy to village-building through community engagement. Hands-on activities and systems development in our new location are opportunities to gain practical, mentored experience.

This course is excellent for those wanting to immerse themselves in permaculture in a beautiful setting and take up the practical, necessary work to transform their own lives and communties.
Instructors: Rhonda Baird, Jason Gerhardt, Chris Smyth.
Contact: Rhonda Baird
812-323-1058
shelteringhills@gmail.com
shelteringhills.net

Permaculture Design Course
Massachusetts

Dates: May 20-24; July 15-21; August 18-21
Location: Various sites, western MA
Description: Located at Snow Farm New England Craft Program and Nine Mountain Retreat Center. Practice ecological design alongside leading designers and educators in the Northeast. Earn your permaculture design certificate with Sowing Solutions which is celebrating over 10 years of permaculture education. Visit numerous demonstration sites such as Sirius Ecovillage, Hickory Gardens, Wildside Cottages & Gardens.
Instructors: Kay Cafasso, Keith Zaltzberg, Llani Davidson, Walker Korby, Ryan Harb, and guests
Contact: www.PermacultureSeries.org

Permaculture Educator Training
New York

Dates: August 18-27
Location: Omega Inst., Rhinebeck, NY
Description: This intensive permaculture educator training embodies and explores this educational approach. Learn how to design and run permaculture workshops, courses, and other educational experiences as ecosystems—by designing and running them! Learn to assess and design for students' learning niches; create effective learning environments; plan for, budget, and market an event; and devise multifunctional, functionally interconnected courses where the whole experience is greater than the sum of the sessions.

Together, we face fears, transform inhibiting narratives, share constructively, and grow deeply in a healthy, safe, supportive, and fun learning environment. We also engage with the business of teaching, among other practical aspects. This rigorous course culminates with you designing and co-teaching a daylong public permaculture workshop series along with your peers. You will leave with new skills and experiences under your belt, and feel empowered to teach permaculture and embody the change you want to see in the world. In fact, we support you before, during, and after the training to design and run a permaculture workshop on your own, post-training!

Attendance requires prior completion of a PDC and an application and acceptance process; there is pre-course homework and a webinar. Scholarships are available.
Instructors: Dave Jacke, Chris Jackson, and Kim Almeida.
Contact: https://www.eomega.org/pctt

Permaculture Design Course
Vermont

Dates: June 23-July 7
Location: Mad River Valley, VT
Description: This course offers an unparalleled opportunity to gain hands-on applied permaculture skills immersed in one of North America's most diverse and intensive permaculture research sites now in its 2nd decade, along with our 2nd site where we are establishing our proven approaches at the commercial permaculture farm scale.

Participants engage with high-performance home and community resource systems that are more resilient in the face of problems posed by peak oil, climate change, environmental toxicity, and the inability of existing economic and social systems to respond.
Instructors: Ben Falk, Cornelius Murphy, Erica Koch, Mark Krawczyk, Eric Schellenberg, Dr. Lee Reich, and others.
Cost: $1,950 ($1,850 early bird)
Contact: 802-343-9490 wholesystemsdesign.com

Permaculture Design Course
Virginia

Dates: May 27-June 11
Location: Cricket Cove Farm, Victoria, Virginia
Description: This course will teach you how to use design to better enable you to turn your environment into a sustainable and regenerative system. You will learn to utilize many strategies and choose which techniques to use, in order to create a world of abundance for you and those around you. Using a variety of learning techniques and strategies, this workshop will present permaculture with all of its applications in mind. Class time will consist of traditional lectures, guest presentations, group discussions, games, exercises, photo shows, and movies.

Many discussions and examples will be explored of possible applications in Invisible Structures, those social, cultural, political, and economic structures that shape much of our world today. Not only will the course be about permaculture, but it will also be modeled after its structure and by the environment we create together during the course.
Instructors: Rico Zook, Andrew Millison, and Jenny Pell, all members of Permaculture Design International
Contact: Marianne Cicala 434-372-1627 marianne@twigsandberries.com http://www.cricketscove.net

Permaculture School
North Carolina

Dates: May 22-August 18, (residency), August 2017-May 2018 (9-month post-residency)
Location: Earthaven Ecovillage Black Mountain, NC
Description: Permaculture School is a year-long learning journey with a 3-month residency at Earthaven Ecovillage, near Asheville, NC. Dive deep into gaining skills and knowledge in Design Systems & Projects + Organic Cultivation + Generative Foodsheds + Food As Medicine + Herbal Medicine & Botany + Natural Building + Renewable Energy + Wise Water Practices + Personal Growth & Communication + Vision & Career Development.
Instructors: NikiAnne Feinberg and Zev Friedman
Cost: $9,600 for the 12 mo. program
Contact: bekah@ashevillage.org

Advanced Design Course
Virginia

Dates: June 16-19
Location: Cricket Cove Farm, Victoria, Virginia
Description: This is a rare and rich opportunity to learn from world class permaculture designers with 20 years of real world experience.

This course is designed to be both a hands-on, project-focused course, as well as one for deepening your design skills and understanding of how to create truly regenerative designs. It is a dense experience-rich environment for learning by doing. Get your hands dirty. In this course, we seek to give you a strong start on this essential foundation with a variety of projects on a functioning farm. These are not make-busy projects; but rather, projects that will help evolve this growing and diverse permaculture farm. About two-thirds of our time will be used installing various land systems at Cricket Cove Farm.

Through discussions, exercises, and hands-on work, you will expand your toolbox of design strategies, techniques, tools, and experience with real life design challenges. This is a rare and rich opportunity to learn from world class permaculture designers with 20 years of real world experience.
Instructors: Rico Zook, Andrew Millison, and Jenny Pell
Contact: Marianne Cicala 434-372-1627 marianne@twigsandberries.com http://www.cricketscove.net

Calendar

May

May 7-12. Ashland, OR. Advanced Pc: Botany. siskiyoupermaculture@gmail.com.
May 17-29. Cottage Grove, OR. Permaculture Design Course. permaculturerising.org.
May 20-23; July 15-17; Aug. 18-21. Permaculture Design Certification Course in Western Massachusetts with Sowing Solutions. www.PermacultureSeries.org
May 20, 21; Jun. 24, 25; July 8, 9; Aug. 5, 6, 19, 20; Sept. 16, 17. Ypsilanti, MI. Permaculture Design Course. glpdc.info.
May 21-June 4. Maricopa, CA. Permaculture Design Course-International Focus. 805-886-7239, quailsprings.org.
May 22-Aug.18. Black Mountain, NC. Permaculture School. bekah@ashevillage.org.
May 24-28. Fountain City, WI. Advanced Design Course. Kristine Beck, kristine@kinstonecircle.com, www.kinstonecircle.com.
May 27-June 11. Victoria, VA. Permaculture Design Course. marianne@twigsandberries.com, http://www.cricketscove.net.

June

June 2-4. Tamaqua, PA. Pennsylvania Permaculture Convergence. www.stonehedge.us/papc-home.html
June 1-4. Fountain City, WI. Plants in Permaculture. Kristine Beck, kristine@kinstonecircle.com, www.kinstonecircle.com.
June 4-17. Winlaw, BC. Permaculture Design Course. Kootenay Pc Institute, spiralfarm@yahoo.com, www.kootenaypermaculture.ca.
June 4-18. Marshall, IN. Permaculture Design Course. Rhonda Baird, 812-323-1058. shelteringhills@gmail.com.
June 16-19. Victoria, VA. Advanced Design Course. marianne@twigsandberries.com, http://www.cricketscove.net.
June 18-23. Hawai'i. Permaculture Teacher Training. www.permacultureacademy.com.
June 23-July 7. Mad River Valley, VT. Permaculture Design Course. 802-343-9490. wholesystemsdesign.com.
June 25-30. Ashland, OR. Advanced Pc: Optical Surveying for Water and Earthworking. siskiyoupermaculture@gmail.com.

July

July. CRMPI, Basalt, CO. Permaculture Academy: greenhouse, forest garden, greywater intensive. crmpi.org.
July 15-29. Orcas Island, WA. Permaculture Design Course. Dave Boehnlein, 360-840-8483, info@permacultureportal.com.
July 16-29. Caledon, ON. Permaculture Design Course. bdolling@wholevillage.org, 519-942-4010, http://www.wholevillage.org.
July 28-30. St. Paul, MN. Transition US Gathering. TransitionUS.org.

August

August 1-8. Cottage Grove, OR. Permaculture Teacher Training. cascadiapc.org.
Aug. 6-Sept. 16. Cottage Grove, OR. Pc. Design Course. Maryam Mathieu; maryam@aprovecho.net; http://www.aprovecho.net.
August 11-21. Cloughjordan, IRELAND.

Continued on the next page….

Classifieds

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EDUCATIONAL OPPORTUNITY

The Dirt Rich School. Earn your PDC through our 3 month Farmcraft Permaculture Internship. Learn animal wifery, modern homesteading, and sustainable food production while staying on a working fiber farm on Washington's beautiful North Olympic Peninsula., thedirtrichschool@gmail.com; thedirtrichschool.org

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Aug. 26-Sept. 7. Lahti, FINLAND. Pc. Design Course. www.permacourses.com.
August. CRMPI, Basalt, CO. Permaculture Design Course. crmpi.org.

September

September 24-November 11. Cottage Grove, OR. Practicum in Water and Forestry Systems. Maryam Mathieu; maryam@aprovecho.net; http://www.aprovecho.net.

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October 4-8. Fountain City, WI. Advanced Design Course. Kristine Beck, kristine@kinstonecircle.com, www.kinstonecircle.com.
October 21-30. Permaculture Teacher Training, Telengana, INDIA. permaculturainfo@gmail.com.

November

November 3-26. Permaculture Design Course. INDIA. ipcindia.2017.org.
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May 2017 **Issue #104**

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Upcoming Issues, Themes, & Deadlines

#105	**Plant Breeding**	**June 1**
#106	**The Doorstep**	**September 1**
#107	**Agroecology**	**December 1**

Architects of a Permanent Culture

Rhonda Baird

For all our lofty—and necessary visions—of permaculture, it is a problem-solving genius cultivated in the hearts and hands and minds. By building from the core (ethics, patterns, and process), I believe permaculture design can cut through many of the barriers between people. Design process as a problem solver is a great key. Everyone has problems to be solved today.

Some of those problems are physical problems: how to put the house and garden into relationship; how to run the pathways to serve multiple functions. Other problems are economic: how to make a livelihood from the farm or the co-op; how to access capital to invest in better fencing for the new herd. Others are social problems: how to effect change in our communities; or how to re-connect to the people living around us. On a more collective front, governments of all sizes are struggling to continue financing and supporting the infrastructures in place. Roads, water lines, gas lines, and sewage treatment at city or county scale all need to be reconsidered. The ability to define the problems and effect systemic change at the appropriate scales is critical and practical. Through careful observation and intervention, permaculture practitioners can use the design process to join in conversations where they can be truly helpful to others.

The public is becoming savvy about the techniques and strategies championed by permaculture designers, but a lack of understanding and ethical basis is still prevalent. You can install the (insert latest trend in design showcased on YouTube)—but did you put it in the right place? Permaculture is after more nuanced problem-solving. Consult with designers that have more experience and understanding—and, for goodness' sake—pay them as well as you can! Good advice will cost you much less than expensive materials, unexpected repairs, or physical wear and tear on your own body through unnecessary work.

These pages are filled with good advice for beginners just beginning to engage in design as well as thoughtful pieces from experienced designers and teachers of design. Dan Palmer's piece adapted from his blog series compares our understandings of design process and deepens it along the way—pointing to the need for adaptation and re-design in the process of implementation. Blake Cothron champions the need to consider stewardship of the new system in the original design. Perhaps the principle of small and slow changes is our guide to successful systems. Peter Bane's contribution on pattern languages as guides for design empowers us to use pattern more effectively and toward more elegant design solutions. I was surprised that few women wrote, and that no one mentioned the design web process brought forward by Looby Macnamara in her People and Permaculture book. That web has much to offer design process in general (including implementation)—though she wrote it for working with personal and social systems.

Throughout this issue, I gain the sense that design process is something we teach and use—but rather instinctively—we know that the design process we teach, the one we practice—is constantly in flux. Rather apologetically, I've told my own clients that when I hand them a report and maps, it is only a snapshot. As soon as we move into implementation, we've begun a re-design phase. Aims and realities change moment to moment—and we must adapt as we go forward. You will find this confirmed in the discussions about the evolution of permaculture design process—and yet few will advise to not capture the best possibilities in one tentative plan upon which to move forward. And that is where the moving calls for Radical Redesign of personal and social systems and the Emergent Design process further empower us.

This issue is also filled with practical advice on annual crops, soil building, biogas digester design, and a further report on water and pipeline activity in the next steps after Standing Rock. I appreciate these authors for sharing their wisdom: gained through taking risks and making mistakes.

Whether you are new to design process or a seasoned teacher or designer, we invite you to consider and learn from each other and improve your game. Let us know what you think—and consider sharing your own hard-won wisdom. Δ

Rhonda Baird has served on the editorial staff of Permaculture Design *since August 2009. She has been teaching permaculture design process throughout the Ohio River Valley and Upper Midwest since 2005, and formally incorporated her design practice, Sheltering Hills Design, LLC, in 2008. She has been a community organizer for more than 20 years, and a gardener and forager her entire life. In 2016, she was awarded diplomas in Education and Site Design from the Permaculture Institute of North America.*

Start Where You Are
Beginning Design Process

Jono Neiger

DESIGN IS FUNDAMENTAL to permaculture. As designers, we can remake the world; as it can and should be; a world that provides for peoples' needs and protects and regenerates ecosystems; a world that repairs torn up communities and respects and cultivates diversity. We are active participants; through design… and through on-the-ground-action.

Begin with observation

Focused observation is a "core practice" in permaculture. Nature awareness, observation of natural systems, is a good way to hone observation skills and get insight into the way nature figured it out… after many millennia of trial and error. One can observe the land for water movement, animal tracks, where leaves and debris collect in the lee of a building, and internally "track" ourselves and our emotional state. Observation is a practiced skill of looking without judgment or labeling. When we do that, patterns emerge that are missed if we quickly scan and identify or label whatever we see. It is the same with nature awareness. Use wide angle vision, sometimes called "owl eyes," and stay open to all input without putting a name to it. When we label and box things and project our own "good or bad" or even just our own definition on it, we miss the subtleties and possibly some very important information.

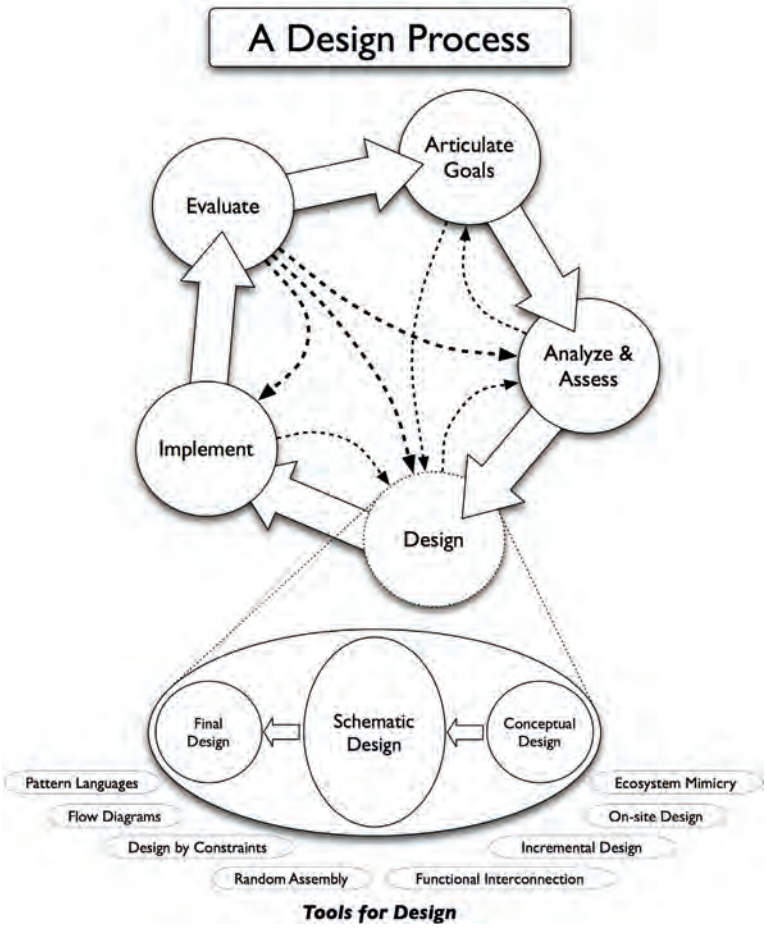
Design Process:

Broadly, the design process includes:

1. Goals Articulation
2. Site analysis and assessment
3. Concept design
4. Schematic design
5. Detail design; phasing plan, planting plans, grading plans, construction drawings etc.
6. Implement
7. Evaluate results. Use the feedback.

Goals drive the site analysis

Articulating goals is probably one of the most challenging parts to a project. The goals may seem self-evident; but the process of saying them, writing them down, agreeing on them—whoever is involved—has an immense power to build clarity, focus, and forward momentum. Write down three to five broad goals which can be further detailed as numerous sub-goals. A top-level goal may be "Grow a wide diversity of food across the landscape for home use and some small-scale commercial income." A more detailed sub-goal of this broad goal could be "Grow fruit trees, small fruit, brambles, and vines with a focus on currants and gooseberries as a cash crop." Goals articulation is a process and requires reviewing and refining them over time.



Design process as outlined by Jono Neiger and Ethan Roland. Graphic by Ethan Roland.

Design is a process of discovery

Sometimes people think amazing design comes in a flash of inspiration or creativity. In most cases, it's a process of discovery; of matching goals with appropriate and suitable uses on the land. The inspiration can come in the flourishes around the edges, but inherently we need places that work; that use less energy, incorporate less toxic materials, that are regenerative and restorative, that enliven and celebrate culture and place. Design comes from place; and the designer just needs to get out of the way.

Understanding your land

What do you need to consider in planning your land? What are the key questions? What are the main features to assess and make decisions around? What are key problems and issues? On the most surface levels, the landscape is made of individual parts; trees, rocks, soil, etc. However, this belies the complexity of the ecosystem, which has evolved over millions of years and involves interconnections and relationships that we are only beginning to understand.

Unraveling the mysteries of landscapes is like an archeologist uncovering the layers of past civilizations. A permaculture designer looks for slight clues to historic patterns of land use, management practices, ecology, and land dynamics such as succession. The land holds its secrets over time and can be "read" with practice. Tom Wessels, researcher and ecologist shows how tree stumps, wind-thrown trees, and other forest artifacts can be used to date logging, storm events, and agricultural activity going back, in some cases, hundreds of years. His book, *Reading the Forested Landscape*, is a must read.

Observe the land and aspects of the land such as topography, soils, water, plants, and microclimates, as well as the interactions between these. It is a deeply complex series of interrelationships. The soil is formed from long geologic processes, bedrock influences, and deep subsoil layers, as well as surficial layers which may have formed or been deposited (or disturbed) more recently. Soils can be very much the same across large areas, or they can vary widely in the span of meters.

Information gathering

Gather all the information you can about your property or area you'll be involved with. We live in an information-rich age (though it may be low on wisdom). Maps and information are available from many sources including neighbors, town and county offices, state agencies, as well as data sources on the Web. Gather and review this information. Have it on hand while on the land.

Aerial photos are indispensable for getting an overview of land cover, road networks, general topography, and the larger context of a property or area. Zoom out on the aerial photo and explore the surrounding areas, digitally, from above. Identify the patterns of the landscape and the surrounding land uses. Does the land have similar or different uses than the surrounding area? What kinds of connections are there with surrounding areas, such as roads, railways, rivers or streams, or forested connectors?

The context of this mountain farm is easier to observe in this aerial photo. . Photo CC0 via Pixabay.

Where is the land in the context of the surrounding properties and ecosystem? Forman describes land as Matrix: background land use; Patch: islands of land use set within the larger matrix; or Corridors: lanes of connectivity to other areas through undeveloped areas, forests, and waterways.

Even a place where you've lived for a long time has many secrets to reveal.

Observation time

With a base map in hand, go through the scale of permanence developed by P.A. Yeomans and refined by Dave Jacke. Draw and mark your observations on the map. Use symbols, lines, color, and quick sketches. Just document the conditions—don't worry about how the sketches look. Add quick notes right on the map to go along with the drawing on the base map. This strategy of marking observations both graphically and with text is important. Employing both drawing and writing uses both sides of the brain and activates different centers of learning and understanding. It is tempting to just draw, but the notes help reinforce what is observed.

Spend time on the land at different times of day, in different seasons, in different weather conditions. Vary between open observation, noting whatever catches your eye, and focused, thematic observation. Sit still in one location, with a good prospect across the land, and let the activity of the place move around you. Close your eyes and listen. Tie a ribbon on a pole or tree branch and notice how the wind catches it. Catch moments when people are active. Watch how people move into, through, and out of the area.

Places are layered and multi-dimensional. Even a place you've lived for a long time has many secrets to reveal. Animals can be living very close by and you would never know if you didn't find small clues like a chewed branch or a footprint in the mud. Keep in mind we can only understand a fraction of the complexity of a place. This is important later when decisions are made that can drastically affect the land.

Site analysis and assessment

Collecting the information answers the question "What?"

Observation pulls apart the pieces to SEE what is there. The assessment brings those observations back together, looks at them in relation, and begins to weigh them and answer the question "So What?" The process of gathering information free of judgments and subjective filters then leads to interpretation and assessment of that information. The goals and site analyses and assessments are like trails leading to a good design. Or you can see the observations and site assessment as arrows pointing to suitable and sustainable solutions for the project in question.

Concept-Schematic-Detail Design

Design ideas begin at the concept stage, setting the broad patterns and general layout. Ideas are vetted, and the big picture is outlined. If there are options that can be evaluated at the concept stage, this can establish the direction and focus of the project. Going from Concept to Schematic to Detail develops more and more detail. At each successive stage, the dimensions, materials, systems, and interconnections are worked out and refined. The final drawings are reflective of a comprehensive and methodical approach.

Getting bogged in the details before the bigger patterns are worked out can lead to missed opportunities....

Some ideas for professional practice

- Design is all about communication and education. There's always opportunity to interact more, ask more questions, offer some ideas. The David Holmgren principal "Engage and Interact" applies here.
- Find your niche and cultivate areas of expertise. Many permaculturists, myself included, are generalists with some knowledge in many areas. It's also good to cultivate a few areas with deeper knowledge. Don't be afraid to dig in and find your niche. What do you have to offer?
- Look for clients who are ready to push the edges. Being able to experiment, try out new ideas, and even fail sometimes, is important on your property or others' systems. Work the edges.

Getting started

Sometimes it can be challenging to know where to begin. One way is to tackle the hardest problem first. Identify the core, driving issue and develop some solutions. It might be site access, or an eroding slope, or a lack of potable or irrigation water. Begin there, and the smaller issues can be brought in as some central themes develop. Often thinking about access and circulation on a property is a good place to begin, and it is often overlooked or disregarded in its importance. Identify the routes, the hierarchy of circulation from main roadways, to paths, to storage and work areas. From there, the water collection, infiltration, and drainage systems can be worked out.

Students preparing to deliver a conceptual design presentation in a 2017 permaculture design course. Photo by Rhonda Baird.

Usually designers want to dive right into the detail. It's exciting to figure out what plants can be grown in a place. But, the principle "design from patterns to detail" is critical. Getting bogged down in the details before the bigger patterns are worked out can lead to missed opportunities and poor solutions.

Everyone is a designer. This is not a practice just for those in the "design business." It's inside each of us. And the skills are something that can grow and transform our connection to the land and communities around us. Δ

References

1. Thanks to Dave Jacke for his insights and work in this arena. For more detailed exploration see Dave Jacke and Eric Toensmeier's *Edible Forest Garden Vol II, Chapters 3 and 4*.
2. Forman, RTT, EO Wilson. *Land Mosaics: The Ecology of Landscapes and Regions.* Cambridge: Cambridge University Press (1995).

Jono Neiger is a founding principal of Regenerative Design Group, with over 30 years of professional experience in permaculture, ecological land design, site planning, community development, agroforestry, land management, conservation, and restoration. Jono teaches widely around the Northeast and Southeast, holds a faculty position at the Conway School of Landscape Planning and Design, and is the founding Board President of the Permaculture Association of the Northeast (PAN). Jono worked as a land manager for Lost Valley Educational Center, a Conservation Officer for the Town of Palmer, Massachusetts and a Restoration Specialist with the Nature Conservancy in California. He is the author of The Permaculture Promise.

An Evolution of Design Processes

Andrew Langford, MSc, DMS, Dip Perm Des

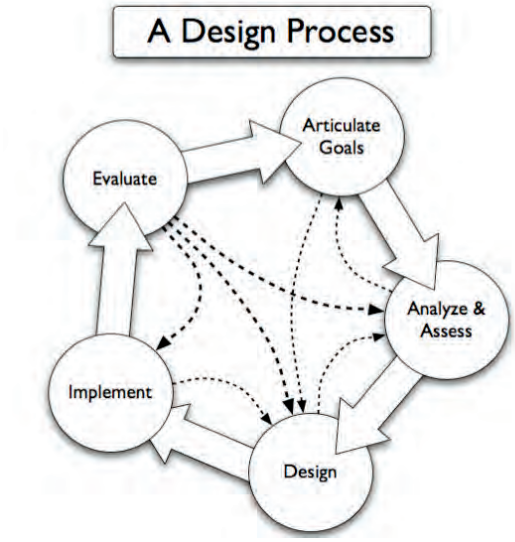
In proper permaculture tradition, the article seeks to be useful to both beginners and aficionados alike. Some of the content here has been published previously in various coursework articles and interactive forum posts on the Gaia U eLearning site. You may contact info@gaiauniversity.org for further information.

DESIGN AND THE *PROCESSES* by which we go about designing have been core topics in Gaia University from our beginnings in 2006. This interest stems from early permaculture design days (early 80s) when, we could claim, permaculture was amongst the first communities worldwide to promote the idea that conscious design was an entirely crucial element of the process by which we would transform post-industrial human cultures on the planet to ecologically and socially regenerative societies.

Others in this design vanguard included Victor Papanek < http://www.nytimes.com/2011/05/16/arts/16iht-design16.html> and Buckminster Fuller <https://www.bfi.org/about-fuller/big-ideas/design-science>. In common with these two giants, permaculture at first had no explicit process—good design kind of "just happened" when permaculture observers showed up on a piece of land and applied their best thinking in a somewhat mysterious way. A key point is that all the processes described in the article have their uses, and the versatile permaculture designer will seek to be agile across all these and more.

Importing and inventing logical frameworks

By the late 80s, permaculture was attracting people from other fields who did have design processes to hand. As the first home-grown UK permaculture teacher, I began to introduce a logical framework approach (SREDIM = Select, Record, Examine, Develop, Install, Maintain) derived from my previous life in production systems design. Others responded by rapidly adding versions from landscape architecture (SAD = survey, analyze, design) and by inventing new versions (OBREDIMET = observe, boundaries, record, explore, design, implement, maintain, evaluate, tweak) and more.



A common design process. Graphic: AppleSeed Permaculture and the GADIE design framework, Dave Jacke.

Each of these proposed that an orderly framework enables people new to the field to be thorough and thoughtful in their work and, importantly, to have a sense that they could use such processes to build their confidence in tackling novel (and sometimes large and challenging) design projects. Bill Mollison spoke to this challenge, of working in situations beyond his current experience, by quipping "I often suffer from "*vuja dé*" (rather than *déja vu*) meaning I am clear that I have never been in this situation before, and I am always being called upon to do fresh thinking."

...it helped if we'd taken the trouble to teach both the client and implementers the principles of design....

On the other side of the Atlantic, in the US, veteran permaculture teacher Dave Jacke was also working to bring some organized processes to bear by mapping out and teaching GADIE as a core design process. See the diagram below.

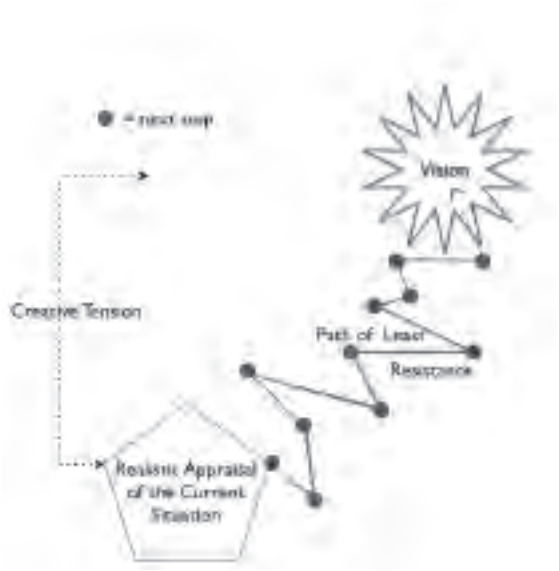
Iteration and successive approximation

In the early 90s, we noticed that we were best served by imagining design as an *iterative* process. Iterative means that we understood there was a need to pass through any of the above log-frames several times, showing our ideas to clients each time and refining these (abandoning some) before arriving at designs that might be stable enough to draw up for implementation.

This iterative approach turned log-frames into what might be called successive approximation methods (SAMs) which expect the designer and client to work their way to a final "go" after first experimenting with all manner of small, rapid-prototype-like mini-designs and testing out ideas in their imaginations.

Responding to context

Even then, we understood that whatever we drew needed to be open to sensitive interpretation by the implementation team as they would surely discover all manner of contingencies out there on the site that were not predictable until they started digging with the backhoe. To have this "adjust during implementation" approach work really well, it helped if we'd taken the trouble to teach both the client and implementers the principles of permaculture design as well as the logic of our design thinking. Then, they could be confident that any changes they made would preserve the essence of the design whilst dealing with the contingencies.



Dancing with systems

There is a deep principle underlying this iterative and successive approximation approach that is not always obvious and quite contradictory to the classical engineering and construction logics. Donella Meadows, on whose shoulders much of our understanding of complex systems rests, explains it like this:

"The future can't be predicted, but it can be envisioned and brought lovingly into being. Systems can't be controlled, but they can be designed and redesigned. We can't surge forward with certainty into a world of no surprises, but we can expect surprises and learn from them and even profit from them. We can't impose our will upon a system. We can listen to what the system tells us, and discover how its properties and our values can work together to bring forth something much better than could ever be produced by our will alone. We can't control systems or figure them out. But we can dance with them!"
http://donellameadows.org/archives/dancing-with-systems/

An artist's view

For emphasis and for an artist/musician's approach, we offer this model from Robert Fritz (Structural Dynamics; http://www.robertfritz.com/index.php?content=principles).

This model has some fascinating features. It proposes two primary zones of focus. One is the long-term **goals and visions** for a project, and the other is a **realistic appraisal** of the current situation. The difference between these two creates a tension, a kind of dissonance that sets the designer's subconscious working on the task of resolving the gap. The provocative insight of this idea is that we need to focus less on working out how to get from one place to another and more on generating the creative tension between the contrasting end-states. Then our subconscious (and the universe) will find the route for us. The method for creating this tension is to pay increased attention to the vision and to the realistic appraisal in turn. The second insight is that each step we take on the way between the appraisal and vision ***changes*** the context; and therefore, a new iteration of our design is required at nearly every moment if we want our next-next step to be relevant. It is well worth thinking of design in this emergent way. Whilst we may have a sequence of steps that we have planned to take in order to unfold the design, we need to remain open to the possibility of abandoning plans (in their exact entirety) and instead, improvising—albeit within a sense of where the design might be headed.

The Path of Least Resistance also refers to this as an "improvisation" approach and suggests that we can look for routes that are do-able, with ease and grace, rather than those that have us struggling in order to keep to plan.

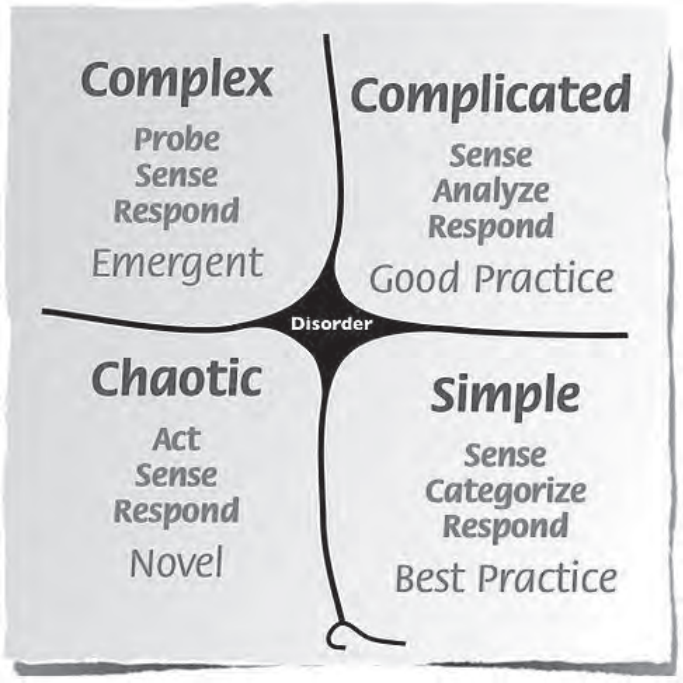
Personal habits and tendencies

In Gaia University, we then go on to invite our students to choose their approach according to whether they are seeking to challenge (contradict) and/or reinforce their normal tendencies. For example, some will be addictively oriented to 'go with the flow' to such an extent that they seem to have no purpose, no vision—for these people, more structure and more goal orientation may be very helpful. Others are so goal-oriented that they fail to notice what's emerging and insensitively grind out the original plan—less structure and less goal orientation may be exactly what's required. Yet others are so stuck in a realistic appraisal mode that they are paralyzed with depression. Getting their attention by acting and doing is a possible good response. And others are so dreamily into vision that they can't get it together to act at all; and, again, some grounding in doing may help a lot.

Balancing intuition/analytical thinking

Yet later, especially in association with ecovillage designers for whom "sensing" or "attuning" is an important aspect of their process, another design process modifier showed up. These people have often emphasized designing "intuitively" rather than "analytically."

Mostly, as mentors, we can accommodate this by using "both/and" thinking that invites these designers to intuit to their heart and guts content (intuition being driven by a heart/gut intelligence combination contained within a prepared intelligence of mind framework) and to put the insights from these inspirations into a "wild-design" box for future reference. Later, these students could use a log-frame approach to "fact-check" their intuitions against the design principles and the data. If the fact-check came up positive, then the intuitions would stand as core design thinking.



Cynefin model. By Snowden (File:Cynefin framework Feb 2011. jpeg) [CC BY 3.0 (http://creativecommons.org/licenses/by/3.0)], via Wikimedia Commons

Design processes in context

You can see from all this that the processes of design are in constant flux. There is no one right way and, indeed, the context or situation we are designing for (as well as our own skills and flexibilities will demand different approaches.)
"Oh no!" you might say, "not more complexity—enough already!"

We deal with this complexity by using concepts laid out in the Cynefin model (see figure). *Cynefin* (sounds like "kunevin") is a Welsh construct and is roughly (but inadequately) translated into English as "place" or "habitat." This framework (which is quite new to us) is a very useful attempt to characterize the various contexts (or situations) we are likely to find ourselves in. It also suggests different and appropriate approaches to operating successfully in these contexts (situations).

Going from lower right to upper right and continuing anticlockwise, the Cynefin model describes five types of context, summarized here.

- ***Simple***, in which the relationship between cause and effect is obvious to all. The approach is to **Sense—Categorize—Respond** (in that order). We can apply best practice solutions—(sense means to notice the character of the context). In this **Simple** case, we can clearly identify cause/effect relationships, and best practice strategies will work. We do need to correctly categorize the situation. So, using a permaculture example, we could look at waterlogged ground and, by pushing a yard stick into the soil; see if it goes in a) just a little or b) sinks right down. We then **categorize** the situation as a) surface water that has overwhelmed the soil's ability to absorb the water (stick goes in a little way) or b) the water table rising up from below (stick goes in deep). These two scenarios require quite different solutions, *and* best practice solutions are already known.

- ***Complicated***, in which the relationship between cause and effect requires extended analysis or some other form of investigation and/or the application of expert knowledge. The pattern of approach is to **Sense—Analyze—Respond**. We *can* apply good practice solutions but only after careful, extended, and expert analysis.

- ***Complex***, in which the relationship between cause and effect can only be perceived in retrospect, not in advance. The approach is to **Probe** (make a small, thoughtful intervention)**—Sense** (see what happens and whether that tells us something about how the system works)**—Respond** using our new understanding of the system (and **Repeat).** A best practice approach is much less useful here as "off-the-shelf" solutions are likely to be solving for the wrong problem.

- ***Chaotic,*** in which there is no relationship between cause and effect at systems level. The approach is to **Act—Sense—Respond.** A disaster scenario commonly creates a context of chaos in which case we "act" to alleviate immediate needs and, if possible, act in a way that trends the context towards something more stable—complex perhaps—so it is more amenable to strategic thinking.

- ***Disorder***, which is the state of utter confusion. In these circumstances, people are likely to respond with panic, and/or withdraw if they can. They **revert** to their own **comfort zone**. This is usually not at all helpful.

We are almost always working and designing for change in situations in which every one of these domains or contexts is alive. Increasingly, the domains of complexity and chaos are coming to dominate the overall (meta) context. For example, with Brexit (Britain leaves the EU), the associated possible Grexit (Greece leaves the EU), and the potential break-up of the United Kingdom; we can see what appears to be the emergence of chaos as the crumbling of the previously apparently impregnable neoliberal consensus accelerates.

The simple/complex paradox

As a relief to the complications of complexity, we oftentimes take relief in the simple/complex paradox which goes like this:

> Permaculture designs are for generally *complex* systems and, under unusual conditions such as especially heavy rainfall, long droughts, fires, high winds and so on, shift to systems dealing with *chaos* (although advanced designers will seek to buffer against these extremes so that they are mitigated towards complex).

However we have noticed that there is an insight that stretches across simple and complex that goes like this:

Some elements of a design can be quite well known—the design of a chicken tractor for example—and that the element's relation to other elements—such as the chicken tractor's ability to harness the scratching ability of the chicken for the shredding of leaves and the clearance of soil surface pests from croplands whilst adding fertility—can also be well known. Therefore, the chicken tractor and its relation to other elements (leaves and cropland) could be thought of (essentially) as *Simple* in Cynefin terms.

...it allows us to confidently design in complex situations by becoming, in the first place, capable designers of open simple systems.

This is in no way meant to denigrate a chicken tractor—simple does not mean insignificant. It can justifiably be described as a best practice. Nonetheless, once we add additional factors such as slope of the land, movement of water, resilience in the face of random weather disturbances, how the chicken tractor integrates to the whole system (including the connection to orchards, soil food webs, vegetable gardens, domestic housing and so on), we can fairly say the context becomes *Complex*—as the possible range and type of connections within the whole system cannot be fully known and predicted.

The insight is this (thanks to Bill Mollison): that just so long as we design the *Simple* elements for connectivity to at least three other *simple* systems, thereby assembling them into a flexible web, we are very likely to find that our designs can elegantly handle (and generate) much more *complexity* than we could easily conceive of at the outset. This phenomenon is known amongst some permaculture designers as the s*imple/complex paradox*.

The simple/complex paradox is very helpful because it allows us to confidently design in complex situations by becoming, in the first place, capable designers of **open** *simple* systems. That's a much less challenging goal than becoming a complex systems designer all in one go—gather multiple designers with experience of designing workable, open, and simple systems to create a collective with complex capabilities!

Once more then, the design foundations we lay in at Gaia University are directly connected with our long term goals of developing our/your abilities to act with thoughtfulness and good attention across the full range of systems and domains (contexts) described by the Cynefin model being *simple, complicated, complex, chaotic,* and *disordered.* Actually, we seek to minimize the amount of time any of us spends in disorder as this is a place of withdrawal: the place we go when we feel we can't cope and, we notice, too many of us spend too much time in there!

Boundaries

One more aspect of a design process is determining where the boundaries for the design lie (that's the B in OBREDIMET, the log-frame approach quoted at the beginning of this article). A boundary might be, for example, in the mind of a client (they can handle some aspects of site zoning but can't handle the idea of having a food growing area visible from the house), a physical boundary (where the owned land stops), a financial boundary, and more.

There is some advantage to pushing at these edges to see just how resistant they are, although a push too far can trigger a snap retraction/rejection, so tact and sensitivity helps. And, as far as land boundaries go, it also helps to imagine that, one day, the neighbors will adjust their thinking towards permaculture, and so we can confidently make the current design one that can extend out to the broader landscape.

The reflective, self-governing designer

In Gaia U, we emphasize that all of us are entitled to make this theory and practice of design our own. We can modify and mash-up methods to suit ourselves, especially if we use our own thinking to stretch beyond our comfort zones and, critically, adapt to the contexts in which we find ourselves.

Our primary request is that we observe ourselves working at design and therefore notice how we are going about it—ready to describe our processes. This self-as-subject orientation is at the core of action learning and collective intelligence—the more we work like this, the better all our designers (and designs) become.

Emergent Design

The development of design thinking is not over yet, not by any means, and the next article in this series calls on the work of Jennifer English, staffer and thought leader in Gaia U, whose collaborative work with graduate students is opening up a new field of Emergent Design. Δ

Andrew Langford combines strong practical experience with academic skills. He developed this blend by interspersing periods of work in manufacturing, farming, and professional practice with post experience Diploma and Graduate studies. Because of this blended pathway, he is both a skilled practitioner and persistent advocate for action-based, experiential learning. That is learning (and unlearning) supported by leading edge thinking in which the purpose of doing the thinking is to inform the doing. Indeed Andrew finds theory without the grounding value of practice somewhat incomplete.

Using Pattern Languages in Design

Peter Bane

THE WORLD IS GRAPPLING TOWARD HOLISM out of a dark and tortured past of schism and separation. Permaculture design is part of the way forward, and we can accelerate our trajectory and heighten our impact by learning the use of pattern tools.

It is axiomatic of our modern world that all environments are now damaged, and all people are wounded. Bill Mollison used the energy of anger that arose as he felt this to propel permaculture forward. Seeking to represent the power and beauty—we could say wholeness—that he experienced in wilderness and among traditional peoples, Bill struggled to offer his students a method to harness that power and achieve that wholeness.

Among his many gifts are a short collection of "Methods for Problem-Solving," which appears on p. 12 of *Permaculture: A Designers' Manual*.

1. Improving (or inventing) tools
2. Collecting a large set of observations, and sorting them
3. Insight—Aha! or Eureka! (flows from 2)
4. Trials: empirical, not systematic
5. Guessing (based on successful trials)
6. Observing unique events and taking note of them
7. Accident (from trials or otherwise)
8. Imitation (testing other's discoveries)
9. Patterning (follows from 2, but rare in science)
10. Common sense (management or adjustment)

The holistic way of knowing is knowledge based in love, and a big enough portal for the birth of a new world.

Finding Mollison's method

It is evident that this list is based chiefly on experiential forms of knowledge—observing, tinkering, poking around, and being present in the system. Note that systematic (rote) experimentation is discouraged. Yet Mollison's list has the character of field notes, being somewhat random. What can we make of this, since science seems to rest so heavily on controlled experiment? It might help us to reorganize this list in a different and perhaps better patterned hierarchy:

1. Observing unique events and taking note of them (experiential, discerning)
2. Collecting a large set of observations, and sorting them (analytical)
3. Patterning (follows analysis, requires spatial or holistic recognition)
4. Insight (Aha! or Eureka!)—a direct, intuitive grasp of pattern
5. Trials (empirical, not systematic)—informed noodling around; testing on an assumed organic model, not random; like the doctor testing a knee reflex. What's connected to what?
6. Guessing, based on successful trials (inductive conclusions)
7. (Fruitful) Accident (luck, a deep form of intuition)
8. Imitation—testing other's discoveries (scholarship, advancing common knowledge)
9. Improving or inventing tools—incremental design for part of a system
10. Common sense—based on a large, shared body of knowledge

This perspective allows us to see the foundational weight the author, trained as a natural scientist, assigned to direct encounter, patterning, and the intuitive knowledge that comes from these. We almost have a methodology for problem-solving.

The emblematic chapter on Pattern in the *Designers' Manual* is like a big pictograph—obviously important, but incomprehensible to most, especially newer teachers and designers. Focused solely on patterns in nature, or with only a nod to art, this seminal essay neglected the rich lessons to be learned from cultural patterning. Mollison did not know how to teach his insights in this realm. Fortunately, we have a Rosetta Stone. A near twin of *Permaculture I* (1978), *A Pattern Language* (1977), gives a complementary picture of holistic problem-solving that makes both systems of building and landscape design more accessible.

Holism finds a prophet

Christopher Alexander went on to write or co-author at least nine other books on holism. Like Mollison, he anchored environmental understanding in the body, its feelings and sensations (see *The Timeless Way of Building),* and later articulated an epistemology of living systems, arguing for a language of fundamental qualities, and for the primacy of emergence or unfoldment in the organization of the world.

This way of knowing is as far from Cartesian rationalism as it is possible to get. Instead of "I think, therefore I am," Alexander and his colleagues give us, "We feel, therefore we create." It is knowledge based in love, and a big enough portal for the birth of a new world.

Following Alexander's intriguing trail, and looking for where it crosses Mollison's, we encounter them most vividly at the nexus of pattern recognition and storytelling. Thus, *A*

Pattern Language came into the world assuming that it would be followed by others, and indeed it has, some of them not surprisingly contributed by Mollison's students. Now we can speak of pattern languages in the plural, and look back prior to the 20th century to find examples in all traditional cultures, from the iconography of Persian rugs to the *feng shui* (wind and water) of rice-growing villages in south China. All are examples that empower us to create or enhance bodies of cultural understanding as pattern languages for repairing the world.

Robert Hart gave the permaculture community and the world a kernel of pattern language for repairing cultivated ecosystems on a small scale: the forest garden. Dave Jacke and Eric Toensmeier recognized this stem as the beginning of a more complex conversation. They wrote a language of 57 patterns to add power and nuance to Robert's core intuition: that the garden should model the woodland. His 7± layers from root to canopy gained depth, texture, internal coherence, contextual meaning, and much more in the encounter with Dave and Eric's loving and educated view of the world. Insight can form the seed for a whole way of living, engendering cultural change.

How patterns marry language

Patterns embody the shape or signature of energy flows through landscape and culture, and when successful and healthy, they resolve stresses, improve flow, and so heal the world around them. Patterns are like pressure-points in the body, or jewels in a watch, enabling the movement to achieve its function with least effort. They are physical, palpable, recurrent, and memorable. They identify the hinge-points, loci of action, and fundamental energy architecture of a living system.

Languages are assemblies of related parts, or 'words,' that can be connected to form an infinite variety of meanings, each ideally suited to a particular situation. In a pattern language, the patterns are the words. To be articulate, any language needs a minimum number of words, and this is true of pattern languages. The range of possible 'statements' expands exponentially with the addition of powerful and essential patterns. Conversely,

Patterns embody the shape or signature of energy flows through the landscape and culture...

weak patterns don't enhance the range of meaning very much. At 253 patterns, the language of Alexander and colleagues from 1977 is the largest yet written down. They acknowledge that it isn't complete, but as it aims to repair urban civilization, its ambition required a large number of patterns. Arguably, in the realm of environmental design and building, *A Pattern Language* may never be surpassed, only enhanced, yet much work remains to be done.

Shaping a design practice

To make pattern language a practical design method and thus to write some of those new and needed pattern languages, I ask students to test it by identifying 8-12 patterns for an initial design project. These are based on their apprehension of the cultural context, which in turn grows out of their first observations and inquiries. Then, I suggest choosing a pattern (or possibly writing a new one, not yet found in the literature) that encompasses the scope of the design without exceeding it by much. The rest of the patterns are subsidiary—they expand or unfold the central concept in key ways. Setting a limit in this way forces essential choices, and aids design thinking. But, of course, a complete and well-rounded understanding of the living system and its context might ultimately touch on many dozens or scores of patterns.

As an example, the re-emergence of community and common-property resources have given rise in recent years to the pattern Community Orchard. In an urban context, this might be an empty lot planted to fruit trees, and tended by volunteers. To realize more of its potential, the language for such a project needs additional patterns. Here is a set that might inform a student design:

1. Living in the Garden—Settlements built around edible landscapes cultivate attitudes of inclusion and abundance.
2. Community Orchard—A village, neighborhood, or town commons managed by volunteers for shared harvest and respectful foraging liberates our generosity and strengthens our capacity for giving and taking equitably.
3. Main Gateway—Neighborhoods, like gardens, require markers of entrance transition: use pairs of trees, signposts, pillars, statuary, or buildings.
4. Outdoor Room—Spaces for outdoor living need containment, but not always a roof. Whether a pergola, patio with hedges, or simply a yard bounded by fences or a trellis, the contained shape creates good feelings of security and comfort for users.
5. Something Roughly in the Middle—An outdoor space with nothing to draw the eye will seem deserted and will repel life: place a tree, a set of seats, a fountain, or even an interesting rock to hold the focus.
6. Paths and Goals—A path is an experience earned by progress from one visually enticing goal to the next.
7. Fruit Tree Guild—Plant, animal, and fungal companions at many spatial levels create microecologies of mutual support: mix annual and perennial herbs, shrubs, and trees based on compatible functions and architecture.
8. BioIslands—Disruption of pests in gardens and farm fields requires a mosaic of tiny habitat patches for beneficial insects, amphibians, birds, and other pest predators.
9. Compost and Mulch—A key pathway for nutrient cycling, especially where animal impacts are light, these humble and ubiquitous materials demonstrate that all waste is really food.
10. Work Teams—Jobs are more fun and people more

productive with a resilient division of labor based in groups of 3-7. Cross-train, meet frequently, and celebrate contributions.

11. Harvest Festival—Connecting communities to landscapes and the cycles of nature requires dedicated places, times, and rituals of gathering in late summer and autumn. Dress up, decorate, sing, dance, imbibe, consume, and memorialize the fruitful ending.

12. Kiosk—A signboard is a natural attractor, and if allowed to flow and ebb with self-posted announcements, if given three dimensions, a touch of art, and a strategic location, it will quietly build community in many dimensions, seen and unseen.

Some of these patterns are plucked from Alexander et al., a few from my own work in *The Permaculture Handbook: Garden Farming for Town and Country,* and some are named from our common cultural experience. Most have wide applicability across contexts. "BioIslands" is a coinage I picked up from Jerome Osentowski. Their collection here is a particular response to one emerging cultural situation.

...we all retain some vestiges of once working pattern languages that can be brought back into use....

Many other patterns suggest themselves once a group such as this is assembled. And while we could expand, we would probably not increase clarity. In a few phrases, we have encompassed the architecture, ecological functions, social interactions, and annual life of a small public space, while still leaving great room for the imagination to enrich this picture.

Cultivating vision

Pattern language comes into the design process at the stage of developing vision. It leads naturally to an artful expression of the vision and problem/solution statement. As Mollison's (reordered) list and Holmgren's principles both suggest, design begins with observation, and layered observation leads to the emergence of patterns. When these are understood in a larger context, a pattern language begins to emerge, often with a name or title that helps us to identify it and thus to name its parts. We have a few written pattern languages now (1), but more importantly, we all retain some vestiges of once working pattern languages that can be brought back into use. All of the arts and crafts, from cooking to sculpture to forestry, have pattern languages, and although these overlap with jargon, they are not the same. As designers, we work to restore and re-enliven many of these areas of culture.

Pattern language is a holistic design method that draws on both sides of the brain: the creative, proprioceptive, spatially oriented right brain, and the analytic, discerning, language-making left brain. By helping to integrate the brain's two halves, pattern language heals the body-mind split along with the deeper spirit-matter split that blights our history and lingers in the liminal zone where a new paradigm is birthing. We can strengthen our grasp of this design method by learning to trust our intuition.

At IPC-7 in Croatia in 2005, Norwegian permaculture designer Jan Bang shared a method for holistic investigation that he calls Goethian science, and which comes through his anthroposophical studies. Its five-step process enacts a kind of brain yoga for deepening intuition while exploring the contours of a thing, place, or idea. It begins with an encounter:

1. *The First Impression,* consisting of feelings and associations, is a right-brain experience; a gestalt that precedes words and sometimes escapes them. Author Malcolm Gladwell has written an excellent book, *Blink,* about this moment of first awareness and how to capture it.

2. *Physical Observation* next arises from the left hemisphere of the brain as it discerns form, shape, color, mass, and texture, as well as smells and sounds.

3. *Dynamic and Context*. The right brain then places the object in time and space, often within a developmental framework or spatial gradient.

4. *Description*. A story begins to emerge in language with all the associations and connotations that words bring out of the distant past.

5. *Symbol, Gesture, Spiritual Quality*. Finally, a wholeness is seen or felt that can be distilled into a spiritually meaningful symbol, gesture, or quality.

As this practice deepens, stage 5 comes to mind more quickly, until it loops more and more easily into stage 1, so that first impressions can be seen as profoundly revealing of wholeness. There we claim the power of beginner's mind.

Practice imagining the vibrant and healthy cultural context of the wounded world you meet in your daily life. Give that cultural context shape, and draw those shapes into a language set. You are on your way home. Δ

Notes

1. Besides Jacke and Toensmeier, *Edible Forest Gardens, v. 2,* Alexander, Ishikawa, Silverstein et al., *A Pattern Language,* and Bane, *The Permaculture Handbook,* see also Schuler, ed., *Liberating Voices!: Pattern Language for a Communication Revolution*.

Peter Bane is the author of The Permaculture Handbook: Garden Farming for Town and Country *(permaculturehandbook.com), and President of the Board of the Permaculture Institute of North America. He will co-facilitate an Advanced Design Studio in Hernando County, Florida from November 8-12, 2017, with Koreen Brennan and Jono Neiger. Contact him at pcactivist@mindspring.com.*

Design Process

Toward a More Perfect Process

Dan Palmer

Editor's Note: This article presents a few summary points from a longer series of blogs posted by the author on his site: makingpermaculturestronger.net. A much more nuanced set of arguments with extensive footnotes and connections is present in the series. It is worth your time and a few cups of tea to review it.

PERMACULTURE WAS FOUNDED on the premise that humans must mimic natural systems if they are to survive (let alone thrive!). Accepting this premise prompts a rather pressing question: *How* do we go about mimicking natural systems? An obvious answer is *by mimicking the processes nature uses to generate natural systems* (1).

This answer prompts another question: What are the key attributes of these processes? Let us ask this question of a specific natural process example. Take the process starting with an acorn and heading toward a grand old oak tree. This process *is* the gradual transformation of a whole-and-its-parts (the acorn with its shell, food store, embryonic plant, etc.) toward a different whole-and-its-parts (the oak tree with its leaves, limbs, truck, roots, etc.).

The transformation happens in a particular sequence. Once germination is triggered, for instance, the acorn's first order of business is to organize an anchor. Drawing down on its in-house larder, cells divide. A root tip emerges. Provisionally anchored and sending out feelers toward water, minerals, microbial allies, and such like, the sequence now starts making moves toward a photosynthetic income stream. A new growing tip, this time heading up, differentiates itself within the dynamics of the fluidly transforming whole. Leaves appear. Photosynthesis commences. The growing tip leaves a stem in its wake, which starts to thicken, and stiffen. Enter wood. And so on.

Something along the lines of this amazing life-unfolding process is happening all around us. It is the formative key to all living tissue, all organisms (2). Versions of this process are underway in your body, right now. A wound heals. Fingernails grow. Even if we stop here, with this simple reflection on one of nature's life-creation processes, we find discrepancy with how, in modern times, humans use something called "designing" to create form in the world.

This comes as no surprise for most modern design processes, which have no intention to create things that mimic nature. Take modern architecture, where the intention often appears to be making buildings as *unnatural* and as *unadapted* to their surroundings as possible.

But what of permaculture, which from its inception has been, *by definition*, an approach to the design and creation of nature-mimicking systems? Does the average permaculture design process mimic natural process, in the sense of our acorn-moving-toward-oak tree example?

Modern architecture such as this German commercial building is an example of moving away from natural patterns. Photo CC0 via Pixabay.

In at least one important respect, it does not. For, as I'll show shortly in a review of nine contemporary presentations of permaculture design process:

A core idea integral to how permaculture design process is understood and communicated in the permaculture literature is that of completing a design to some satisfactory degree of detail and only then implementing it.

But the acorn does not create a detailed design of the oak tree *and only then* implement this design. It literally figures the details out *as it goes along*. The only place a detailed design appears is in the *actual unfolding reality of the tree itself*. The acorn contains something we might say is akin to a goal, in the form of genetically encoded rules constraining or directing the kind and sequence of transformations that take place. This 'goal' contains parameters that are different from the parameters encoded in the DNA of a eucalyptus seed, or an elephant embryo. But there is no specific layout. No detailed design. No blueprint. No master plan. There is no picture to aim toward.

Let's consult an actual acorn on this:

Us–Listen acorn, why don't you draw up a detailed sketch of the oak tree you'd like to become first—then you can use the sketch as a guide to move toward.

Acorn–What, are you nuts? How on earth can I tell how many leaves, limbs, etc. etc. I'm going to end up with? Why do I even care? Why would I waste my energy creating some imaginary future state that will never, ever correspond to where I actually end up? All I need do is take one step at a time, basing each decision on what makes sense for the reality of where I am in

that moment (which includes my DNA, current environmental influences, my current size and shape and stage, etc. etc.).

Us–No, seriously, you should listen to us. After decades of practice, we're convinced you're much better to make mistakes on paper first, so you get things right on the ground, and, err, up in the air.

Acorn–Again, this is crazy talk. My ancestors have been researching this stuff for well over 300,000 years and I can tell you with certainty that the surest way to make mistakes with this creating natural systems stuff is to try and plan all the details out in advance. Just relax, figure out what comes next, make a move, plan the next step, then repeat. Seriously, take a leaf out of nature's book, why don't you?

Let me next share a review of nine published approaches to permaculture design:

Dave Jacke *(Edible Forest Gardens Vol. II)*

Chapters Three and Four of Dave Jacke and Eric Toensmeier's *Edible Forest Gardens Volume Two* (2005) contain what is perhaps the permaculture literature's most profound and influential presentation of design process, even if Dave, who wrote these chapters, referred to it there as a *forest-garden design process*, and nowadays prefers to call it an *ecological design process*.

Early on, Dave warns against treating design process as "clean, linear, and organized" and as "rigidly following an idealized design-process outline, even ours" (p. 142). As he puts it:
Design is an elusive and enigmatic alchemy. Yet the magic of design lives, not in any design technique we might learn and use, but inside each one of us. The techniques serve only as touchstones to connect each of us to our own living creative process. Do not confuse the finger pointing to the moon with the moon itself (p. 141)

… where, despite this…
Like the forest, the design process is complex and multilayered, yet both have structure. Certain principles and "archetypal" activities undergird every effective design process, yet each trip through it is unique (p. 142)

… and, despite the way or order in which you engage with them…
When we take apart an idealized forest-garden design process, we can see six fundamental, interrelated actions:

- Goals articulation
- Site analysis and assessment
- Design concept development
- Design
- Implementation
- Evaluation

In more detail, Dave breaks the overall design phase into *conceptual*, *schematic*, *detailed*, and *patch* design sub-phases. Bringing our focus towards the threshold between design and implementation, in the detailed design phase, Dave recommends that:
… ultimately you should aim to create hard-line drawings detailing the exact size, shape, and location of every element (p. 271)

… giving the example in Diagram 1.

… then, as the last design phase (or sub-phase, if you prefer) before implementing…
In the patch design phase, you determine the species composition, patterning, and spacing of your garden plantings patch by patch to a high degree of specificity (p. 286)

…where, overall, his point is that…
We must design the details of that [design concept] whole to a point where we can gather the materials, energy, and money necessary to create it, or at least identify logical first steps (p. 142)

…then, after evaluating your design and the process you've used to get to it, Dave explains:
Implementation is the next phase of your work, and the last piece of the design process. Site preparation usually comes first, followed by staking out the design on the ground and making final adjustments. Then you can plant (p. 313).

In subsequent chapters, Dave addresses *Site Preparation*, *Garden Establishment*, and *Management, Maintenance and Co-evolution.* To summarize for the purposes of our focus in this inquiry, in the idealized design sequence given in *Edible Forest Gardens*, you complete a detailed design before implementing it.

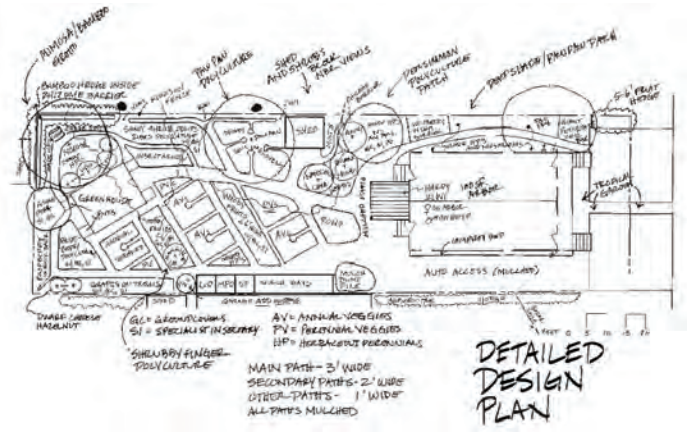


Diagram 1. *This diagram is adapted from* Edible Forest Gardens, Volume II *by Dave Jacke with Eric Toensmeier (2005) and is reprinted with permission from Chelsea Green Publishing.*

Ben Falk *(The Resilient Farm and Homestead)*

Like that of Dave Jacke, Ben's take on design process in this 2013 book stands out for its thoughtfulness, originality and high calibre. Indeed for Ben, design is more of an ongoing attitude than a process with a defined beginning or end. In his words:

It is essential to remember that this [design] process does not stop once the shovel hits the ground. Designing is a constant state of being, and when engaged in the world as a problem solver, you never turn off the tendency to notice a sub-optimal situation and think systematically about how to improve it. Design process can take many forms, and no one approach can be prescribed as the best for all people and all scales. However, it can be said that any effective design process is rooted in intense engagement with the problem at hand and the world in which that problem resides (p. 24).

Early in his *design process and site establishment* chapter, Ben shares a simple diagram showing the planning and design process as an endless cyclic interplay between *analysis* (see, observe, study), *interpretation* (consider, decide, affect, apply,

mimic) and *action* (disturb, construct, implement, manage). The diagram blurb reads: *site planning should be continuously fed by a never-ending process of analyzing, interpreting, and acting.*

In another relevant passage, Ben explains that feeling overwhelmed with the unknown at the start of a path toward regeneration and resilience:

A structure for sifting through the seemingly endless variables is needed. Enter a process. Its beauty is its ability to narrow down options; its danger is in missing solutions that may be important. It is important to begin with two foundational elements: (1) you and (2) your place (or intended place). The rest of the design process can flow effectively from these two starting points but only if it is informed by the existing conditions of you and your place (p. 46).

Like Dave Jacke, after many such insightful introductory comments (including a fascinating list of 72 novel design principles), Ben proceeds to talk and share an example journey through a sequence of steps starting with the foundational elements mentioned in the above quote and ending with what he calls a *working master plan*.

Here's the sequence, noting that he recommends reversing the order of the first two steps if you already have your land:

- Goals identification and requirements of the design
- Assessing the site / land analysis
- Design criteria
- Imagination
- Schematic design
- Working plans and implementation documents

Ben emphasizes the critical importance of treating the *master plan,* or as he prefers to call it, *master working plan* or simply *working plan* as highly malleable in light of what actually happens throughout its implementation:

Master plans are not solid, set-in-stone documents—although everyone wants them to be. Heck, I am hired many times largely because people want a plan that's solid, unwavering, and something they can follow now and in ten years. Sorry—they don't exist. Most plans are iterative. And despite the authoritative sounding name, master plans are no exception. A good 'master' plan is a working plan—in other words, it's the latest version of good approaches. It will change: that much is guaranteed. The important part to remember is that it's a guide for next decisions, not an ultimate life map or site oracle. Land and the lives unfolding for them are far too complex, unpredictable, and mysterious for any vision of a 'way' to hold up year after year. And they have one more primary purpose: to avoid huge mistakes—for instance, not putting the house in the wrong place or putting the orchard where a road for the eventual barn will need to go. Such plans are 'master' only in that they locate elements that are thought to be inevitable in locations such that other actions can be made down the line. The paralysis that dominates a place when such a plan doesn't exist, or conversely, the repeated mistakes made when such a plan is not in effect are spectacular. In this way, a master or 'working' plan is essential. But don't abuse it—remember, it's a living document. It must change to remain valid (Ben Falk, The Resilient Farm and Homestead, *2013, pp. 72-77).*

To sum up, amongst deep insights about the essence of design, and despite emphasizing the malleability of a working master plan for a site once implementation commences, in his shared sequence and examples in *The Resilient Farm and Homestead*, Ben recommends completing such a plan before implementing it.

Aranya *(Permaculture Design: A step-by-step guide)*

In his 2012 book *Permaculture Design: A step by step guide*, Aranya accessibly presents his take on permaculture design process in this sequence:

- Surveying the site / recording site information
- Client interview
- Analysis
- Placement
- Design proposal
- Implementation
- Maintenance and evaluation

When he arrives at the implementation stage of the design, he explains:

So we are almost at the point now where we can impose our design ideas upon the real world, but first we need to create an implementation plan to guide us (p. 152).

The logic here is clear—complete your design, plan its implementation, then start implementing it.

Toby Hemenway *(The Permaculture City)*

In this highly-regarded 2015 publication, the late, great Toby Hemenway introduces the idea of a design process as follows: *The point of any design is to move toward some desired outcome—a productive garden, a rewarding business—with as much certainty as possible, some sureness that we're taking the right steps. Put simply, a design is a plan or set of strategies toward a purpose. The design process, then, is a program for articulating that purpose and for giving us a sure set of procedures for choosing steps toward it (pp. 25-26).*

Design in the head and on paper; implementation on the ground.

After a rich survey of the various ingredients of what he calls a permaculture design toolkit, Toby explains that we now*... need a process that guides us through design from start to finish. Permaculture designers give their design processes an assortment of names and acronyms, but they all follow the same pattern (p. 45).*

Here is the list of steps Toby thinks best captures this pattern:

- Observation
- Research
- Conceptual design
- Master planning
- Implementation
- Evaluation
- Tweaking

Skipping on down toward our target of the design-implemen-

tation threshold, Toby describes master planning as:
… the step that most people think of as design, where the locations and relationships of the systems and elements are put on paper, and the organizational structure is laid out (p. 46).

Implementation in turn is where:
… we plan the sequence of tasks that will make the design real, then implement them (p. 46).

Followed by the evaluation step, where Toby explains:

In permaculture design, [evaluation] is an integral part of the design process. It creates a feedback loop, a defining hallmark of any whole system (p. 46).

Finally, evaluation leads into tweaking, where: *If you did the design well, the changes will be modest, not wholesale revisions (p. 47).*The idea being that you should expect to tweak your earlier design work based on the new information garnered during the process of implementing it. It is interesting here to note Toby's choice of the word *tweak* which, as he explains above, implies relatively fine-grained modifications to the already-completed design.

Jessi Bloom and Dave Boehnlein *(Practical Permaculture)*

In their *Practical Permaculture* (2015), Jessi Bloom and Dave Boehnlein:
… take a master planning approach to the design process, which means breaking it down into steps that result finally in a master plan. In part 1 of the design process, you will analyze and assess the needs of your site and yourself. By bringing these sets of needs together, in part 2 you will use permaculture design methods to generate ideas that you can evaluate using the principles we discussed earlier; after that, in part 3, you will take the big picture master plan you've created and get down to the details of implementing it (p. 59).

In more detail, their design process steps are:

- initial site observation and getting to know the land
- development of vision and objectives
- site analysis and assessment
- conceptual design
- schematic design (resulting in master plan)
- implementation planning
- detailing and working documents
- maintenance planning

Again skipping to our point of interest here, Jessi & Dave explain:

During the schematic design step, your goal is to land individual elements on the base map. This means you draw all buildings, roads and paths, water bodies, and other major site features to scale where you intend them to be installed. During this step, it is also important to create multiple iterations of your layouts so you can have several options to choose from (or hybridize) (p. 97).

In terms of the degree of detail, they say that: *At the end of this step, you will have a master plan from which to work (p. 97).*

where…
Not all the details of your master plan need to be figured out during this phase, but it should be comprehensive enough to guide you toward your goals (p. 97)

Giving some at least relatively detailed examples of master plans, in the implementation planning step, Jessi & Dave explain: *Once you have your master plan in hand, you're ready to get to work on the land (p. 130).*

Peter Light (article in *Permaculture Design* magazine)

In his article "No Challenge" published in the November 2016 issue of *Permaculture Design,* permaculturist Peter Light explained:

During the first stage of design… a great deal of time must be spent listening to and asking questions of a client to find out as many details as possible about what the client needs and wants, the functions the building or landscape are meant to fulfill, who will be living, working, or being served by the creation, and so on…. The next step for permaculture is a site analysis… Once a site analysis is completed… we can begin to start stage three, formulating a design, in head and on paper…
Coming to stage four—the on-ground implementation of the design… (p. 59)

I find this breakdown interesting in Peter's emphasis that not only are the design and implementation steps *separate* in *time* or *chronological order,* but that for him they also occur in separate *places*—the design "in head and on paper," the implementation "on the ground." Peter refers more than once to the:
..two separate stages of design work: the on-ground implementation of a design, in the first case; and the formulation of a design in head and on paper, in the second case.

Given its relevance to our focus on the boundary between designing and implementing, let us explore this a little more. It is interesting to reflect that while this statement is extreme, it is probably not that controversial. The literature of permaculture design does tend to treat design and implementation as not only separate steps in time, but as happening in separate places. Design in the head and on paper; implement on the ground.

Yet of course no one would question that the two start dissolving into each other in practice. In *Edible Forest Gardens*, Dave Jacke has a section discussing the pros and con of designing on paper vs designing onsite, in which he states:

Some people prefer to design onsite to the exclusion of designing on paper. That is certainly fine if it works best for you.

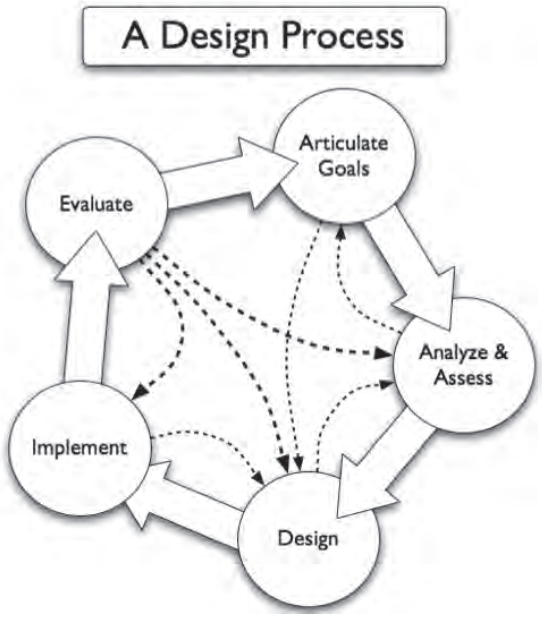
… where on the one hand…
… even if you want to do mostly onsite design, we recommend that you create a rough base map for site analysis and then keep the map and a notebook handy to sketch ideas, take notes, and evaluate options during the design phase.

… but on the other… *at some point everyone will have to stop designing in paper and use stakes, string, and other tools to lay things out on the actual landscape before actually planting or building; some will choose to do this sooner rather than later.*

In *The Resilient Farm and Homestead,* while giving many examples of designing on paper, Ben Falk stresses that:
There's absolutely no better way to physically hint at and offer insight into the possible changes (and results) to a place than using large objects to lay out in a space for help in envisaging the changes. We use wood, tires, vehicles, people, barrels, potted plants, rope, chalk lines on the ground, and much more to do this (p. 68).

We sum up this unexpected little side discussion in the below diagram, which we assume most permaculturists, including Peter, would be comfortable with (modifying the degree overlap to suit their preference):

As it is presented, discussed, and exemplified across the literature of permaculture design, designing tends to happen more in the mind and on paper, though of course it also involves on-the-ground marking out / mocking up. On the flipside, though implementation happens mostly on the ground, it ideally also involves evaluating and modifying the design as well.



Appleseed Permaculture (www.appleseedpermaculture.com)

On their website, the team from Appleseed Permaculture share this "visual map of the process we use with each of our designs." Because their description is so concise and helpful, I repeat it in its entirety:

We begin by collecting the goals and vision from our client. We look for both pattern level goals like increasing on-site food production to specific desires like introducing chickens. We use both pattern and detail level goals to inform the rest of the design process. After our first visit with the client, a more formal Goals Articulation Statement will be created.

Next we begin to Analyze and Assess the site. This phase of the design process begins before we arrive on the site by researching soil types, printing aerial photographs of the site and establishing a bird's eye view of the property in relation to its surroundings. Site analysis continues through the initial consultation, and depending on the size of the property/project, additional site visits will be scheduled. This crucial data collection phase is informed by the landscape. We will be looking at slope, soils, aspect, and existing vegetation to name just a few of the already existing landscape features that will support the rest of the design process.

These initial phases form the foundation upon which the rest of the design process unfolds. Now we move into Design. We begin by creating a number of Schematic and Concept Designs. These designs are not detailed and act as a creative canvas, throwing all of our ideas on the table. The point at which our ideas are exhausted, we distill down all of the right design elements to be included in the Final Design.

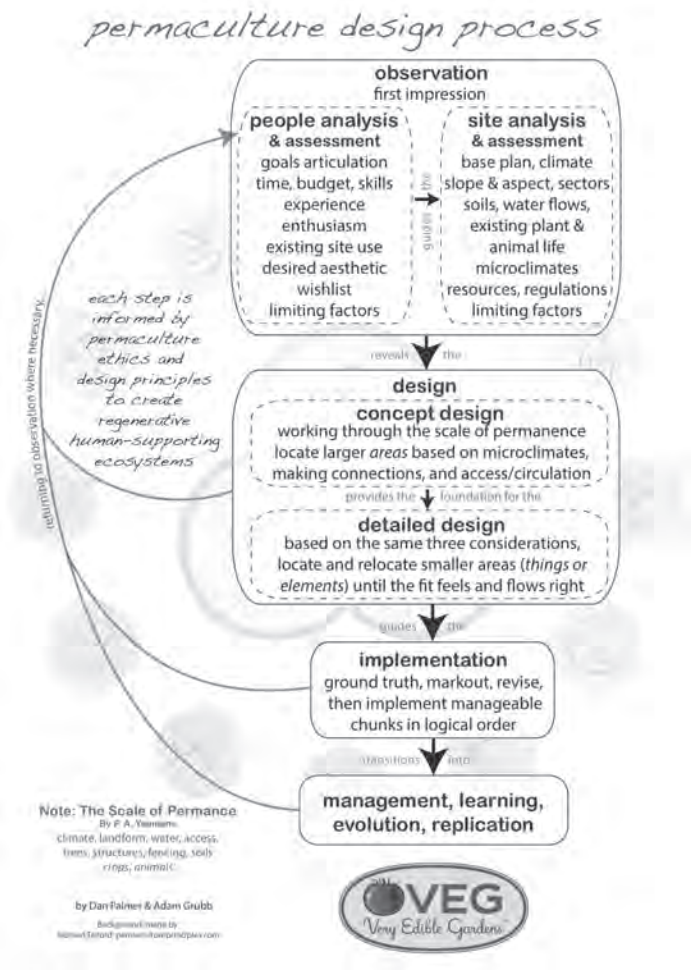
Once the design is complete, we move into the Implementation phase of the design process. This is where the plants go into the ground, the pond gets dug, and the solar panels go onto the roof. AppleSeed Permaculture specializes in certain elements of Implementation and works with trusted professionals to ensure that all of your desired design elements get installed.

The last phase of the design process is Evaluation. This is where we take a step back. The landscape informs us on the validity of our design decisions. From there the Design Process begins anew. New goals might be formed based on the Evaluation phase and so forth.

The statement with the most bearing on our current inquiry is: *Once the design is complete we move into the Implementation phase of the design process.*

Very Edible Gardens (www.veryediblegardens.com.au)

Here is a diagram developed by Andrew Grubb and myself (and influenced by Dave Jacke's thinking):

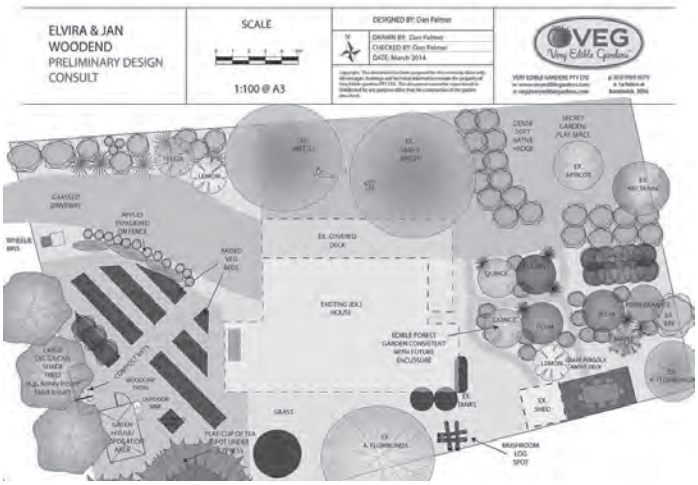


Note in particular, the separate boxes used to indicate design and implementation, the darker arrows showing the suggested chronological sequence of steps, and the lighter arrows indicating the return sweep of feedback from each stage of the process back to its beginning.

Here's an example of a (pre-implementation) detailed design

resulting from this approach:

In summary, in the Very Edible Gardens process, you com-



plete a detailed design before moving into implementation.

Occidental Arts & Ecology Center (www.oaec.org)

The Occidental Arts & Ecology Center website explains that:

The permaculture design process consists of several phases: assessment, visioning, designing, and implementation.

In more detail, these phases are presented and summarized:

- Assessment
- Visioning
- Designing
- Conceptual Planning
- Master Planning and Design Review
- Element Specifications and Budgeting
- Implementation

At the *Element Specifications and Budgeting* stage, the authors explain that:

Once the master plan is complete, each element is designed in detail. Once the element designs are complete, budgets can be created, funding sought, and permits acquired. The sequencing of the implementation of the design takes place as part of this phase.

Here clearly a detailed design is completed prior to its implementation. Then, reminiscent of the return arrows we saw in all the above design process diagrams, they close with the statement:

The design process is a reiterative process that may move linearly through design steps or may circle from one to another and back again. Depending on the information that arises in each phase, steps may be revisited and the design revised.

So, where does this lead us?

If we consider the nine different presentations of permaculture design process as a chronologically sequenced series of steps, stages, or phases.

All these published (and in many cases widely read and respected) presentations are variations on a theme in which:

- In one order or the other, you tune into people and site.
- You *only then* come up with a design, working from patterns (concept/schematic) toward details (master/detailed design).
- Design completed to a satisfactory degree of detail, you *only then* implement the design.
- You manage/maintain/evaluate the process of implementing the design, going back to tweak, adjust, or revise it as necessary.

Many, if not all, of the treatments emphasize the messiness of the process in reality, the jumping about, the constant iterating back to an earlier phase, and the importance of treating the design as a working plan to keep revising as the project evolves. In spite of such disclaimers, after what I hope you will appreciate has been a careful and sympathetic reading of each reviewed design process presentation, this post leads me to conclude as follows: A core idea integral to how permaculture design process is understood and communicated in the permaculture literature is that of *completing* a design to some satisfactory degree of detail *and only then* implementing it.

Solving problems nature's way

In the foregoing, I have shared a contradiction. On the one hand, the natural systems permaculture seeks to mimic do not complete a detailed design before implementation. On the other hand, the permaculture literature widely advocates just this.

I believe this contradiction is a problem needing serious attention. For me, the problem becomes particularly clear when I consider that all *design* processes are *decision-making* processes. To design, that is, is to make a series of decisions. Imagine you've drawn up a detailed permaculture design on paper (or on computer) such as the example here (one of my earliest professional designs). Imagine choosing an object—a garden bed, an apple tree, a path, whatever. Now consider Alexander's observation that:

When we examine an object, we may see that each element in the object (part, line, edge, position, color, size) represents a decision. In very rough terms, we see that each line represents a different decision. We may also say that each line has created space on either side of it and near it, and therefore typically represents some four or five decisions about space (through size, convexity, adjacency, organization)….

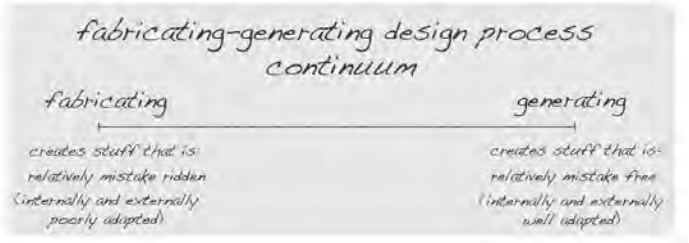
Each element has the possibility of being wrong. By that I mean the element as placed, sized, and oriented, may be well-adapted to its neighbors, to the space around it, to the conditions which exist, and to the conditions arising from the structure of the surrounding elements—or it may be badly adapted to the neighbors, conditions, space, trees, arising from surrounding elements.

We are going to count the number of possible mistakes, and try to estimate how many of these mistakes have been avoided, and how many have been committed, in different types of plan. It is here, that we shall see the vast superiority of generated plans. They avoid mistakes. A fabricated plan cannot avoid mistakes, and in all fabricated plans, the overwhelming majority of possible mistakes, are actually committed (2002, p. 186).

Here Alexander makes a distinction between what he calls *generated* and *fabricated* plans. The details of a *fabricated* plan arise in the process of creating the plan prior to implementing or creating it. The details of a *generated* plan, in contrast, unfold or emerge through time inside (rather than

outside and up front of) the very process of implementing or creating it:

Consider the hundred or so permaculture design examples, examples I personally had a hand in. Consider the example of permaculture designs given in YouTube. In terms of the current analysis, these designs constitute the aggregation of hundreds

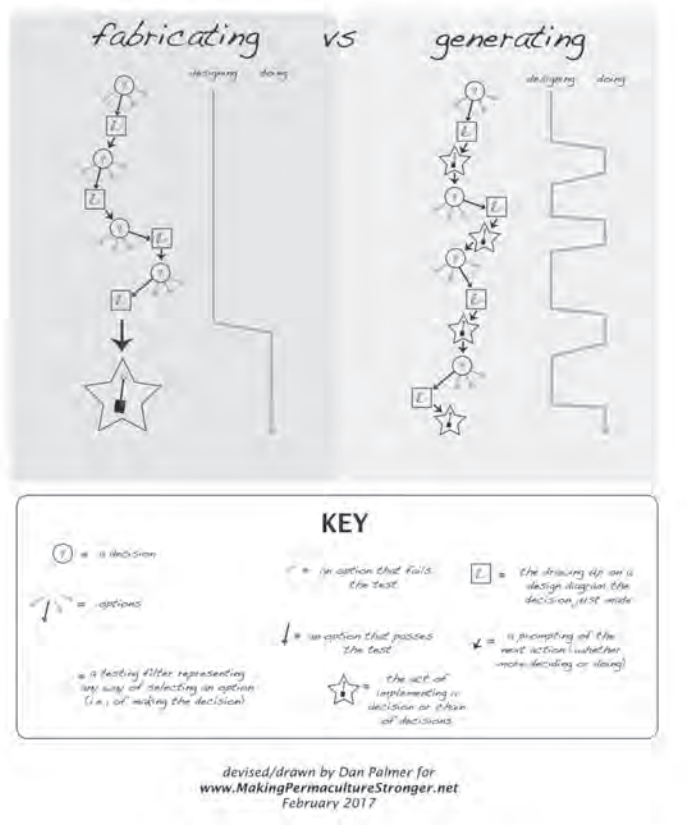


or even thousands of decisions, all, it seems, made on a piece of paper before any implementation.

If Alexander is right, *many of these decisions are likely to be mistakes*, or at least not as on-track as they would be if they were made at a more appropriate moment in the actual unfolding of the garden or space being designed and created.

Towards getting as clear as possible on what the difference between fabricating and generating might look like in a permaculture design context, see what you make of this diagram:

As is hopefully decipherable from the diagram, in both approaches you start with a decision that needs making (such as where the new driveway will go). Then, in both approaches, you survey your options (or different ways of making that decision,



such as the driveway could go like this, or like that, or what about around here like this? etc). You then, in whatever way, test the options and select one. The type of testing is not relevant here—it might involve thinking, doodling, marking out on site, consulting experts, whatever. The point is that one way or another you make a decision—you select an option. Now, again in both approaches, you draw in that decision on your plan (for example, you might draw in where you've decided is the best spot for the new driveway).

Here is where the paths diverge. In the fabricating approach, the just-drawn-in decision prompts another decision, and you re-enter another round of the same sequence you've just completed. In the generating approach, you go out and *actually implement that decision on the ground*. The actual reality of the implemented decision (for example the actual driveway itself once installed) now prompts and provides a context for making the next decision.

In the fabricating process, the rhythm is therefore *decide-draw-decide-draw-decide-draw* before moving on to a big chunk of (post-design) **DOING**. In the generating process, the rhythm is *decide-draw-do-decide-draw-do-decide-draw-do* such that the designing and drawing only get ahead of doing by a decision or two.

Perhaps the key to it is that in a generating process, apart from the first decision, *all key decisions are directly prompted by the just-updated reality of the site.* In a fabricating process, by contrast, apart from the first decision, *all key decisions are directly prompted only by the just-updated reality of a drawing of the site.*

Alexander claims (and I obviously think he has a point) that if you are making your design decisions based on what you've just drawn, *you just don't have access to enough key information to avoid making a shitload of mistakes.* You are engaging in some degree of fantasy, and you *will* get off track.

Feeling your way into it

Christopher Alexander makes a strong case that the process of completing a detailed design before implementing it (*fabricating* in his language) is inherently flawed. If we wish to create systems more akin to the rest of nature, Alexander argues we must us a *generating* process, where decisions are made inside and during the creating process, not before it.

For Alexander, in a healthy process able to generate nature-mimicking systems:

Each… decision is made in sequence and in context. It is worked and reworked right then and there until it is mistake-free, i.e., it takes into account all the connecting relationships. This must be done in sequence and in context because the necessary information for a successful decision is not available prior to that step in the unfolding (2002, p. 201).

Let's start with Bill Mollison's *Designers' Manual.* There are many helpful whispers regarding the issue we're exploring, even if a little bit of reading between the lines is required to draw them out. Consider his Methods of Design chapter. Under the heading The Establishment and Maintenance of Systems (pp. 65-68), we find some at-first-glance contradictory emphases. On the one hand, Bill says things like:

Because impulsive sidetracks are usually expensive, it is best to fully plan the site and its development, changing plans and designs only if the site and subsequent information forces us to

do so

and, as a first step…

Design the site thoroughly on paper.

On the other hand, he says things like: *Instead of leaping toward some imaginary end point, we need to prepare the groundwork, to make modest trials, and to evolve from small beginnings. A process of constant transition from the present to the future state is an inevitable process…*

Thus, our design methodologies seek to take into account all known intervening factors. But in the end, it comes down to flexibility in management, to steering a path based on the results of trials, to acting on new information, and to continuing to observe and to be open or non-discriminatory in our techniques

In all of this, design methodologies plus management are involved, and it is therefore far better to train an owner-designer who can apply long-term residential management than to evolve a roving designer, except as an aide to initial placements, procedures, and resource listings.

To me, these latter statements strongly support more of a generating than a fabricating approach, given that, one more time, **in the end…**

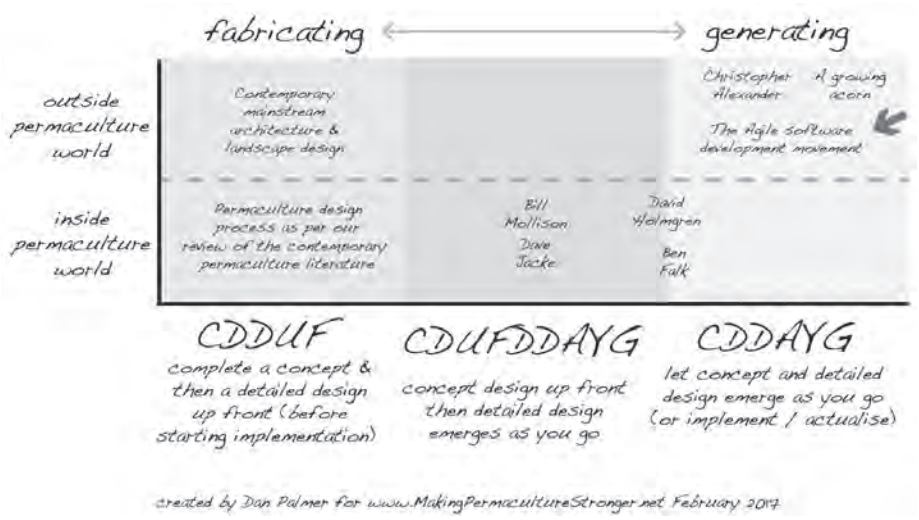
…it comes down to flexibility in management, to steering a path based on the results of trials, to acting on new information, and to continuing to observe and to be open or non-discriminatory in our techniques.

These seemingly contradictory emphases are complementary on a closer reading. Bill suggests that yes, it is essential to complete some kind of whole-site plan up front, and to think through a sound starting point and sequencing of subsequent stages of development. *But then*, you get the development/implementation process underway, where you complete more detailed nucleus designs for different areas in the process of developing them, the prior broad-strokes plan ensuring all the little areas evolve as threads in a coherent larger fabric:

Break up the job into small, easily achievable, basic stages, and complete these one at a time. Never draw up long lists of tasks, just the next stage. It is only in the design phase that we plan the system as a whole, so that our smaller nucleus plans are always in relation to a larger plan.

I believe this treatment is in some ways more sophisticated that the default idealized (and ultimately linear) presentations of permaculture design process we reviewed at the start of this inquiry. There, a common theme was the recommendation that you craft a concept and detailed drawn design before commencing implementation (**CDDUF)**. Yes, feedback then kicks in, but the flavor I get (or maybe extrapolate is more accurate) from Mollison's words above, is know your clients and the site, get the big picture layout and staging sequence sorted, then figure out (or even better empower the owner-residents-managers to figure out) the details as you go along.

This is an exciting development! Thanks to Bill Mollison, we have found the beginnings of a potential resolution of the fabricating/**CDDUF** and generating/**CDDAYG** dichotomy. It is a hybrid we might call **c**oncept **d**esign **u**p **f**ront then **d**etailed **d**esign **e**merges **a**s **y**ou **g**o or **CDUFDDAYG.**



At this point, we hope that we've come to something useful for designers and those taking up the practice! Take the above diagram, and work on developing your own approach, and let us all know how it goes. Δ

Dan Palmer is a permaculture designer and creator based in Victoria, Australia. Co-founder of the now global permablitz movement, and co-director of Very Edible Gardens, Dan's current focus is collaborating with others to critically revisit and redesign permaculture's foundational understandings of design process (in part through his blog project www.makingpermaculturestronger.net).

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1. Obvious in that surely the best way to mimic anything is by mimicking the processes that have proven themselves capable of generating that thing.
2. Organism is a noun of action denoting an ongoing process of organizing. To organize is to make into an organ, as in a part of a greater whole.

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Design Method Applications

Urban Settings

Karl Treen

WE ARE LIVING IN A TIME of unimaginable possibilities….

Many of us live in cities. Our food supply chain snakes out over long distances, leaving trails of pollution, political instability, and spoiled produce. Growing food creates jobs, and local jobs boost the local economy. Local food is often the freshest and most healthful. Plants literally add life to a community. They give us a reason to come together cooperatively, to celebrate community and the seasons. Therefore, localizing at least part of the urban food supply is an obvious solution to many of today's challenges.

To meet (and localize) our food requirements, we are learning to implement a uniquely *urban* permaculture design. We are also learning to apply permaculture methods to urban problems such as lack of open space, contaminated soil, lack of knowledge, violence, poverty, transient communities, etc.

Until Toby Hemenway's *The Permaculture City*, urban permaculture books focused mostly on small-space gardening tips and techniques. Instead of building on this collection, Hemenway described, more generally, how permaculture strategies could be applied to solve urban challenges.

We have, at our fingertips, an overwhelming amount of information, products, plants, and techniques. A common consequence is that one can easily get excited about solutions that may not be appropriate for one's own situation. For example, how many times have you seen someone living on a flat acre who wants to implement strategies designed for slopes, or someone with a large farm focusing on space-saving techniques? While these exercises may bring forth new innovations, they may not be the most efficient uses of our energy. It is important, then, when designing for any environment, to follow permaculture design methods to discover a site's unique qualities. In the city, you can take inspiration from techniques designed for larger spaces, but small spaces often require unique solutions that only you can develop. Permaculture provides a path that can be followed on any site, rural or urban. It is a path of observation, research, planning, implementation, and revision that includes a handy kit of design tools. But remember, while these methods can be described as a path, they are really a lumpy, multi-dimensional web of repetition, revision, and discovery.

Observation

Observation often begins with unfocused meditations on a site and progresses to detailed record keeping. Whatever your meditation style, you will observe weather, wind, water, soil, existing plants, sunlight, neighbors, noise, smells, views, etc. These observations help to determine your resources and deficiencies, and you begin to compile them into logical collections. The question becomes "what exists and what is needed?" To think this through, a "needs and resources" analysis can be a valuable tool. Table 1 is a very general needs and resources

Conventional permaculture zone analysis.

analysis of an urban lifestyle. A more focused analysis for a site will include existing plants and conditions. These analyses will vary greatly, and can be as granular as needed, even down to the microclimates beside a foundation or a walkway.

Research

After observation comes the research phase. Urban permaculture research might include looking for vacant lots; researching previous uses of garden spots; finding a supportive community; researching zoning laws that restrict (or encourage) gardens and urban livestock; looking into grants or subsidies for gardens or renewable energy; talking to neighbors about their own gardens and their feelings about urban homesteading; finding out more about native and/or successful plants for a particular region, etc.... You will want to compile some of these observations into data overlays. You might also create flow diagrams and highest use analyses to determine how to most efficiently use resources as they pass through a site.

In this phase, we dig more deeply into our observations, studying and recording the sectors that affect our site. The results of your observations feed into a "sector analysis" which helps you discover where the sectors come from and how they may be used or constructively directed. For example, you might turn your "trash-throwing neighborhood kids" sector into a "garden protectors" sector, by offering them kindness, respect, and a small plot of their own.

During this phase, your resources might be subjected to a "highest use" analysis. Greywater, for instance, doesn't need to pass directly from the faucet to the drain. It might be used to dilute urine, creating a phosphorus and nitrogen-rich solution to be filtered by plants further along. It might create energy while flowing from one floor to the next. It can be used to flush solid waste, depending on the toilet situation. It can be filtered and repurposed almost indefinitely. During the research phase, all of these possibilities would be studied and evaluated for practicality. Some might be abandoned as too costly or illegal; others would be refined and described in detail.

"Random assembly" can be used to compile various, seemingly incongruous, elements into new and innovative designs. For example, storage space can be optimized using this tool. I used it in my grow room to discover that my worm bins could stack above my cold stratification fridge and my grow lights in the wintertime, using the warmth to bring the worms up to a more comfortable temperature.

All of the above analysis tools are discussed at length elsewhere so, if you need definitions, a quick web search will do the trick. Different questions can be applied to different challenges—gardening or otherwise, and the solutions are limited only by your imagination.

Table 1: A General Needs & Resources Analysis for an Urban Lifestyle.

Needs	Resources
Water	Storm-water run-off
	Greywater
	Public water supply
Food	Home grown
	Grown away from home
	Foraged
	Bartered, gifted and traded
	Purchased locally
	Purchased from far away
Space	Small, shady backyard.
	Vertical space: trellises, fences, arches, tripods, stacked pots, window boxes, roof & porch gardens
	Borrowed space: vacant lots, park land, community gardens, neighbors' yards, sidewalk cuts and "tree pits"
	Square foot gardening strategies like container and hay bale gardens
	Mix of all above. Consider random assembly exercises to create new, efficient combinations. Use sector analysis to determine the "sectors" that will impact each site.
Clean, fertile soil	Composted "waste" from restaurants, grocery stores and farmers' markets
	Urban livestock bedding
	Town compost and mulch
	Composted cardboard
	Composted leaves
	Properly remediated soil
	Diluted human urine as fertilizer
	Properly composted human waste
	Hay bales
	Aquaponics
Stability & continuity	Community gardens
	Religious organizations
	Friends and family
	Legacy and estate planning
	Community groups
Tranquility	Parks
	Public greenhouses
	Community gardens

Planning

The planning phase is often divided into several sub-phases, including everything from brainstorming to budgeting. The process will be familiar to the rural permaculture designer, but specifics are unique to each situation. The most familiar design strategy used during this phase is zone analysis, but sector analysis, data overlay, and flow diagrams also come back into play. For the sake of brevity, we will use zone analysis as an example of a way in which urban permaculture can be very different from rural permaculture. Permaculture zones, in a rural setting, typically take the form of warped, concentric rings around the home—which we now commonly refer to as "zone 0." We instinctively think about zones from the inside out—from zone 1 to zone 5—often ignoring zone 0 entirely. This way of thinking works great for a farm, where everything is located on the same plot of land and, by bending the zones a bit, can be made to easily represent the intentions of the designer. Surprisingly, this model feels foreign and discouraging to urban dwellers. To envision urban permaculture zones, the city designer must include much more than just the contiguous yard. Additionally, instead of minimizing zone 0, as a concentric ring model nearly always does, zone 0 should be given a prominent position. In an urban setting, the home becomes the center of conservation and efficiency. It often helps to drop the concentric ring model entirely and, instead, think of

something resembling a neighborhood map. This map can show preferred paths (not the "shortest paths") around the city, and the places along the way where one might grow, or otherwise acquire, food and local resources. The various stops on the map may include lists of supplies. Consider listing multiple sources for every category of food, thus giving the strategy additional resilience. You may also want to list things like "community" or "work" on the map.

If I were designing an urban lifestyle with no yard, my second zone to plan (after zone 0) would be zone 4—the foraging spaces. This may not be useful if one lives in a city with no parks, but many cities have park land within the range of public transportation, where one can, at the very least, forage for some wild foods. By observing the quieter depths of these public spaces, one may soon determine that, with a bit of guerilla gardening, they can be modified into something resembling a zone 3.

I have no compunctions about transplanting native edibles into quiet corners of local parks. These species evolved with the local ecosystem and have often been foraged almost to extinction. It is only right that we make some attempt to replenish and nurture them back to abundance. In my biome, this list includes native mushrooms, grapes, elderberries, groundnuts, shagbark hickories, beach plums, pawpaws, sassafras, blackberries, raspberries, pumpkins, and strawberries.

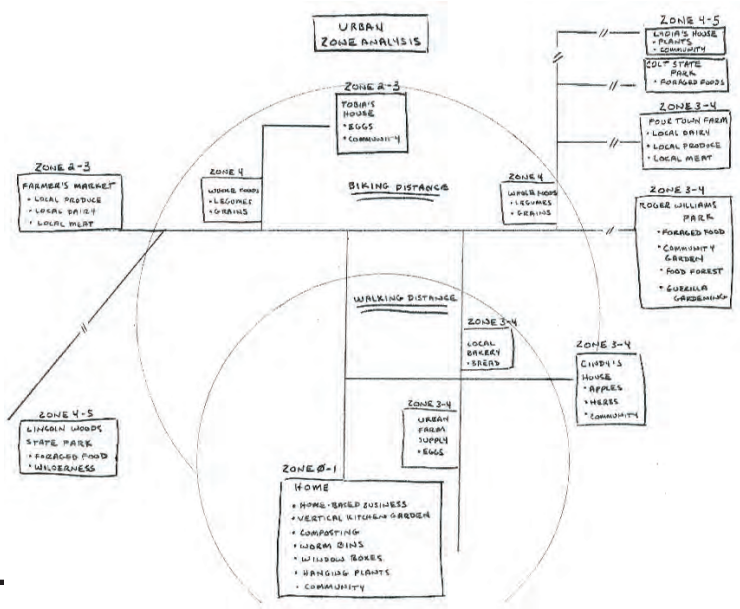
While the rebel in me loves a guerilla garden, it is often

Guilds of perennial vegetables and fruits can often withstand more neglect than annuals....

more productive (and more permanent) to engage your local parks department in a dialog about bringing back native species—or even creating an urban food forest, like the Beacon Food Forest Permaculture Project in Seattle, or the food forest in Roger Williams Park in Providence, Rhode Island. Creating a community group around a food forest project can address common urban concerns about stability and continuity—providing the gardener, and the community, with a more sustainable future.

Zones 2 and 1 can be the most difficult for the urban permaculture designer. If one is fortunate enough to have a small yard to design, you can line the perimeter with dwarf fruit trees, vines, or climbing annuals (squash, peas, beans, indeterminate tomatoes). These plants make good use of vertical space (which is virtually limitless) and can be trained along, around and over just about anything. You can guild them with herbs and low herbaceous plants, and plant pollinator attractors anywhere the soil is too contaminated for food. For inspiration, *Paradise Lot*, by Eric Toensmeier and Jonathan Bates, is a great read. If one has no yard, creating zones 1 and 2 in common spaces can be very difficult to design and manage.

My advice to people who are gardening in common spaces, like community gardens or parks, is to research perennial herbs and "permaculture zone 3" plants that need little care. Guilds of perennial vegetables and fruits can often withstand more neglect than annual plantings. Along with living groundcovers, a thick, 4-6" (10-15 cm) blanket of mulch can work wonders with deep-rooted perennials, reducing the need for watering to a



Urban permaculture zone analysis.

bare minimum. Guerilla gardens near streams or ponds will need much less supplemental watering. Water quality can be an issue, however, and should not be ignored. Fruit is commonly understood to absorb fewer toxins than vegetables, so keep that in mind. Unknown soil and water quality can be a serious concern.

Each of these decentralized spaces deserves to be mapped and designed using appropriate permaculture design techniques. You may be able to use the conventional zone planning approach within contiguous spaces. It can even be very handy when designing a kitchen or a physical work environment.

Although I am mentioning specific techniques and species, it is important to learn the methods and plants that work for your particular climate and region. My intention is not to say what to plant, but to inspire independent, local research. Planning a site, or a lifestyle, is always a unique and personal exercise.

Implementation

Implementation flows from the planning process. It is unique to the site and dependent on the project's goals. It is tempting to implement a design all by yourself. Many folks are drawn to permaculture by a mythology of individualism and self-sufficiency. In a rural setting, this myth may be easier to envision, but it is often the reason that permaculture projects are abandoned. One of permaculture's paradoxes is that Bill Mollison wrote passionately about the important role of community, but many of permaculture's most enthusiastic proponents have only

attempted the implementation process as individuals.

In the city, if one is to avoid psychosis, one should admit to being part of a community. This is a good thing, because humans are, by nature, social animals. If the pack mentality is not given constructive work, it often emerges in destructive ways. Group dynamics, while challenging, can also be intensely satisfying. And it is easier find community when we have common goals and projects.

Personally, I have to force myself to reach out to the community. Many of my projects have been solo efforts because asking for help is anathema to me. This has made my projects easier to design but more limited in scope and creativity, and more difficult to implement. If one is willing to offer help and accept it, one's implementations will be more efficient, enjoyable, and permanent.

As for specific implementation techniques, I will leave that to the creativity of each designer. There are more than enough resources for techniques online, at the library, and in one's own imagination.

Revision

Mollison liked to say that permanent culture was impossible without permanent agriculture.

Revision in an urban environment is no different than elsewhere. It is, nonetheless, essential for the longevity of a system. Every season brings new lessons and ideas. Revision is what keeps permaculture from getting old. It is part of our mission, as designers, to harness the energies of change for our particular needs. The possibilities for cities are only limited by the time and energy that we apply to them. This is the beauty and the challenge of permaculture. Permaculture requires an ongoing relationship with nature that many people still have not discovered, but more are discovering every day.

Conclusion

A friend of mine owns a store in my city. At the time she opened the store, a sector analysis of her site would have demonstrated that her most difficult "sector" would be a certain neighbor with a chip on his shoulder. It is possible, though not certain, that permaculture design strategies might have provided insights that could have avoided a great deal of expense and frustration.

Siting and planning a store is only one example of a process that can benefit from permaculture design techniques. Every day people buy appliances, move into apartments, hunt for jobs, and dream of community without giving much thought to planning and design. They open businesses, celebrate weddings, plan their estates, and make many other important choices without applying the valuable tools of permaculture. Permaculture design methods can be amazingly helpful for inspiration and organization. Needs and resources analysis, sector analysis, zone analysis, random assembly, data overlay, and flow diagrams are my favorites, but there are another half dozen (at least) to choose from. It is only fitting that people have finally begun applying these methods beyond the reaches of the garden. There are even consultants who are making it their specialty to apply these methods to business and civic challenges.

We may regret the environmental challenges and the governmental upheavals of the present. But if upheaval is the problem, it may also be the solution. These upheavals are inspiring impressive increases in activism and concern, and much of that energy is centered in urban environments. Mollison liked to say that permanent culture was impossible without permanent agriculture. If he was correct, then urban permaculture is not just a good idea, it may be a necessity. Δ

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Front corner of our home system.

Radical Redesign

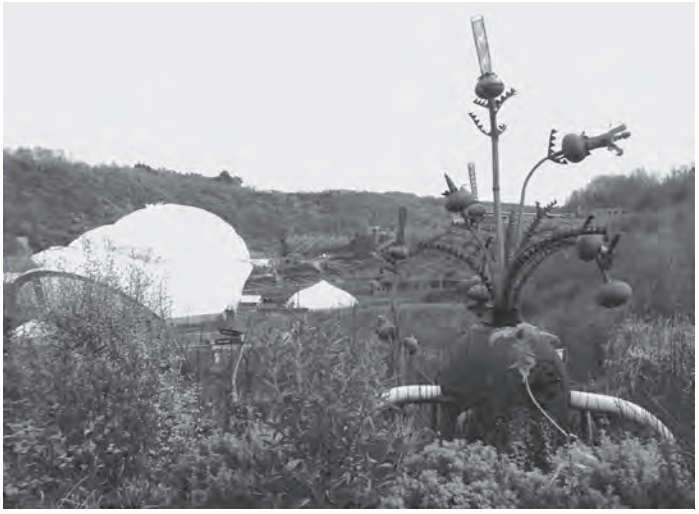
Dr. Charlie Brennan and Bridget O'Brien

WE OFTEN HEAR that something is "normal," or "natural," or "the way it's always been." And then there are aspects of our lives, storylines we live, that it doesn't even occur to us to question—they are so woven into our beings they've become all but impossible to see. Expanding upon this, existential philosopher Martin Heidegger tells us that "fracture renders the familiar explicit," in everyday speak—we don't know what we've got 'til it's gone or broken. People will often experience some kind of revelation through travel, or life-stage changes, or the loss of loved ones that fracture the familiar in one way or another. We're in a time of perhaps unprecedented change, dislocation, and loss. When the dust settles on the remains of what was, we are left with the opportunity, and need, to Radically Redesign—to write a new story.

Design as an activity is easy enough to understand as something that we all do daily in one form or another. Redesign is taking this a bit further through understanding that often we are changing, adjusting, or tweaking something that has been created previously. But what makes redesign radical? When we realize that almost everything in life has, to some extent, been constructed—made, shaped, or framed—through social processes, and therefore the redesignability is as far reaching as we can possibly comprehend. This includes gardens, houses, clothes, livelihood, lifestyles, relationships, communities, ideas about nature, belonging, identity, and more. When this is taken into account, it becomes apparent that all these facets of our lives are radically redesignable and that we have the ability to play with the power and possibility that proactive wholistic design processes provide. Going back to Heidegger, we can wait for things to break, fall apart, or be lost or destroyed, or we can proactively Radically Redesign our futures.

The biggest global issues are beyond governments....

A previous era of social change and upheaval led to profound changes in many aspects of (Western) life. Malcolm Gladwell says that permaculture was born in response to the 60s and 70s counterculture of protest, back to the land, self-sufficiency, and intentional communities, and the general experimental sentiment of that time. Those 'going back to the land' were often from urban backgrounds, often bought old farms, and often suddenly were asking themselves 'OK…, now what?' Permaculture gave guidance—a kind of to-do list and was the case of a new story emerging at the right time and place. Australia at that time saw rapid political and social change, Aquarius events, and forest blockades and protests that eventually led to the conservation of the last of Australia's rainforests.



Redesigning a gravel quarry, the Eden Project, Britain. Photo by Bridget O'Brien.

Many of us fondly remember encountering the iconic images in *Permaculture One*, particularly the fish pond with planted edges, insects hovering, and seed-laden trees overhanging the water. It engaged our imaginations because it showed how differently we could relate to gardens, farms, food, ecology, and shaping the land; it showed dynamic Gaian, self-making, organic, life systems. We better understood the beneficial roles of weeds. What the book most clearly signified was the importance of design. The methods of agriculture imported to Australia from northern Europe were not traditional to those places and were generally not suited to the old fragile soils of that newly "settled" place. The models of economy, community, housing, food production, and transport were also being fundamentally questioned during this time of cultural transformation. The point here is that permaculture, as initially conceived by Bill Mollison and David Holmgren in Tasmania, was and is Radical Redesign.

Permaculture drew together a story of systems thinking, agricultural science, urban geography, technological advances, and inspirations from diverse people: Fukuoka's natural farming methods, Yeomans' keyline, soil, weeds, water, and landscapes and Lovelock's Gaia Hypothesis. It became a worldwide movement. Despite a range of potential criticisms, the movement endures, and inspires and galvanizes the actions of many people. In the more than 40 years since the first permaculture books, films, and presentations, a great deal has changed. Further, the rate of change is accelerating continuously. Sir Ken Robinson shows that we actually have no idea what life will be like for most people in 10, 20, or 50 years time, so it's very hard to know what to educate people for, what to design for (see his Ted Talk for more). In that presentation, he argues that creativity is of the highest importance so that people can shape, and adapt to, this rapidly unfolding but unknowable future story.

We argue that many people don't have a handle on the current moment, let alone the future. We do know that this is a time

of enormous upheaval, dislocation, loss, and personal, social, economic, and ecological change. In the Western world, life expectations are declining, and the principal factors for ill health are now social isolation (loneliness), poor nutrition, insufficient exercise, stress, and socio-economic status. Jobs are being streamlined and automated. Wealth is concentrated. Housing has become unaffordable. Farms and landscapes are being either mechanized or abandoned—both leading to rapid depopulation. Unfortunately, there's more—much more. The biggest global issues are beyond governments—climate change, biodiversity loss, resource depletion, pollution, military expansions, declining corporate tax contributions, and the desperate plight of hundreds of millions of displaced refugees. In this context, we really need Radical Redesign!

The good news is that there are literally tens of millions of people and communities around the world doing just this. Ever since the 60s-70s, people and communities have been carrying out living experiments as they dedicate their lives to putting into practice the ideas and ideals that emerged from counterculture and a revitalization of indigenous ways. This is no easy task. It takes 10,000 hours to become good at something—from alternative land use, to conservation, to holistic health, to community development, to alternative economies, to psychology and spirituality. We need to acknowledge, evaluate, and learn from these practices and practitioners that have been on the edge writing that story for so long.

... we can creatively and playfully engage in more connective experiences.

Permaculture itself must accept being reviewed, critiqued, and redesigned. *[editor's note: see Dan Palmer's contribution, this issue]* Permaculture helps us shape community gardens, build sustainable homesteads, and retrofit declining farms; but it's so much more than that. Permaculture needs to ensure that its not enclosed in its own bubble and that it is relevant and accessible to all. We need to be prepared for redesign, allowing permaculture to more readily acknowledge indigenous cultures, social, and ethnic diversity, and be open to input from other disciplines of science and technology, social sciences, psychology, and spiritual practices. Lastly, the movement needs to openly and critically review the initial 70s teachings, some of which work and others that clearly don't.

Redesign is happening by itself. In this time of profound uncertainty, people are consciously and unconsciously heading back to some sense of "the core"—a place to retreat to, and a place to be strong from. This is not another iteration of modern day narcissism, but it is about pro-actively practicing care for, and healing of, our selves and landscapes. Learning practical skills is as relevant as ever. So is understanding ideas, values, and ecopsychological relationships that underpin both environmental issues and solutions. It has been long understood that practice and ideas are best arranged so they form a synergy; each supporting while challenging the other. For many, this movement to some kind of core place is a spiritual celebration and resilience; others find themselves forced there by bureaucracy, finances, and/or other life difficulties. This movement is nothing but essential in our storyline.

These times call for a resounding mass rejection of mainstream lifestyles that can no longer be endured and probably will not offer much in the days ahead. These times are asking us to reflect deeply upon our dreams, ideas, inspirations, and basic life-sustaining needs—clarifying what is important and what's not. We are being asked to respond, design, and redesign, focused on an ethical foundation of caring more about the choices we make and how they affect whole systems. As the world we know crumbles away, we can creatively and playfully engage in more connective experiences. Maybe it's time to head out and inhabit our semi-abandoned landscapes; or to go sit resting deeply in a tree or on a hilltop; or to say "that's enough" and go on a pilgrimage through sacred landscapes, expansively exploring the root of cultural redesign and radical connectivity with all that gives us life.

Do we go forth by current story default or by proactive wholistic design? The current system is largely depleting and exploitative, but redesign offers infinite possibilities. Shining examples of rehabilitation and innovation worldwide include the Eden Project, Enchanted Makeovers, Greening the Desert, and Growing Power. These prove we can radically redesign our spaces. The Earth Activist Training, Looby Macnamara's book *People & Permaculture*, Mondragon Corporation, and the international cooperative movement prove that we can redesign social and business systems. Coats that turn into shelters, paper cups that plant trees, and home biogas digesters demonstrate that we can interweave old tools and skills with appropriate technologies to redesign better ways of being in our day to day lives. We can go further. We can challenge status quo. We can radically redesign the future, writing a new story about a place where we can thrive in the world we want to live in. Δ

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Designing from the Front Door-Part I

Peter Light

WHEN I LOSE TRACK of what permaculture is all about, I remind myself that above all else, unlike a regular hobby farm, market garden, truck farm, or homestead, permaculture is, above all else, a *designed* agriculture, rather than just a hodge-podge of components.

Permaculture is a *designed* integration of agriculture and human habitation meant to provide for all human needs—food, fuel, fiber, water, medicine, building materials—in as small a space as possible starting at your doorstep. We accomplish this first, by reducing our needs and wants and living simply, and then by applying design principles, utilizing vertical space, filling every niche, and using a wide mixture of mostly perennial, multifunctional plants and other components. We have a special emphasis on trees: arranged in self-supporting, interactive guilds within a built forest of multiple levels and open spaces.

Design made manifest is, finally, about putting *components* together to make something *function*, which is about *action* or *performance* intended to be both *effective*—which is about the actual production of, or power to produce, an effect; and *efficient*, which is about doing it economically, without waste of time, effort, and resources. Thus, in the case of *permaculture* design, it allows us to better manifest the Prime Directive: "The only ethical decision is to take responsibility for our own existence and that of our children. **Make it now**."

... I have been blessed to have consistently found a way to live my life exactly as I wanted to....

A word of caution

The word "permaculture" means not only "permanent agriculture" but also permanent *culture*. One person does not a culture make. It takes a village to properly maintain all of us, let alone raise a child. Mollison wrote of needing at least 30 adults, carefully chosen, as a minimum for true sufficiency. Where does that leave most of us, even in this rarefied world of permaculture practitioners? It may be our greatest failing, that we are often working alone, or with partner and children only, or with some version of what I call pseudo-community. Despite everything, most of us are still without vernacular, intentional community; and, having to acknowledge that no matter the

River and Shad at the cabin in August 1971.

production at our doorstep and beyond, our dream of true, viable, community-sufficiency is either unformed, in its infancy, struggling, floundering, fading, compromised, incomplete, or unfulfilled. All this is to say that we need to remind ourselves of our impossible post-industrial task.

My background

Each of us has had our own, unique life trajectory leading up to our interest in permaculture and design. Each path is no doubt affecting how and what we are manifesting in our lives at this moment, and how we approach living a "permaculture lifestyle." I sometimes have trouble making distinctions between what that might mean and look like compared to the lifestyle I adopted well before Bill Mollison's brilliant gift to the world. How much of my path—whether universal or idiosyncratic—may be helpful to yours is hard to know. I hunch and hope that how it unfolded for me will be interesting and relevant, and that this preamble to the main body of information on permaculture design I wish to present will be tolerated, if not forgiven.

For the most part, since 1962, I have been blessed to have consistently found a way to live my life exactly as l wanted to—radically outside of the box. The first two essentials for success were having a vision of what I wanted to do; and then *just starting*, trusting that at the very least I wouldn't starve or freeze to death. Each time I dropped out, I had no specific ideas of *how*, financially, I was going to "follow my bliss," but each time the way opened before me, my livelihood flowing out of the lifestyle I had chosen—a roof, a meal, a couch, a day-job for a week or a month, a cash crop.

Two other essentials for success were actually *not* having much money, and, finally, living completely off the grid and away from stores so I *couldn't* spend any money! That freely chosen way *forced* self-reliance!

It was only *after* my successful leaps into the unknown that I encountered the book *The Seven Laws of Money,* by Michael Phillips, and was affirmed and gratified to see that the first chapter was entitled "Do It!"

Somehow, I cannot separate my success with permaculture design from these four basics: Get clear about what you want to do, start doing it, don't worry about the money, and keep it small and simple.

Nevertheless, despite having lived simply since adulthood; despite 30 years of vegetable gardening, ten years in the woods, two permaculture design courses, and a ten-day hands-on; despite reading, studying, thinking, and doing permaculture since 1987; and despite occasionally teaching permaculture—I have only been able to consider and begin executing a full-fledged design twice. Once was in the 70s, ten years before I heard the word permaculture; and once now—developing a design for the past two years. My daughter described the first as utopia, and my grand-daughter the second as paradise. Because both echo Bill's suggestion that permaculture is the creation of the Garden of Eden ("and why not"?), I take both characterizations as some validation of what I did and do.

Forward to the past: the Storm Bay design

Root influences and events led, in the summer of 1967, to a fervent desire to live off the grid in southwest British Columbia, "chopping wood and hauling water." I was well equipped: As a child, I grew up as a middle-class kid in Vancouver, across a tree-lined street from a 1.4 hectare (3 acre) park, and two blocks from Burrard Inlet and the beach; I loved nature. I vacationed every holiday on a small truck farm in the Frazer Valley. I knew how to use and *sharpen* simple hand-tools. I had built a log cabin with a friend with axe and cross-cut saw when I was 12.

The back-to-the-land dream was aided by the fact that I had already twice successfully gone through the experience of radically unhooking from the dominant paradigm: out of university into the ban-the-bomb movement; and out of that into city hippy explorations. I had embraced Thoreau's and Gandhi's ideas and had taken some kind of vow of voluntary poverty by early 1966.

Ten days of planting trees for BC Forestry ("What!? You mean they hire hippies?") in the spring of 1967 paid for all our second-hand tools; ten days the following fall doing the same bought a three-month supply of food. On October 23, my daughter was born. On November 27, our literal last dime flipped off the stern of the boat, and we were gone: ten miles up Sechelt Inlet by water or air to Storm Bay—beyond roads, electricity, telephone, and TV.

My first design then followed. I was not consciously following any permaculture principles or methods. They hadn't yet been articulated. I knew I wanted to build a log cabin in the woods, and grow my own food. I'd grown up with chickens and goats, so figured I'd get some of them. I wanted to learn the wild edibles and medicinals; I figured I'd fish, hunt, and gather.

I did do all that. The goat only lasted a few months. Hunting soon fell by the wayside, despite my father having lived on deer, moose, and bear for ten years in northern Alberta, homesteading a quarter section, before I was born. Fishing took a lot of time, sometimes with no catch, but it was a nice break. The emphasis soon settled into gardening and gathering—then chickens, then bees.

How did I start? What determined the design? How did I end up with such a beautiful and productive little clearing in the woods?

Overall, it's hard to go wrong if you're poor, small, simple, full-time, and determined to directly provide for yourself, your family, or your intentional community, It is almost unnecessary to know anything about design or permaculture principles given those parameters. I had a small abode. I was limited by the size of my clearing. I owned no power tools with which to extend my reach beyond my grasp. It is hard to go wrong when you have so little distance to go!

The first step was choosing a site. I knew I did not want to be right on the water, where the other collective landowners intended to build, and where I would be exposed to all manner of boaters seeking the calm and fertile waters of the protected bay for vacation and recreation. I also wanted to be close to the creek that flowed down just off the eastern edge of the 28-acre property. Just off the upper corner, I decided on the only suitable spot.

Nasturtium growing on the fence amidst the zone 1 gardens.

Then I made a couple of serious design errors. I sited the cabin at the south end of the clearing so that it shaded the first few feet of ground immediately in front of the north-facing doorstep, while the down-hill side of the building was shaded by the close-by tall trees of the forest. These problems were solved when the cabin burned down four years later. We moved into what had been imagined to be a toolshed and workshop. It faced southeast. We had down-sized from 16'x24' with two 16'x8' sleeping lofts at either end (which wasn't all that big itself) to a 12'x12' cedar pole and shake with one 8'x12' sleeping loft. Simplify, simplify, simplify. Smaller is beautiful!

But I am ahead of myself.

The next stage was the vegetable garden. Its location was obvious—the rest of the clearing. Having been limited by my criteria for the location I chose, I focused on building my log cabin and didn't even bother to check the soil. I started with the

garden, once we settled into our new home, and I found that basically there was no soil! It took years and much effort to sieve out the rocks and add humus.

The design process usually proceeded in a pretty simple and obvious way. Other elements were subsequently placed around the perimeter of the garden: the woodshed nearest to the door, a root-cellar close by on the other side, a garden shed and chicken coop at the top of the garden. All of this was in what I would now call zone 1—all still within not more than about 50' (15 m) from the doorstep.

Because of the small size of the clearing, coupled with my driving desire to produce as much of our food as possible, it seems natural that certain practices advocated by permaculture were adopted. Using vertical space mandated pole beans, of course, and combining the vertical with the idea of multiple function, we put two bee hives on top of the hen house and grew giant squash up and over our second cabin. Ruth Stout turned us on to permanent mulching, an example of "designing from nature." It was obvious that we wouldn't waste our own manure, or any other resource, for that matter: sawdust was sifted out from the floor of the woodshed and used in the outhouse and as a first fine mulch around emerging seedlings. I stopped piling and burning branches when I realized the tremendous waste of energy, and began using everything down to an inch in diameter as firewood, placing the rest here and there to rot down. Wood-ash from the stove was of great value. Garden and kitchen scraps went to the chickens, where the deep litter became the compost pile, the hens were our workers, constantly turning the pile. Their energy was also used to break up the large maple leaves we had in great abundance. If we used them whole as mulch, they formed dense, impenetrable mats. In a compost pile, they impeded the shovel when turning the heap.

With the introduction of the chickens—and more particularly, the installation of netted runs—my creative juices really started to flow. I began inventing an agriculture that I thought at the time was new and unique. It probably was, except that another guy was inventing it on the other side of the world at the same time! In other words, this is when my little enterprise really began to look like permaculture.

I started by enclosing a permanent straw-yard with old fish net, which is freely available here on the west coast of Canada. That soon led to making three runs surrounding the central one, with three gates allowing separate access to each at different times. We planted an orchard of nuts and dwarf fruit trees in the small pastures, as well as an understory and ground-cover of clover, comfrey, and other herbs and multifunctional plant species for hen and human. The bees pollinated the fruit trees and visited the clover flowers for honey. The chickens did not eat the bees or the flowers, but fed on the leaves of the clover, which was also adding nitrogen to the soil. The leaf-drop from the trees provided mulch and more richness. The chickens were fertilizing the orchard with their droppings, and helping with digging, mixing, earth-moving, and pest control. Oh yes, they also provided eggs.

Before my move out of the city, I had had a romantic notion of what our family lifestyle would look like. All during those years in that Garden of Eden, it felt to me as though we were living in the middle of that romantic vision.

Back to the future

Moving to a new spot on my rural property here in Roberts Creek in 2015 enabled me to initiate a full-on permaculture design at the best site I have ever started with: full sun all day and all year, good soil, and lots of water. This opportunity to finally manifest a complete design—this time with full awareness of permaculture—focused my attention like never before on the principles and practices that are guiding me.

The *preparation* for a permaculture design starts with a whole-site analysis: wind, sun, slope, aspect, gravity, and resources already present on and near the site: water, soil, wood, sand, gravel, rocks, plants, etc. Having lived on the property for 17 years at another location, I was already familiar with these intrinsic parameters, and I had been deeply considering the area where I am now for six months before I moved my trailer over.

This opportunity... focused my attention like never before on the principles and practices that are guiding me.

The *execution* of the design starts with the doorstep. The next task is determining destinations. The third, laying out the paths to these destinations. And the fourth and fifth, making path-side picking beds and activity areas. That leaves the rest of the space to be gradually filled in with components.

This sketches, for me, in broad and primary strokes, the on-ground framework of a system. It begins to clarify and simplify the design process and helps me to get started with developing a system. Δ

(to be continued in August issue)

Peter Light left the city in 1967, part of the back-to-the land movement, and developed a lifestyle based on voluntary poverty and simplicity. His first and most fully expressed permaculture was designed and lived in for ten years before he had heard the word. He subsequently took two design courses and a ten-day hands-on, and has taught permaculture in a dozen or so workshops.

Stewardship: The Missing Element

Blake Cothron

WALKING AMONGST THE SHADE of the permaculture-themed food forest in small town, central Kentucky, I am quite delighted that some local group had the vision and took the time, resources, and effort to plant all these useful trees and plants on what was once a yield-less green lawn. As a nurseryman, I take note of superior genetics here: "Kokusa" Korean mulberries drip their honey-sweet lavender berries—perhaps the sweetest of all the mulberries. Hardy figs hug the sides of a few buildings; as do tangled hardy kiwis and a few small, espaliered pears. In early autumn, a "Nyomi's Delicious" pawpaw *(Asimina triloba)* hangs with delicious, ripe, avocado-size fruits; and a "Keener" American persimmon *(Diospyrus virginiana),* reportedly developed by Luther Burbank, is laden with seedless golf-ball size fruits. They are the best I've ever had. A few jujube *(Zizyphus jujube)* fruits are to be found, as well as more pawpaws, more persimmons, Nanking cherries, and red-leaved plums with sweet fruit. I don't hesitate to utilize this rich community resource as a commons for my nursery purposes or to feed my family. However, as good as this planting is, I can clearly see that it is mostly failing in its mission. This is, in part, because I am one of the few people utilizing it for anything besides a spot to smoke cigarettes. For all its inherent goodness and beauty, it is also obvious it lacks stewardship and purpose.

Lack of stewardship is a major issue I see all over the country in almost every permaculture-designed garden or site I come across. The elements of good design are there: stacking functions, various useful species, guilds around trees (beneficial connections between components), appropriate species selected, and on…. Sometimes I see rainwater catchment, native plants intermixed, animal housing, natural buildings, solar dehydrators, herb spirals… but I often also note the growing entropy and disorder at these sites. It is a symptom of the crucial missing input: stewardship. The question begs to be asked: *Is stewardship (by skilled, dedicated people) the crucial missing element in permaculture design?*

... are we properly accounting for the effects of time, regular labor needs....?

The steward sector

When we think of energies entering and interacting on a site, we often think of the basics: sunlight, thermal effects, wind, rainwater, climate factors, water flow, landscape, elevation, and

Fall maintenance at the Bloomington Community Orchard. Photo by Rhonda Baird.

the compass directions. We may also calculate in traffic flow, number of residents, purposes of a site, animal interactions, etc…. Ascertaining these components and energies is necessary for good design. We then develop a site plan to meet the goals of the people and aims for the specific site. Often one primary goal is food production, usually through gardens, edible landscaping, orchards, domestic animals, or a combination of all these. However, are we properly accounting for the effects of time, regular labor needs, and financial obligations for this site? Do we make realistic provisions for possible management changes, availability of labor, or the social interplay of the people involved in the site? How will this site be maintained into the future? Are we preparing people or institutions for these interacting energies, possible developments and shifting realities; or are we instead selling them an overly simplistic, very attractive fantasy?

Let's examine a typical scenario: A vision for the system is inspired by the hearts and minds of those involved which leads through the design process to a plan formed on paper. Workdays are scheduled. People show up with shovels, surveyor equipment, potted and bare-root plants, seeds, and excitement. Through sweat, conversation, laughter, and labor, the vision starts to take shape. Lawns get ripped up. Swales are dug. Beds are made. Trees are planted. Now, we as designers water it all in, pat ourselves on the back, collect a check and smile with satisfaction that we just restored a tiny piece of the earth and made the world a better place, right? Well, maybe, but let's examine things more in depth.

Below the surface of permaculture design culture there is a deeply rooted, firmly embedded permaculture *myth*: that of the

elimination of work through permaculture design. The story-myth goes something like this: through good permaculture design and sincerity, a site can be designed and constructed that is not only gorgeous; it is self-maintaining, self-fertilizing, weed-suppressing, works completely in tune with itself, is diverse and overflowing with abundance of food and useful products for human use, and requires virtually zero maintenance or work. Have we all heard that one expressed, in so many words? Have any of us experienced or designed such a site?

In defense of the myth, I will admit that I have deeply experienced a few advanced permaculture sites, *all in tropical locations* ("Big Island" Hawai'i) that, through good design were very *low* maintenance, somewhat paradisiacal in features and incredibly abundant—producing mostly tree fruits and a few perennial vegetables. Yet, as easy as the living was, it still required maintenance, labor, and inputs. Have you ever tried to tackle elephant grass?

I think that the regurgitation of this common permaculture myth and the fact that it does not reflect reality is a major obstacle holding the movement back from having the impact we desire. That impact, for many of us, is the changing of culture; the re-invigoration of local food systems, ecosystems, and town/household resilience; of transforming an unproductive, resource-exploiting, lawn and automobile-centered, import-dependent, energy-intensive, polluting, stimulation and media-obsessed, unhealthy, degenerative society into a regenerative, productive,

Family time in the garden. Photo by Rhonda Baird.

That's the main elimination of work through permaculture design, not an elimination of small, simple permaculture stewardship.

non-or minimally polluting, happier, wholesome, local food growing, safer, saner world—to put it in a nutshell. I believe permaculture can help facilitate a lot of those changes, but not if we believe, perpetuate, and regurgitate myths that are not based on reality or practice.

Let's examine the word *eliminate*. Webster defines eliminate as: "To put an end to or get rid of." Synonyms include abolish, purge, exclude, eradicate, reject, dismiss, take away. It is a transitive verb, a word that implies a direct action—it gets a result.

Is permaculture design's purpose *really to eliminate work?* Without obsessing over semantics here, we must realize words are powerful and perpetuate beliefs, biases, intentions, and myths. If we tell people that permaculture design will eliminate work or create productive, self-maintaining gardens and orchards that require zero upkeep, are we really serving them or the planet? Or are we creating new problems? Are we doing this intentionally to sell permaculture as the ideal "do nothing" solution? Are permaculture systems like machines we must simply properly design, create, plug in, turn on, and we're good to go? If only they were! But, are work, regular labor, and stewardship merely the result of poor design or unnecessary micro-management? Is it really necessary?

Let's look at a common design element: chickens. What does Bill Mollison have to say? In the *Designers' Manual*, Mollison describes raising chickens in a permaculture setting and explains how leguminous trees, mulberries, and free ranging can meet most of a chicken's food needs. Yet, he also goes on to explain that chickens also *require* a regular source of clean water, housing that is secure from predators, grit, dust, supplementary food, other chickens, and several other basic inputs. That certainly sounds like stewardship and labor. Were we expecting to simply buy and set loose some chickens and then lie back and relax as they eat all the harmful insects, manure the orchard, scratch out weeds, sustain themselves on the range, self-regulate, multiply, manage their own population density, fend off predators, etc…? Perhaps they'll even de-feather and clean themselves, and jump in the oven for us! Even something as hardy, intelligent, and somewhat self-maintaining as a chicken requires a basic level of stewardship and inputs in order to sustainably function within our design. The point Mollison was making was that, through permaculture design, high-quality chickens and eggs can be produced locally without reliance on massive industrial inputs and vast resources taken from all over the globe (fish for protein, massive industrial factory-farm chicken houses, monoculture grain farms, international imports, and more) *That's* the main elimination of work through permaculture design, not an elimination of small, simple permaculture stewardship. The **work** we as designers need to eliminate through permaculture is relying

on massive industries for our every need, on multinational corporate involvement, on fossil fuels to accomplish every task, and on expending more energy than we receive in terms of yield. Permaculture designs should not necessitate micro-management or large inputs, but do require stewardship.

Stewardship is the critical missing element of many designs. We are strongly misleading and disempowering people, families, and communities when we neglect to strongly emphasize the absolutely crucial input of stewardship. It's no exaggeration to say that stewardship is just as important as water, soil, or sunlight to a design's long-term success. Would we tell people that their plants would succeed with zero water or sunlight?

A major difference between permaculture design and conventional, modern systems including modern industrial agriculture is that permaculture design maximizes the utilization of forces and inputs naturally entering and present at a site to efficiently utilize and cycle them to acquire production that can be achieved and maintained while *reducing* inputs necessary to maintain those yields—including human labor, fertilizers, irrigation, fossil fuels, heavy machinery, and money. In good design, the need for many of those inputs can be *reduced drastically* (though usually not eliminated entirely), while maintaining suitable yields. Permaculture is no silver bullet to end all outside inputs, labor, or stewardship, nor the end of acquiring food by the "sweat of the brow." Permaculture can reduce that sweat, absolutely… instead of sweating by the plow, perhaps by the stirrup hoe or quiet scythe; under a humid, lush canopy on soft earth and not a dusty, hot, blinding noonday sun in a parched, packed, eroding field. To quote a clichéd phrase, it's about working smarter, not harder, not "zero work."

Fukuoka's contribution

But wasn't Fukuoka's mantra "do nothing," and his system called the "no-work" farm? Well, perhaps. But, understanding something of Fukuoka's background philosophy of Taoism and Zen Buddhism sheds light on the "no-thing" philosophy. Fukuoka obviously worked very hard and diligently to maintain his farm. Remember those photographs of him and those strapping young Asian men in those cool Japanese farmer hats with sharp kama sickles in their hands, going out first thing in the morning to cut weeds, farm, and do lots of work? What about picking 20 tons a year of citrus fruits off those giant un-pruned Satsuma trees? Is that a "no-work farm"? As a student of Taoism and Zen philosophies, I take Fukuoka's premise of "do nothing" farming as not meaning "do not work or perform any actions" but rather, as a releasing of the struggling, striving mind always seeking to "do, do, do" and thus the identification of oneself as the mind and ego and thus the "doer of actions." It's like a warning against rushing out and being anxious to "do, do, do" without first stopping to quietly listen, watch, and observe. Breathe, and let the actions flow forth, as a cosmic, perfect event unfolding…. Certainly, I do not believe Fukuoka was promising zero-work, effortless farming that simply does all the work for you through "good permaculture design" or advocating not performing any actions. No, Fukuoka was simply advocating for a different kind of doing that requires a background in Taoist or Zen philosophy to appreciate the context. He envisioned a farming system built around character development and sensitivity to nature as an alternative to tractors, chemicals, and micro-management. He wanted to see the village garden return. In Japanese memory, the village garden was based around traditional grain farming without machines and chemicals. The garden and fruit seeds were tossed to and fro and unpruned, untended wild trees with sweet fruits grew behind huts and in fencerows. Animals foraged, children laughed and played, and a pleasant simplicity emanated. Everyone's needs were met, and nature was not dominated by force or manipulated.

These hybrid ideas are like an invasive species taking over vast swaths of healthy habitat.

Utopian drive

What is even the attraction to a no-work, labor-less system? Where would the meaning and satisfaction be found in having a system in which you simply implement "good permaculture design" and then it perpetually puts out abundant yields of produce and you simply sit in the shade, enjoying it? Such a utopian scenario exists only in the world of mythos and the minds of beginners. I would argue that the utopian paradise myth is an archetypal, *possibly real* ancient memory very deep in our DNA that echoes past epochs of much greater ease and abundance (that hopefully will one day be restored!). Such stories and myths are found in the Garden of Eden in the *Torah* and the Golden Age of the Vedic philosophy (however, what is rarely mentioned is that Adam was created to be a **steward** of Eden!).

A cultural expectation of ease

What about our current preoccupation with lightning-fast information, next-day delivery, and no-work permaculture design? These characteristics define an elitist, overly privileged Western society. We are trying to collectively un-learn and detach from this system in order to re-culture ourselves into healthier, more realistic and regenerative paradigms, that *certainly* are far from instant, lightning fast, always super-easy, and no-work. Those very deep threads of the ancient mythos, hybridizing with the entitlement, luxury, and ease-centered modern mindset have quietly infected many of us. These hybrid ideas are like an invasive species taking over vast swaths of healthy habitat. That infectious story runs deep within our psyches and colors our perceptions, expectations, and conscious and unconscious desires. Within the modern elitist mindset, why would we want to sweat, get our hands dirty, wake up early, and get to work to grow food and maintain systems of any kind? Haven't we been accustomed to leisurely acquiring our food in luxuriant, air-conditioned,

fluorescent-lit, obscenely GMO food-lined shelves while listening to relaxing 90s pop music?

Many permaculture enthusiasts tried all the organic gardening fuss, with the tools, wheelbarrows, compost, weeding, and the like, and found it hard, sweaty work. Permaculture and "no-work" systems sounded so much more attractive! It sounded like the best of both worlds: local, organic food in crazy abundance for zero work or almost zero work.

Permaculture design in no way will ever fulfill the no-work dream or make zero-work for high yields a reality. Remember, the aim is **reduction of work and inputs**, not *elimination*—big difference. Work and labor are crucial inputs just like sun, water, air, and land. None of these can be eliminated, or system collapse will result. Without stewardship, just about any site design starts to degrade towards entropy, or at least total weed take-over.

We need to be extremely careful about what we are selling people.

Why the story?

The question then arises, *why are designers telling people the zero-work story?* I have several theories on this that I believe are true, at least some of the time, and which may sound controversial.

Theory 1: In my experience, many permaculture designers are quite skilled at designing systems that are attractive and functional *on paper*. The challenge, however, is rooted in designers having a lack of personal, practical, dedicated experience of being land stewards for many seasons themselves. Many permaculture designers have completed a PDC but have little to no experience growing crops, gardens, or orchards in real life. They need more time observing plants and fields growing throughout the seasons; watching ecosystem interactions; noting the results of things like pruning, new species introduction, or altering microclimates. That's a huge disadvantage to their practice. If you will notice, many permaculture designers out there come from previous office jobs, professional or corporate careers, or are very young and simply lack the life experience of turning a bare plot of scratch into a functional, mature system. They've read some books, done a PDC, seen many pictures and videos, visited a few places, and may have a few years' hands-on experience, but have yet to establish a functional, long-term system themselves. Should they be teaching others how to establish something they have little to no experience with? This lack of actual experience usually leads them to believe and perpetuate the no-work story themselves. In turn, many erroneous beliefs and stories get passed on to clients. This behavior disempowers those owners; keeping them from establishing truly functional systems. The question arises: should we even be teaching permaculture to beginner site owners, or just teaching them to first grow good organic gardens and then modify the design and vision to permaculture over time, through ongoing education and tools?

To share some real-life examples, I recently read online about a permaculture design that was implemented in a small Midwestern US town. A California permaculture designer was flown out to the site to help design the experimental urban agroforestry project. She focused the design on using native pawpaw trees, *(Asimina triloba),* wild flowers, and a few other hardy plants. She designed the planting to be set up on large raised berms, with the trees peppering the site and the rest of the species as the understory layer. The idea got people excited, and they got to work, built it as designed and planted it. Likely, she was paid well and flew back to California thinking this was a great thing they all did. However, what happened next was sadly typical. A few years in, the site grew lush and the trees established well, but so did the weeds and grasses and now the site is a big, wooly-looking mess with wildflowers and pawpaw trees amidst

Community gardening at a Bloomington church. Maintaining the garden plot is challenging each season, with no regular caretakers. Photo by Rhonda Baird.

the apparent chaos of it all. The folks involved were upset and said it looked awful and was an eyesore in the middle of town. It will probably be removed, or perish if left to its own devices. The problem here is that the designer apparently did not factor in the reality that the site would need maintenance, did not teach or empower the people involved to be stewards, or, possibly through her own lack of experience, did not even know that it would need maintenance in order to avoid chaos. This kind of situation creates very negative feelings about permaculture and is not helping communities to grow and thrive, and not allowing or assisting permaculture to have the impact we desire it to have in our world.

The urban agroforest site I mentioned at the beginning is another example, which is mostly failing in its vision because it lacks stewardship and an educational outreach to local people. It was planted with the intention on feeding the local college students, but I do not see that really happening. Mostly the forest is used as a cigarette-smoking area, and the locals have no idea any of the trees are useful, as is apparent by the piles of

rotted fruit under the trees or drying up on the branches. That's sad because it and many other similar projects, have the potential to be so much more. Perhaps the myth of zero-work and a self-sustaining system that would be so abundant and amazing that everyone would simply *get it*, is killing this permaculture site. I've taken upon myself to start doing a little pruning on the site to take out suckers off the base of the fruit trees, as a token of gratitude for the site.

I recently was asked to design a very large permaculture site for a college, that would include miles of walking trails to be planted with edible trees and useful plants. Many designers would eagerly jump on such an opportunity. But, I politely declined and said, "Thanks, but no thanks." I perceived from discussing the vision that a board of directors, who had very little to no practical experience but big budgets, imagined this glowing vision of an edible park for students to enjoy with miles of gorgeous, food-lined "nature trails." But it was an overly ambitious vision that would not succeed long-term. It had no plan for stewardship or proper maintenance, and I did not wish to become involved in it. I would rather direct my energies towards smaller, family-oriented projects.

We need to be extremely careful about what we are selling people. Are we selling them fantastic myths we have inherited from other myth-keepers? Are we selling them delicious visions of an earthly utopia? Or, are we offering them a realistic opportunity to co-create and steward a low-maintenance, functional, healthy, engineered ecosystem that requires minimal inputs and labor for a sustained, useful, diverse, regenerative yield over time? Are we equipping them with tools, knowledge, and resources to prepare them for the long-term task of stewardship?

These are just small ways we are trying to cultivate stewardship consciousness....

At our nursery, I suppose I sometimes reduce our sales by giving people very realistic expectations and advice around their orchard ideas and visions. I would rather sell less nursery stock to a person and yet empower them with realistic goals and stewardship tools for success, rather than make a huge sale and have them become overwhelmed and fail. The interesting part is that the empowered person consequently becomes a satisfied and loyal client, while the overwhelmed person does not, and often gives up or feels that our products failed them. As designers, we must ask ourselves, are we setting people up for success, or selling a dream that will turn into a nightmare? Only by empowering for stewardship will these permaculture sites and projects succeed long-term. We must first become empowered in our own skill-set by doing the work, learning from mistakes, doing massive amounts of research and dedicating many years to this slow, gradual process of learning and becoming expert. *Then* we can share that knowledge and experience with others in meaningful ways and set them up on the road to stewardship.

We need to find ways to empower people and set them up for success. For example, we're implementing this in our nursery business through offering local classes on organically growing fruit. We also sell high-quality tools, natural fertilizers such as rock minerals, and excellent books. I also offer local consultation work. If we don't sell something they need that is useful and high-quality, we refer them to someone who does. We include in-depth planting instructions and provide other free educational materials to our clients. These are just small ways we are trying to cultivate stewardship-consciousness and not profiting from people's fantasies by selling a story about simply planting lots of trees, doing no work, and then coming back in a few years to collect bushels of amazing fruit, because that's not how it works. That simply does not happen here, or most places. Many of our clients want desperately to hear me reassure them of that story and myth, and I am swift to gently snuff it out and give them some reality instead, which they come to respect and realize is better.

It should become standard practice for designers to offer follow-up consulting and direct people to other resources. This could look like a bi-yearly check-in over Skype or email about how a project is moving along, offering follow-up advice or follow-up consulting. In the meantime, the designers could be cultivating their own practical skill-set and knowledge base so as to better serve their clients and community. I am sure this is already common practice and that many other designers much more advanced than myself have other great ideas worth sharing about continuing stewardship practices.

Cultivating stewardship-consciousness is the crucial missing input that I believe will be necessary for permaculture to have the culture-changing and earth-rehabilitating impact we all desire it to have. We have to face the fact that the no-work yet high yield, self-perpetuating, and maintaining permaculture design is one that exists only in permaculture myth and not in actual working reality. The hesitation towards work, dedication, long-term commitment and stewardship absolutely has got to be overcome and the slow, patient work of regular interaction, maintenance, and stewardship must be embraced and taught for permaculture to achieve its goals. Otherwise, all we are doing is glorified edible landscaping at best and creating messes for others to clean up and convert back to lawn at worst. Stewardship and partnering *with* the land and ecosystems *through* permaculture principles is the emphasis we need to be making, not selling the permaculture myth of imposing a no-work paradise design on a site. Create the design and then put on your boots, roll up your sleeves, and wear a hat—there's work to be done. Δ

Blake Cothron lives in the Bluegrass area of Kentucky. He and his wife Rachel co-own and operate Peaceful Heritage Nursery, a permaculture-based fruit tree and edible plant mail-order nursery. They recently acquired a new five-acre site in Stanford, KY, to convert from a lawn-based system into a new permaculture orchard site and nursery business. Their website is www.peacefulheritage.com.

The Magic of Multiple Yields from Single Crops

Maximizing Your Annual Garden

Chris Smith

AS PERMACULTURE DESIGNERS, we've learned to "Obtain a Yield." Our actions and processes have to result in something; nature has a purpose. Along with a lot of other permaculturists, I like taking this principle to the next level: Obtain multiple yields. Our minds are often drawn to the classic examples, like chickens: we harvest the eggs and/or meat, but we can also use chickens for pest control, weed control, manure production, deseeding bales of straw (there are always seeds!) and a primary stopping point for food waste disposal. The big picture stuff is great, but obtaining multiple yields is a principle that can easily be applied on a microscale. I find permaculture is a way of thinking, as much as designing or doing. So, be creative.

Take an orange, for example. I used to peel oranges and leave the peelings in a separate pile from the rest of my compost because the worms don't like citrus. The orange peelings went straight into the main compost. They took a long time to break down, but it was OK because I was a good permaculture student. I was attaining multiple yields: the orange as food and the peel as compost. One day (a couple of days…) I didn't take the pile of peelings out to the compost and they dried. I was making a pot of herbal tea and had a scratchy throat, so I threw a handful of dried orange peels into the brew. The tea tasted great, and afterwards the peels decomposed faster from the hot water treatment. Now I dry and use all my [organic] orange peels, but I'd never previously thought of the skin as a viable food source.

After the orange revelation, I applied a more critical eye....

After the orange revelation, I applied a more critical and creative eye to obtaining multiple yields, especially within the realm of my annual garden. Our annual gardens often require a big chunk of time and energy, but we justify that time and energy with the wonderful food we grow and eat. The additional step I'd like to share with you is challenging the assumption that most things are grown for a single yield, when in reality we can find multiple yields—and many of them are edible!

I've broken the following section into some common categories to consider when assessing possible additional yields beyond the main food crop. But don't be limited by my categories. The stigma of a saffron flower is a valuable crop—what other stigmas are edible and tasty? The calyx of roselle is delicious—what other calyxes are edible? Roots, pods, and pollen—if one type of crop offers something as their main yield, maybe another type of crop could offer it as a secondary or tertiary yield.

Beet stalk, beet root, and beet greens—all in one crop!

Greens

It still surprises me when people don't eat the greens of many vegetables that have edible greens! Especially the greens that produce throughout the summer while our classic greens are bolting and bitter. I assess the additional yield of greens at various stages in my garden:

- I start my spring *Brassica* seedlings indoors and always

oversow. When I thin out the weakest seedlings, I end up with a bowl full of microgreens with little additional effort.

- I grow my root crops (carrots, beets, radish, and turnips) in rows. Again, I sow a little heavy. Once I have a dense row of baby leaf greens, I thin through to get the correct mature plant spacings and have salad greens for a week. As the roots grow, I'll selectively harvest the greens. This light harvesting won't damage the overall production of my main crop. Once the roots are mature, the greens are still good, but they become cooking greens. I use them in stir fries and soups, or roast the thick stalks of the beets and turnips. I'll often juice the carrot greens and mix them with something sweeter like orange juice.
- Pea shoots are delicious, even from cover crops like Austrian winter peas. Nasturtium leaves are prolific and add an arugula-esque spice to a salad. We have Asian customers who buy sweet potato slips from us, but the greens are the main crop, and the tubers are secondary!

Flowers

All annual vegetables will flower in the season you grow them because the flower precedes the fruit, which protects the seed. Many colorful flowers offer important vitamins and phytonutrients and make interesting additions to the table.

- The squash blossom is classically stuffed with cream cheese and baked (or fried). It's a good starting point for your edible flower adventures. Squash are monoecious plants, meaning they have separate male and female flowers on the same plant. The female will produce fruit and seed, but you can eat the male flowers without harming overall production (as long as you leave some for pollination!).
- Nasturtium flowers are spicy like their leaves but come in a range of beautiful colors, and make a great addition to salads. Borage is a prolific flowering plant and a great pollinator and companion to the vegetable garden. The bluish-lavender flowers are another good salad option. Add in a few pea blossoms (offering an unsurprising pea taste), or bean blossoms if it's later in the season.
- Don't forget a broccoli head is actually just a compact bud set. Any of the *Brassica oleracea*—think cabbage, broccoli, cauliflower, kale, Brussels sprouts, collards, kohlrabi—have edible buds and flowers with a distinct broccoli flavor.
- Corn silks are the female flowers of corn and have a rich medicinal history, especially for the urinary tract. You can harvest the green silks as you shuck your sweet corn and make teas and tinctures.
- Chive flowers crumbled into scrambled eggs are a personal joy of mine.

Seeds

I encourage everybody to be a seed saver. Seed-saving is a key component of sustainable and secure food systems. Seed-saving often produces a large surplus, especially with out-crossers like corn and squash, which require large population sizes to prevent inbreeding depression. Some of that surplus may have culinary value….

- Pumpkin seeds are good to eat, but shelling them can be a pain, and eating them with the shells on has inherent limitations. Unless I'm growing a thin-hulled (or hulless) variety, I usually save all my pumpkin seeds and press them for their oil. The fresh oil is very tasty, and the press-cake makes a good animal feed or flour for baking. Note: squash (summer and winter), cucumber, and melon seeds all make edible oils of differing flavors.
- In many cases, the seeds are the main crop, as with soup beans. Take the extra step to ensure 10-20' (3-6 m) between bean varieties, and you can save a small packet of pure seed and eat the rest.
- Sunflowers are a great multi-yield crop. Often grown for their beauty alone, they attract birds and pollinators, can be used as a high biomass cover crop and the seeds are edible. As with pumpkins, the shelling can be a pain, but pressing for oil is a natural option.
- Buckwheat is a fast growing cover crop and a friend of pollinators. While many people will feed the seed to the chickens, you can thresh and winnow the seed, then grind it for a gluten-free flour.

Structure

- Don't underestimate the root structure of your crop as a future yield. A decaying root system will add organic matter to your soil without ever lifting a spade. Don't pull plants from the ground—cut them at the base and leave the roots to decompose. Legumes will also fix nitrogen and, once cut, gradually release it into the soil.
- The upper structure of plants can offer shade and trellising options. Don't be limited to the classic three sisters of corn, beans, and squash. Nasturtiums can shade the ground of vining melons and have the additional benefit of repelling squash bugs. I use sunflowers to mark my squash hills in a dense winter squash planting, but they'll also support a climbing cucumber if your soil has the nutrients to feed them all.

Nasturtium flowers, leaves, and pickled seeds are all edible.

My champion multi-harvest crop: okra

If you're not an okra lover, read on—okra is amazing. If you are an okra lover, but you live in cooler northern regions, there are a range of options for your okra growing success. Black row cover to heat the soil early in the season (okra likes hot soil), growing under cover to extend the season, and selectively breeding cooler tolerant varieties (check out Lofthouse Okra [garden.lofthouse.com/seed-list.phtml] for an okra landrace that tolerates colder temperatures). Carol Koury, Sow True Seed's founder and owner, successfully grows okra in Massachusetts.

From a single planting, we can extract the following yields:

Greens: Okra leaves are entirely edible, good for fresh eating in their very young stage, but more often used as a cooking green where the heat removes any spines. They can be used as thickeners in soups or powdered for winter storage for use in smoothies, soups, and stews.

Pods: We eat the immature pods before they go 'woody.' The number of pod preparations is astounding, and I fully believe anyone who doesn't enjoy okra just hasn't had it cooked right. You can ferment, pickle, freeze, and dry okra for winter use. I've been pasteurizing the woody dried pods (once I've extracted the seeds) and inoculating them with oyster mushroom mycelium for a secondary crop prior to giving the spent mushroom block

Piteba oil press for pumpkin seed oil and press cake for the animals!

to my worms. The mycelium breaks down the tough okra pods to a point where the worms can turn them into vermiculture. How many yields is that?

Flowers: The flowers are big and beautiful, attract and feed pollinators, and have an okra-y-asparagus taste. They can be prepared along the same lines as squash flowers, but are also good raw. Okra flowers are perfect (botanically, meaning they have both male and female parts), so you'll be sacrificing pod

Okra stalks are strong enough to make excellent trellises for climbers like this winged bean.

development. However, most okra growers complain of overproduction, so eating the flowers can be a great way to slow it down!

Seeds: Okra varieties have a variable oil content in their seeds, but I've successfully pressed them for a light, citrusy, olive oil-like oil with a yellow-green hue. The mature seeds can be roasted and ground for a rich, nutty, gluten-free, high protein flour. I've made pie crusts, pizza bases, and crackers with the flour, and the flavor is excellent, almost coffee-like.

Structure: Okra has an incredibly aggressive root network, with 4.5' (almost 1.5 m) taproots at maturity and wide, dense lateral roots. The opportunity for injecting organic matter deep into the soil is huge. Okra stalks are strong and much less prone to lodge (fall over in the wind) than corn or sunflowers. These stout stalks can support beans in season and peas during the winter (I've had dead stalks stand all winter), and the bast fiber makes a very strong cordage. The center of the stalk has been used to make fine quality paper. As I said, okra is amazing!

My list of examples was never intended to be complete. This is a magazine article, not an encyclopedia! But I do hope it challenges you to look at your annual garden with fresh eyes. As a parting word of caution, please verify from a reliable source whether the part of the plant you intend to eat is actually edible before eating it. Δ

Chris Smith is an enthusiastic grower and permaculturist from a green-thumbed family. He has immersed himself into the world of seeds and Southern growing. On his urban homestead, Chris is experimenting with landraces, selective seed-saving, crop trials, grow-outs, and edible seed oils! Chris works for Sow True Seed, an Asheville, NC-based, open-pollinated seed company committed to sovereign and secure seed and food systems.

A tale of buried treasure in the Arkansas Ozarks

The Forgotten Permaculture Principle

John Wages

ONE OF MY CHILDHOOD HEROES was Ruth Stout. In her late 80s, she invented a new way of gardening based on permanent mulch. Whenever a weed appeared, she threw a handful of straw on it and kept about 8" (20 cm) of mulch on the garden all year long. Over time, the continuous addition of organic matter made her soil loose and rich. Her plants were healthy and never needed spraying. She claimed it wasn't necessary to dig for any reason. Not to start an asparagus bed—just put the crowns on top of the ground and cover with straw. Nor to dig potatoes—because she simply laid them on top of the ground and covered with straw. She also claimed not to have watered her garden in 35 years. No compost pile—kitchen scraps, lawn clippings, tree leaves all went into or under the mulch layer. Aside from the *in situ* composting, her only fertilizer was soy meal or cottonseed meal. Her magnum opus, *The No Work Garden Book,* had just one prescription for every ill: add more mulch.

Why don't more people garden like Ruth Stout? Even permaculturists who learn the virtues of permanent mulch, usually reflex to tillage for growing annuals like tomatoes, beans, and corn. And when we drive past fields of corn, cotton, or soybeans, none of those fields have eight inches of mulch.

The limitation of the Foundation Farm system is the need to import mulch material.

Foundation Farm: Ruth Stout at scale

What if we had a way to set up an annual garden on a no-till/no-dig basis that actually worked and that could be applied to a thousand acres as easily as a backyard? While at the SSAWG (Southern Sustainable Agriculture Working Group) conference in Lexington, KY, in January, I took time out from the *Permaculture Design* table in the vendor area to attend a talk by Patrice Gros. His presentation convinced me I needed to go and see if what he claimed to be doing is really possible. In early March, Gwen and I visited his farm in the Ozark Mountains of northwest Arkansas where the owner has been farming (profitably) without tillage for ten years—no plowing, no discing, no rotary tillage, no spading, no double-digging, not even broad-forking.

Drip irrigation conserves water. String marks the boundaries of the growing beds. Row covers are used for certain crops and in winter, both inside and outside the high tunnels.

You may wonder what's the big deal, if Ruth Stout already told us how to do this back in the 70s. Well, not many people are actually doing it, and there must be a reason. One major problem is that Ruth Stout's system isn't really scalable. It works in a backyard garden—works quite well, actually—but it would never scale to a 25- or 3,000-acre farm. The impressive part about Patrice Gros' system is that it should be scalable. I see no impediment to taking his model, developed on ten acres in the Arkansas Ozarks, and expanding it to much bigger acreages in the rolling hills of Kentucky or the plains of Kansas. There doesn't even seem to be a need for new equipment. At the most, a seed drill, like the ones that are used in conventional no-till agriculture, might be useful.

Eureka Springs reminds me of Lake Tahoe—a mountain resort town, although much smaller and without the big blue lake. It's not far from Fayetteville, a progressive outpost up in the northwest corner of a very red state, and a good market for organic vegetables and salad greens. Patrice's farm is on a low ridge just a few miles out of town, right alongside the state line—his farm is on the south side of the road, while the other side is in Missouri. Gwen and I visited on a warm, very windy day when it surely seemed as if most of the uncovered soil on the Arkansas side would shortly end up in the Show-Me State. Patrice took the time to give us a detailed explanation of his methods and a tour of his farm.

The Soil Farmer

The essence of the Foundation Farm approach to no-till

The basic unit of production is a 4'-wide growing bed, permanently covered in mulch and/or crop, and a 3'-wide access path covered in grass. Foundation Farm has a ten-year track record of building soil and profitability.

farming is to take care of the soil by always keeping it covered with mulch. Where does this mulch come from? While Patrice imports wheat straw from elsewhere, he also grows much of his own mulch.

The fields are made up of mulched growing beds, alternating with grass-covered paths. The paths are mowed before grass sets seed, and the clippings are directed onto the adjacent growing beds. The soil is always covered, and care is taken to avoid compaction. That's the essence of it. Very simple. Very elegant—and scalable—the foundation of a new agriculture—maybe that's why he calls his farm "Foundation Farm."

But what about the "no-work" part? Patrice maintains his ten-acre market farm with the help of two to four interns, and he claims that they work only 3 mornings per week—about 50 man-hours a week, on average. So, aha! There is some work involved, but not much. Somebody has to mark the beds, move the mulch around, plant and harvest, and do some minimal weeding.

Foundation Farm has been USDA-certified organic for seven years and grows about 25 crops, including lettuce, leeks, dill, celery, cabbage, chard, tomatoes, peppers, eggplants, squash, cucumbers, turmeric, and sweet potatoes in 24,000 sf (about 1/2 acre or 1/4 ha), including five high tunnels. The farm is in USDA Zone 6-7a. Sales are through farmers' markets in Fayetteville and Eureka Springs, a CSA, local natural foods co-ops, and four or five restaurants. Location of the farm with around 200,000 people in the Fayetteville-Springdale-Bentonville corridor is key to the farm's profitability of around $80,000/year. The key to this success is in the soil.

No-till

Tillage fluffs up the soil in the short run, but massively disrupts microbial communities and leads to carbon and nutrient losses, together with a loss of tilth, in the long term. By simply not tilling, the bacteria and fungi in the soil are allowed to grow, undisturbed. By feeding them a steady diet of decomposing straw, the soil food web thrives. Each species finds its niche, at whatever depth. Over time, the soil develops optimal microbial life, optimal water and air content. The result is optimal nutrient availability. Earthworms proliferate. The soil in the growing beds is incredibly loose. Lifting out a handful, you can actually see the tunnels the worms (and possibly other soil life) have made! Even though the beds aren't raised, rain permeates the soil readily because of these tunnels.

If necessary in areas of very high rainfall (Foundation Farm gets about 50" (~125 cm) per year), one can construct raised beds, but this complicates an otherwise simple system. Foundation Farm sometimes receives heavy rains that saturate the soil. Patrice has observed that this waterlogging damages the soil food web and slows plant growth, which can take a couple of weeks to recover. He is experimenting with very shallow drainage furrows on either side of the growing beds.

No compaction

Heavy machines, humans, and the weather (rain) compact the soil. Foundation Farm avoids compaction by using no heavy machinery—only a lawn mower to cut the grassy paths. Planting, weeding, and harvesting is done by reaching into the growing beds, without ever stepping on the soil. All the growing beds are covered in some way: mulch, row covers, high-density plantings, and/or high tunnels, to avoid compaction by rainfall. These passive anti-compaction strategies are augmented by more active methods: decaying roots, soil microbial and macro life (earthworms), and freeze/thaw cycles during the Ozark winters.

Organic matter

One of the fundamental problems with organic gardening is the requirement for massive inputs of organic matter. Biointensive methods like those popularized by Ecology Action (John Jeavons) set aside a portion of growing beds to produce organic matter ("compost crops") to feed the other beds. Foundation Farm accomplishes this same goal using the three-foot access paths. Simply directing the stream of grass clippings from the lawn mower onto the adjacent bed adds nitrogen (grass clippings have a C:N ratio of around 20:1), and also a thin layer of mulch. One could probably shift the system toward more nitrogen input by using legumes in the paths.

The bulk of mulch currently is wheat straw from a nearby farm. Grass clippings and decaying crop plants actually are a minor portion of the total organic matter applied to the beds. The

degree to which on-farm inputs could be maximized needs some research, but my impression is that optimization could certainly decrease the need for imports.

When Patrice bought the land for Foundation Farm, it was rated "not good for agriculture." With 1.5-2% organic matter at the outset, permanent mulching has raised organic matter to 8.6% as of 2016. The cation exchange capacity (CEC) is 20. Initially, he applied some rock dusts and other typical organic fertilizer, but for the last several years, his only fertilizer inputs have been rabbit manure (~1/2 lb./sf) and fine dusts of feather meal for nitrogen (14-0-0). However, his soil fertility has increased to the point that he now applies rabbit manure only every other year. He recommends reducing manuring once organic matter reaches 6%.

Mulch

Did we mention that the growing beds are always covered in a thick straw mulch (except for a few weeks in spring and fall when the beds are opened for planting)? Clippings aren't enough, and off-farm inputs are required. Generally, this is wheat straw at the rate of about one square bale for every 50 sf (~5 m^2), requiring 600 bales/yr. for the entire farm. Lots of other possibilities exist—other grain stalks/straw, pine needles, leaves, wood chips—depending on local availability, but no hay (grass seeds), fresh sawdust, or plastic is used.

The limitation of the Foundation Farm system is the need to import mulch material. While this may be a negligible expense, another plot of land, somewhere else, is having its organic matter removed. And, the sheer volume of straw required could be a problem, should large acreages take up the permanent-mulch practice.

Part of the beauty of Patrice's system is that he generates significant amounts of mulch on-farm. One can imagine that much more could be produced in the grassy margins, and even in the access paths if the species mix were optimized. Currently, there is plenty of wheat straw available, and as long as supply isn't limiting, there's been no need to optimize for on-farm mulch production.

Our hero makes an appearance.

There are no animals on the farm, except for a guard dog. The permaculture mind runs wild with possibilities for rabbits and other small livestock to generate fertility on the farm.

Permanent bed/path system

The basic unit of the Foundation Farm system is a paired 4' (120 cm) growing bed and 3' (90 cm) access path. The growing bed is permanently mulched; the access path is grassy. In Patrice's case, the grass is not planted specially for this purpose, but is the fescue or orchardgrass originally growing on the land. There is some crabgrass in the summer, but no bermudagrass or bindweed. Clumps of crabgrass are chopped out with a shovel in fall and left to decompose on top of the mulch layer. Grassy paths are mowed, and more mulch is added to refresh the mulched growing beds.

The growing beds are not raised. They vary in length (100-150', 30-45 m). Beds are laid out straight, with a string along the side. The string is an important part of the system, as it provides a reference line for cutting the paths and for seeding with an Earthway seeder. Because the grasses do tend to invade the beds, the paths are regularly cut back with spades, following the marking string, to maintain the straight line of the beds.

Drip irrigation

When irrigation is needed, drip tape is used, as this uses the least water. Each 4' bed has two drip tapes.

Organic polyculture

Foundation Farm has no large compost piles other than the beds themselves—no cover crops besides the grassy paths and no crop rotation—18' (5.5 m) plants flourish in beds that have grown tomatoes for ten years. Patrice notes that "Nature certainly does not have a crop or tree rotation program… crop rotation is only needed if your soil becomes deficient in some ways."

Yes, but what about…?

The other place where we have to inject some reality into the situation is with the nature of the weeds involved. Key to easy establishment of Patrice's system is a total lack of bermudagrass or anything similar. His land had orchardgrass (fescue), and that was about it. Tame stuff compared to rhizomatous subtropical garden-destroyers. Throw some straw on it—yeah, right—by tomorrow morning, the bermuda will have already grown straight up through the straw and be lying back soaking up some rays and sipping on a tequila sunrise. The same story with cardboard—it just takes a few more days.

Naturally, I asked Patrice about this. If I wanted to establish a system like his on my land, where no substantial area is free of bermudagrass, how would I go about it? Black plastic for a few months was his answer. On the way home, I thought of where might be the best place to try his system. Passing by the fields getting ready for the 2017 rice season in the Arkansas Delta, I realized that most of the farmland that's been drenched in atrazine and RoundUp for years and years is the ideal relatively grass-free place for the Foundation Farm system. All you need

to do is lay out the beds and plant an all-season grass (or mixture of grasses and other plants—ideally something that grows fast to generate as much biomass as possible, but which doesn't spread easily). Bring in some straw or other mulch for the beds, and go from there. One could even plant the entire field to something that generates a lot of biomass and suppresses bermudagrass the first year, like sorghum sudangrass, to reduce the need for inputs.

Another important point to note is that Patrice's soil was a good loam to begin with. In this writer's opinion, his system would work with any type of soil, from heavy clay to sand, but it would take longer to achieve such perfect tilth.

Agri-cultural transformation

Foundation Farm is remarkable for its peace and quiet. Growing beds are interspersed with shrubby zones with trees (some walnuts and various natives), and the margins are grassy. Birds and insects abound, in stark contrast to the miles and miles of monocrop rice, cotton, and soybeans fields, mostly empty in early March, that we passed as we drove back home. All those bare fields made me think about the past and of possible futures.

Last summer, we visited the site of Rocky Springs, in southwest MS, first settled in the 1790s. In the 1820s and 30s, the area produced tons of cotton to enrich some 50-odd planters (plantation owners), with the "help" of a few thousand slaves. Unfortunately, the hillsides proved too steep and easily eroded due to the loess soil, and gullies formed. Almost 200 years later, the site is a ghost town with little left but a few foundation stones, a cistern, and, curiously, two multi-ton iron safes sitting out in the woods. Other than a church built in 1837, nothing is left of the town. The springs are gone, and the deep ravines are covered in trees. These deep cuts in the landscape began as small eroded cracks in fields that became gullies, widened, deepened, and eventually grew into these gaping holes in the ground.

Her two brothers joined the Army to "get out of the cotton patch," as she put it.

If there were no signs on the trail to explain their history, one could be forgiven for thinking they were natural features of the landscape instead of stark evidence of ecological and economic limits.

Cotton devastated the South, leaving gashes on the landscape and cruel scars on the soul of the people. Slaves and sharecroppers alike owned almost nothing and lived harvest-to-harvest. One of my aunts, on my mother's side of the family, tells how she was always thin and sickly as a child. She tended to get nosebleeds from the heat, but everybody had to pick cotton anyway. So, when her nose bled, she was sent to the shade at the end of the field, and when her nose stopped bleeding, she had to start picking cotton again. It sounds harsh, but all six children were needed to bring in the harvest. Her two brothers joined the Army to "get out of the cotton patch," as she put it. They chose the jungles of Vietnam over the cotton fields of Mississippi (perhaps without having all the information in hand). Generations lived this way.

Mechanization, powered by fossil fuels, lessened the sheer toil required to harvest cotton and to grow other crops. Other factors, like an increasingly generous federal government, helped, but the unlimited energy in oil powered the transformation. We exchanged fields of slaves for fields of sharecroppers for fields of giant tractors and harvesters. What's next? When the oil grows more and more expensive, will we stubbornly look to the past and choose to enrich the few at great expense to the many? Or will we look to a future that regenerates the land and works for everyone? We have models: Fukuoka, Ruth Stout, permaculture, and now, Foundation Farm.

Grassy acess paths continue inside this high tunnel. The tunnel itself prevents soil compaction by rain, and high-density plantings of lettuce, cilantro, peas, etc., also help keep the soil covered, even where mulch and grass are absent.

Naysayers abound, and many "experts" would claim that Patrice's system could never be applied on a commercial scale. But, when I look at his fields, I see growing beds where the rows of a soybean field would be, and I see grassy, mulch-producing paths where the tracks of the giant tractors run. Perhaps agricultural economists have calculated exactly how much potential cropping space is lost because the tractors need room to travel (and turn around at the end of the rows), but I'm sure it's significant. Why not replace that compacted, wasted zone with nitrogen- and biomass-producing swaths of green? Stop erosion in its tracks (pun intended), and generate some of the farm's own fertilizer at the same time. As more and more acreage is converted to the Foundation Farm system, runoff clears, dead zones shrink, more carbon is sequestered, and the soils of the South grow rich again. Instead of thinking of nothing but getting off the farm, our children would be drawn to these green-swarded, polycul-

tured garden-farms where birds sing, and the work is enjoyable, not onerous—a cultural, not just an agricultural, transition.

Patience: the forgotten principle

We've gotten used to a lot of things we should never accept. For example, our creeks and rivers are often muddy when they should, for the most part, be clear. Mud comes from eroding soils from clearcuts and farmland. Cover crops are a good idea, but tillage breaks the cycle, and the land inevitably sits uncovered for some time while the cover crops or new crops germinate and take hold. During this time, wind and rain can erode the soil. We should never have accepted that plowing and the hard work of farming are inevitable.

A 10,000-year addiction is hard to escape.

We know there's a problem, but as a society, we seem incapable of changing course. A 10,000-year addiction is hard to escape. Meanwhile, millions of tons of topsoil wash to the ocean and are lost for human use. Conventional agriculture has gone for "no-till" in a big way. Unfortunately, conventional no-till farming relies heavily on herbicides for weed control.

That's why Ruth Stout's cavalier approach to convention is so refreshing. By taking care of the soil, she solved multiple problems at once: soil fertility, cultivation, weeding, irrigation, and pest control, all while reducing manual labor. Her Extension agent, the local garden club, and all her neighbors insisted it was impossible to grow a garden without plowing, tilling, digging, or other forms of hard work. She wasn't a Master Gardener, yet she had insights gained from observing what worked and what didn't, and she wasn't afraid to go against the grain. In Japan, Masanobu Fukuoka observed natural processes at work in his orchard, tossed aside his university learning about the proper way to farm, and set about inventing a new system. Foundation Farm has taken the permanent mulch of Ruth Stout and the do-nothing farming of Fukuoka to a new level.

So, why aren't more people gardening and farming like Patrice Gros? It's because it takes patience. When starting out with a new system of permanently mulched beds, you may have to deal with tough, determined weeds. Slug populations may skyrocket for a while, before being brought under control by ground beetles. Patrice Gros says this took about three years on his farm. Lots of people have a month's worth of patience, but that may not be enough for a transition of this magnitude. Just because you throw down the mulch, the soil won't be instantly remineralized with perfect tilth.

Success requires courage, persistence, and patience. Observe before doing—and above all, be patient. Δ

The information in this article came from a talk Patrice Gros gave at the SSAWG conference in Lexington, KY, in January 2017, an interview on his farm in March, and his three booklets that describe his farming system in great detail. The three booklets in the "No-Till Soil Farming" series are *I. Peace and Fertility, II. Winter Harvest,* and *IV. Planning for Profit* (Booklet III is in preparation) and are $50 for the set (well worth the price, in this writer's opinion). To order or to inquire about workshop and internship possibilities on this remarkable farm, visit www.foundationfarm.com. Δ

John Wages is Publisher of Permaculture Design *magazine. He lives with his wife, Gwen, on the small farm where he grew up near Tupelo, MS. They currently have 24 Delaware chicks. No goats, rabbits, pigs, geese, turkeys, or ducks—yet.*

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Is this the challenge we now face?

Becoming "Water-culturists"

Terry DuBeau

"*We are water after all"* from the CD "Hoka, The Wolves Have Returned" by Nako, *Medicine for the People*. As human beings we are up to 60% water.

From Toby Hemingway in *Gaia's Garden* (2009): "In truth, our planet should be called Water, not Earth. About 70 percent of the globe is blanketed by this life-giving liquid, roughly 331 million cubic miles of it. But most of that is not available to us. All but 3 percent of the Earth's water is salty, and of that remaining dab of fresh water, three quarters is locked in ice. It gets worse. About half of what's left, Earth's unfrozen fresh water, is 2,500 feet or more below ground, embedded in rock. That is too deep to recover economically. Are you following these shrinking numbers? The accessible fresh water in lakes, rivers, groundwater, and the atmosphere makes up only half of one-quarter of 3 percent—for non-Einsteins, that works out to 0.375 percent—of Earth's total water. It's precious stuff."

In *Permaculture: A Designers' Manual,* Bill Mollison states: "Very little of the world's total water reserves are actually available for present human needs. Many areas of earth, particularly dryland areas, over-developed cities and towns or cities surrounded by polluting industry and agriculture, face an absolute shortage of usable water. Millions of city dwellers now purchase water, at prices (from 1984 on) equivalent to or greater than that of refined petroleum. That is why the value of land must, in future, be assessed on its yield of potable water. Those property owners with a constant source of pure water already have an economically valuable "product" from their land, and look no further for a source of income. Water as a commodity is already being transported by sea on a global scale.

"The PRIMARY SELECTION FACTOR," when choosing a cropland property to develop, should be an adequate, preferably well distributed, and above average rainfall. "Adequate" here is about a minimum of 80 cm (31 inches) and upwards."

WE ARE WATER. Water is Life. Life is Water. Without water, we cannot care for the earth or care for the people, and we can't create a surplus to share.

Mni Winconi means "water is life" in Lakota. Water is what brought us, several thousand people from around the world, together. We had as many as 300 different indigenous tribes gather from the spring of 2016 through the winter of 2017 in Standing Rock, North Dakota.

The pull that was deep enough to create this movement, which woke up the world, came from our relationship to WATER. The fact is that without it, we quite simply do not live. It makes sense that so many came to stand in solidarity for water. The call came from within our own cells. The cry was easy to hear.

Mni Winconi, those words spread thru the camps like a wildfire, with a fist held high to the sky. The camps I speak of were on the treaty lands of the Standing Rock Sioux Tribe. The earth called us there. It was the place we gathered in peaceful and prayerful stance protecting the Missouri River from the Dakota Access Pipeline. Those words are to be spoken as a prayer.

Water delivery!

At Standing Rock, the core issue compelling us to come together became the crucial factor in keeping us alive. The winter of 2016-17 in North Dakota was tough. The local water was contaminated by all the fracking in North Dakota. It tasted terrible. One solution was the LOVE TRUCK. It came by way of Tennessee—Jay, who developed the filter system in the truck, got water from several sites nearby throughout the winter and delivered it to camp. Those sites were close, but changed often because of local politics. They were hard to access both to and from camp as we had one of the hardest and coldest winters North Dakota had seen in years.

The truck had to stay warm to keep not only the water from freezing but the precious filters. A building was built to house the truck and water containers. We used every shape and size of container. People drove to the truck, or the truck drove to them. Water bottles came on sleds and left on sleds. Dogs pulled them, people did—and so did snowmobiles. But water still froze.

It froze in your car, in your tent or tipi, or whatever structure you kept home in. Besides personal water needs, we had the water needs of many kitchens—to cook and to clean up. We needed water for the medical area. The herbal tent had teas available almost around the clock. There was a station outside with cups and big containers full of teas to help replenish and restore your vital self. Horses needed water, and so did dogs.

We had snow and plenty of it. But, we could not afford to melt snow. The firewood and propane were precious energy sources for heat. The snow was contaminated. We were dusted like pests in the field. They sprayed us with fertilizers and pesticides. And in addition, at the front lines we were doused with water cannons, pepper spray, and a mix of chemical cocktails.

So, what do you do when the water running from the taps nearby is not fit to drink, and the water falling from the sky as snow is the same? Filter it. That is what we tried to do, but what

if this becomes a massive issue? Most of our water filtration depends on technology. When the systems fail, can we filter enough water for the masses? When these pipelines break, and large water systems are contaminated by oil, you can call on anyone you like, but it will be a widespread issue seeking a local immediate solution.

As "water-culturists," whether on US soil or in any other country, we need to be ready to face these major water issues collectively. The pipelines are popping up all over, and Flint, Michigan is still very real.

People ask me: What is the next step? What is the take home from Standing Rock? What is happening now? Many water protectors took a break to rest. Many returned to home and work. The majority went to other pipelines throughout the US. Below is a recent Facebook compilation of pipelines in the US and Canada—I am certain that not all are listed.

What can you do? Educate yourself on the water issues nearest to your home. Divest from and ask your community to divest from the banks that support these pipelines. Empower the youth where you live. Involve them. The initial energy for the NODAPL (NO Dakota Access PipeLine) movement came from FIVE YOUTH. FIVE humans. Now, it is law in North Dakota that five or more people standing together are considered "inciting a riot."

The power we have as people is enormous. Make a conscious effort to know your local tribe. OFFER tobacco. The water issues are mostly on or through tribal land.

I, as many other water protectors I have talked to, have had a hard time adjusting. We know we can make a difference. We can come together quickly in community and work together. We did succeed. Now the seeds planted in winter are awakening from dormancy. We all took the seeds home. The seeds are in our hearts. The fire burns. We are asking you to take a seed, to hold onto the coal and let it burn in your community. Water is life. Life is Water.

We all stand in prayer still.

Stand with us. Δ

There are also pipelines in process in Lancaster, PA—the Atlantic Sunrise Pipeline; In Iowa—look up "Indigenous Iowa": and Klamath Falls, Oregon look up Jordan Cove LNG (Pacific Connector).

<u>Compiled by an anonymous Keyboard Water Protector:</u>
<u>Water Threats Throughout The US and World</u>

GLOBAL: http://www.theodora.com/…/world_oil_gas_and_products_pipeli…
Great page for info: https://www.facebook.com/US-Pipeline-Resistance-Camps-1395…/

Here are a few more... there are many, so please search in your area.

East Coast, WV, VA, and NC:
The Atlantic Coast Pipeline is set for construction in 2018. It goes from West Virginia, through Virginia, into North Carolina.
Link: https://www.facebook.com/Atlantic-Coast-Pipeline-Resistanc…/.

Arizona:
Protect Oak Flats
From the Website: "The Southeast Arizona land exchange was one of the bills that was attached to the Nat'l. Defense Authorization Act and passed by the US House and the Senate… the bill gives land at Apache Leap and Oak flat in southeastern Arizona to a foreign mining company, Resolution Copper, without any environmental impact studies or without consultation with the San Carlos Apache who consider the area sacred. The San Carlos Apache Tribe has worked tirelessly to avoid this from happening."
Links: FB Page: https://www.facebook.com/Saving-OAK-FLAT-ChiChilBidagoteel…/
Website: http://www.apache-stronghold.com/index.html

Arkansas:
Diamond Pipeline
From the FB Page: "The US Corps of Engineers Office in Little Rock has approved plans for Diamond Pipeline to cross rivers and watersheds in the state, which essentially green lighted the project even ahead of a hearing by the Arkansas Public Service Commission…. According to Arkansas Public Service Commission Executive Director John Bethel, the Commission's authority concerning the project is limited to approval of how Diamond Pipeline will construct and operate "navigable water crossings" over five critical state water sources along the route of the pipeline. Links: FB Group: https://www.facebook.com/groups/104080083383523/
Petition: https://www.change.org/p/tom-cotton...

Michigan:
Nexus-Pipeline: From the FB Page: "Overview of NEXUS Pipeline Project—NEXUS Gas Transmission, LLC has proposed construction of a natural gas pipeline to deliver gas from the Marcellus and Utica shale fields to markets in the Upper US and Ontario, Canada. New construction for this pipeline would begin in Kensington, OH, and end near Willow Run Airport in Ypsilanti, MI, where it would tap into existing pipeline. The current scope for this project includes approximately 250 miles of up to 36-inch diameter greenfield pipeline with four new compressor stations and four new meter and regulation stations. It is designed to deliver 1.2 billion cubic feet per day of natural gas beginning in November of 2017."
Links: FB Page: https://www.facebook.com/NO-Nexus-Pipeline-in-Michigan-Ohi…/

Oklahoma:
Plains All-American Red River Pipeline:
From the BO Website: "The Plains All American Red River Pipeline project would be a 16-inch pipeline running 350 miles from Cushing, OK, to Longview, TX, and would pump 110,000 barrels of crude oil per day to Gulf Coast refineries where it would then be turned into fuel and other petroleum-based products.The Red River pipeline threatens land and water for both Tribal Nations and neighboring ranches and farming communities, who have been sued by the company using eminent domain for private gain and seizure of their land for the pipeline."
Links:FB Page: https://www.facebook.com/NoPlainsPipeline/
Bold Oklahoma Website: https://boldoklahoma.webaction.org/...

The Unexplored Promise of Biogas

The Domestication of Dragons

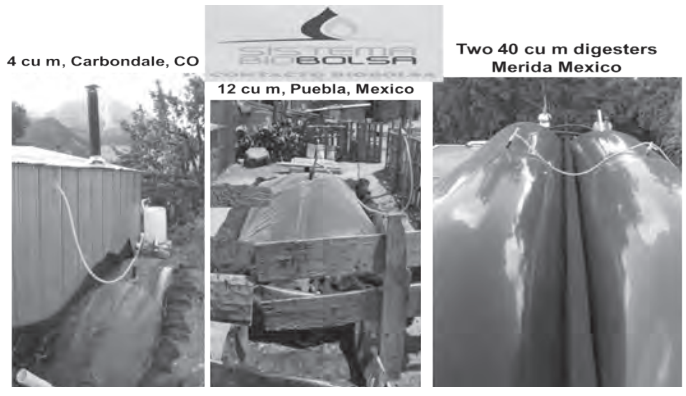
Bob Hamburg

AFTER FOUR DECADES THRASHING at the end of life's anaerobic digestion thread, I suggest that the easiest way to get a personal understanding of biogas systems is to consider "lighting farts." Google offers thousands of experiences; and you can even check on Wikipedia. The digestion process that occurs within the intestines of all animals results in the production and release of a mixture of gases that are often combustible—hence, I think of biogas systems as dragon husbandry. This intestinal activity is largely accomplished by trillions of anaerobic microbes which symbiotically inhabit our guts. It is "they"—these lifeforms from another biological kingdom (Archaea, Earth's oldest)—that digest what we eat. It is they that make the embodied energy and nutrients available for "us" to be.

This mutually supportive arrangement has evolved over more than 2 billion years. As earth's oldest lifeforms, the microbial Archaea developed 3-4 billion years ago in an environment devoid of chemically unbonded oxygen. When cyanobacteria and photosynthetic eukaryotes began to proliferate about 2.3 billion years ago, they released huge amounts of O_2, which is poisonous to most Archaea. (See the "Great Oxygenation Event".) In an effort to survive as widely as possible, some anaerobes struck a deal with multicellular organisms (the Eukaryotes): If the larger organisms would protect them with an internal home purged of poisonous O_2, the Archaea would decompose the complex compounds in the larger organism's food and make the embodied energy and nutrients available to sustain the larger organism's existence. This deal has served both biological kingdoms quite well over the last couple eons—a great example of permaculture, if there ever was one.

Thus, from its evolutionary beginnings, our species has had a very intimate symbiotic relationship with anaerobic microbes. We provide them a home in our guts, and they digest our food. Without them, our bodies would not be able to make use of the nutrients we consume. There also appears to be a quickly growing understanding that these beasties have much broader impacts on our physiology, health, mental processes, and behaviors—but that's another story…

Biogas systems may be recognized as externalizing the anaerobic digestion process so as to expand upon the 2-billion-year-old symbiotic deal struck by Archaea and Eukaryotes. This symbiotic expansion can increasingly help in creating greater regenerative energetic and material flows from resources coopted by human activity. Technology applied to the biological semi-cycle of return—in the service of diversity and regeneration.



In a "sausage design," sequential batches of feedstock are digested in a process that mimics intestinal digestion. Photos provided by Alex Eaton, Sistema Biobulsa (www.sistemabiobolsa.com).

Biogas is a groovy byproduct. Nutrient conservation is the thing.

Two recycling pathways

Nature has provided two bacteriological pathways for recycling organic materials: aerobic (composting) and anaerobic (digestion). In nature, they have much in common, and there is much collaboration.

Both pathways begin with photosynthetically created organic materials (solar energy-animated earthly stuff). Both do best with a feed material carbon:nitrogen ratio of around 20-30:1. Both pathways are greatly facilitated by grinding the feedstock so that bacteria have easier access (think: chewing our food). In our digestive system, aerobic microbes dominate the early phases of the process, while anaerobic microbes take over in the intestines.

Aerobic decomposition requires large amounts of oxygen (O_2) to sustain the processes. Thanks to a couple billion years of green life's photosynthetic O_2 production, the current atmosphere allows this to happen naturally over most of the earth's surface. To increase the speed or concentration of the process generally requires significant energy inputs for collection, operation of aeration pumps, and/or turning piles. The process works best at moisture levels of 40-60% (damp, but not sopping wet). When conditions are optimal, the composting microbes transform the stored photosynthetic energy into the

Biochar and recycling woody, lignin-rich organic materials—Enter the Fungi!

Both aerobic and anaerobic recycling pathways rely on bacterial activity. Composting woody materials in a timely fashion requires considerable energy inputs for size-minimization and aeration. Without even more significant pretreatments, the anaerobic pathway cannot decompose woody materials—at least not in an economical or timely fashion.

Fortunately, an entire kingdom of life has evolved to more rapidly re-utilize the energetic and material resources available in woody materials: the Fungi! And don't forget that even the humble fungus is decomposed after life by the two bacterial pathways.

Hügelkultur offers wonderful possibilities for multi-purposed recycling of woody materials (see PcD #101, "Raised beds—permaculture style: Hügelkultur 101" by Diana Sette).

And now there is biochar: a thermochemical, rather than bacteriological recycling pathway (see PcD #92, "A Great Chain of Benefits: 55 Uses for Biochar" by Kelpie Wilson and Hans-Peter Schmidt).

Biochar certainly returns some long-lasting carbon to the soil, and it does handle woody materials. But the process releases huge quantities of solar energy as heat, and many other soil nutrients are volatilized in the process, and these losses are greater in poorly designed systems. Energy-wise, biochar systems might do well to include utilization of all that wasted heat. In temperate climates, there might be a "biochar season" in colder months, and the heat could be usefully directed. Nutrient-wise, biochar is said to greatly increase the nutrient and water storage capacity of soils. So a biochar saturated with compost tea, vermiculture liquids, or digester effluents would greatly kick-start the benefits. It's largely a matter of trying to understand and manifest the potential long-term symbioses. Δ

heat necessary to maintain their metabolic processes.

In contrast, anaerobic digestion systems require the exclusion of oxygen (O_2). Therefore, the most important consideration is some sort of gas-tight containment vessel. Water saturation is almost always chosen as the means to exclude O_2 from the process, although there are exceptions. Since digester feed slurries may vary from <1 to >15% solids, the vessel or lair must also be robust enough to contain the hydraulic pressure. The second major consideration for anaerobic digestion systems is temperature. Anaerobic digestion produces insignificant heat. The photosynthetic energy in the organic feedstock is transformed into the energy in the chemical bonds of methane (CH_4) which is released upon combustion.

So as a series of biological processes, digester activity is highly dependent on temperature. Over the last couple of eons, millions of species of anaerobes have evolved to exploit the earth's oxygen-free ecosystems, both internal and external. The activities of hundreds of thousands of anaerobic species are generalized to suggest these nice, smooth ideals. All these anaerobes do have their favorite conditions, but most can and do adapt to gradual, moderate temperature changes. For most biogas systems (aka, domestication of dragons), a mesophilic temperature seems most appropriate (35°C or 95°F). The following graph describes the effect of differing temperature on mesophilic digester activity. At 95°F, reasonably complete digestion occurs in about 19 days. At 75°F, it takes >30 days for the same level of decomposition, and at 55°F, it takes about two months. At lower temperatures, some activity does continue, but the beast may be considered to be hibernating. Even if frozen, digesters tend to return to (vigorous) activity as they warm (with implications for permafrost).

Creating symbiotic inter-relationships with digesters is far simpler in tropical climates, where ambient air and earth temperatures are more supportive of reasonably active systems throughout the year. But food scraps and other discarded organic materials tend to occur in temperate climates as well. If we have to deal with this surplus organic stuff, why don't we investigate a biological means to both make use of the huge residual of solar energy and conserve all plant nutrients for the next cycle of growth at the same time? The trick is to somehow keep digesters warm during temperate winters. And NO…. the biogas produced will not be sufficient, but there are other alternatives…. of design, etc.

Energetic differences between aerobic and anaerobic digestion translate into heat losses. Aerobic composting releases most of the organic materials' embodied solar energy as heat. Certainly, there are many ways to make further use of this heat, rather than cavalier release to the atmosphere, but most often this heat is indeed wasted. Anaerobic digestion produces little to no heat, but releases the photosynthetically ensnared energy as natural, renewable, combustible methane gas.

Material differences are also important considerations. Both pathways prepare the organic material's carbohydrates for long-term incorporation into the soil. Through composting, many embodied organic nutrients may be lost through volatilization due to composting heat and/or rainwater leaching. In most situations, the final product can generally be handled as a dry material. In contrast, through a well-fed digester, all nutrients, except for a bit of sulfur (as H_2S) are conserved in the effluents to feed into the next cycle of growth. Digestion systems generally produce liquid and semi-solid effluents. Whole system designs can take full advantage of gravity flows, but pumps and/or manual handling are almost always necessary at some points.

Benefits of anaerobic digestion

Biogas systems offer a broad range of benefits:

- Nutrient conservation. All nutrients going into a digester are available in the effluents (except for a small amount of sulfur released as H_2S, and some N_2 if the digester feed is imbalanced), thus providing a full spectrum of plant nutrients in the effluents and reducing or eliminating the need for chemical fertilizer inputs. There are certainly many examples of problems resulting from the uncontrolled over-abundance of nutrients: ocean dead zones, algae blooms, eutrophication, etc. However, I suggest that, in more consciously designed systems, the more biologically active nutrients that are conserved from one growth

cycle to feed into the next, the greater the opportunities to help create an increasing spiral of life.

● Soil regeneration. Residual organic compounds in the digester liquid and semi-solid effluents increase the humic content of agricultural soils.

● Sanitation. When allowed to go toward completion, anaerobic digestion results in total destruction of many disease vectors that may have been present in the feed materials, with significant reduction of most others, including the most recalcitrant (e.g., Ascaris and other roundworm eggs). Also, the digestion process does not introduce any new pathogen vectors because the anaerobes do not survive in the presence of O_2.

● Odor control. Digestion largely consumes the volatile compounds (what we smell from organic residues). Digesters and their effluents certainly have an earthy odor—these dragons are like any other livestock—but it seems to be quite far less objectionable than that of undigested residues.

● Fly and rodent control. Insects and rodents are generally not attracted to digester effluents—there is no food value left.

● Weed control. The digestion process reduces the viability of many weed seeds in feed material.

● Natural gas. And if all this were not enough, digestion also results in the production of natural gas—without fracking. With adjustments, this biogas (generally 65% CH_4, 35% CO_2,

Biogas for Energy and Education at the Dickinson College Farm

Matt Steiman, Assistant Manager, Dickinson College Farm
Project Leader, Dickinson College Biofuels

Dickinson College in Carlisle, PA, began experimenting with small biogas systems in 2008, when we embarked on a lab-scale system using 2 L (1/2 gal.) bottles as biodigesters to test gas production from different feedstocks. This project, while cumbersome, gave us the bug when we made our first bit of burnable gas from a sheep manure slurry. The following year, a student intern built our first plug-flow digester out of a tractor inner tube. We cut the inner tube to make a sausage shape, plumbed an inlet and outlet pipe into each end, and placed the digester in an insulated, heated box. Within about two weeks, we had enough gas for the student to fry bacon and eggs on a crude home-made stove—Eureka! It was clear right away that a moderately sized (25 gal., 100 L) plug-flow digester is much easier to manage than a small bottle digester—the larger volume and regular turnover of materials were more conducive to a healthy microbial population.

The following year, a second student intern built a larger digester, a 500 gal. (2,000 L) unit made from reinforced EPDM roofing membrane (or pond liner) that we glued into a burrito shape, with various ports for passage of fluids and gas. Our notable innovation for this project was using plumbing floor flanges bolted and caulked through the EPDM membrane to make gas and water-tight seals that held for several years. This digester unit, nicknamed "Frijolcoatl—the Beany Serpent"—was installed in an insulated trench in a dedicated small greenhouse. After much trial and error with elaborate pumping systems, we settled on a gravity-feed method for adding slurry made from diluted cow manure, biodiesel glycerin, and some food scraps. Frijolcoatl was highly productive during the warm seasons and gave us enough gas to cook student lunches on the farm or give demonstrations to school groups on low-tech renewable energy production from waste. Another group of students experimented with small cascading ponds to make use of the nutrient-rich effluent from the digester to grow aquatic biomass plants.

After several years operating Frijolcoatl, we embarked on a new project following the vision of Biogas Bob Hamburg from Omega Alpha Recycling Systems (OARS, www.omega-alpharecycling.com). Together, we designed and built a new 15' x 30' (about 4.5 x 9 m) greenhouse dedicated to biogas production. We hired an excavator to dig two 3' (1 m) deep trenches before the greenhouse went up—these became the foundation for two parallel 1,000-gal. (4,000 L) digesters. These units are made from an intact EPDM tube, with Bob's uniquely designed plastic end-caps in each end bearing various valved ports for liquid and gas passage. The first unit, called Bathena, was completed in the spring of 2016 and proved to be a big success. Feeding it three times per week during the warmer months, we were able to keep our farm well supplied with biogas for three different kitchens. After startup with a cow manure culture, we ran the digester the rest of the season solely on ground food waste from the college cafeteria. Our production from feeding 50 kg (about 100 lb.) of food waste three times per week was 3-4 m^3 (~100-140 cu. ft.) of burnable gas per day—enough gas to power a single burner stove for about five hours each day; enough that we left our electric stove turned off most of the season. Gas is currently stored and moved around the farm in portable EPDM gas bags on lightweight wooden carts, though we are exploring the possibilities for a more convenient pipeline between the gas shack and various points of use. Our second digester for the greenhouse is under construction now, as are experimental heating systems to keep the project active through the colder months. Liquid effluent from the new digester has been dribbled on our vegetable fields in the off season to fertilize cover crops, and is also distributed to local gardeners by Biogas Bob. We hope to conduct further research on the value of the effluent in the coming year.

In addition to these projects, we have also constructed and used an IBC digester designed by Solar CITIES, and a commercial unit from HomeBiogas in Israel. We continue to use the lab equipment yearly in a digestion exercise for environmental studies students. The possibilities of a biogas project for hands-on educational opportunities and tinkering are literally endless. Biogas systems provide exciting lessons in biology, nutrient management, plumbing, construction, and project safety, to name a few. Students enjoy working with the living system and eating the food they cook with the resulting biogas. Δ

traces of other gases) can be used in any way fossil methane or any other combustible gas is used. Emissions from biogas combustion are similar to those from burning fossil gas, but without the environmental degradation from extraction and transportation. When clean-burning biogas is used to replace biomass or coal as a cooking fuel, indoor air pollution and related health problems are greatly reduced.

Biogas past, present (and future)

There is anecdotal evidence of biogas systems in ages past. Anaerobic sewage treatment applications date from at least the 1800s, and are included in most new installations. Philadelphia, PA, recently increased anaerobic treatment capabilities by 16 million gal. (64 million L) and now produces nearly all the electricity necessary to run the treatment plant. Toward the end of WWII, German (and French/European) farmers turned to biogas systems to maintain their operations. More recently, interest in broader utilization of larger-scale biogas systems was stimulated by oil shocks beginning in the 70s.

Over the past couple decades, larger-scale digesters have begun to proliferate worldwide at sites of large concentrations of organic residues (sewage treatment plants, concentrated animal feeding operations (CAFOs), food processing and food waste management operations). Germany has become a leader in large-scale agricultural digesters, but much of this has resulted from perverse financial incentives/subsidies which seem to justify growing corn crops with the sole purpose of feeding digesters, rather than managing organic residues in a regenerative fashion.

Various digester feeds tend to produce varying quantities of biogas.

Nearly all large-scale efforts are justified by the electricity generation potential of the system. The waste heat from this generation is generally fed back into the digesters to help maintain active temperatures. Liquid and semi-solid digester effluents, although used in one way or another, have largely been viewed as a disposal problem. Over the past decade or so, this view does appear to be slowly shifting, as the potential of digester effluents comes to be more widely appreciated.

However, digesters, especially when symbiotically integrated with other biotechnologies, are appropriate at much smaller and more decentralized scales. There may be tens of thousands of situations in which larger-scale digester systems are appropriate, but there are hundreds of millions of situations where much smaller digesters can have more localized and collectively widespread, regenerative impact. In tropical climates, with design and construction care, ambient temperatures can suffice for adequate year-round gas production from stand-alone digesters. In temperate climates, this is not the case. Digestion activity falls off precipitously as the digesters cool, and the beasts pretty much hibernate below 10°C (50°F). These beasts, even if frozen solid (check all pipes), do tend to return to active lives with the advent of warmer temperatures and gradual re-introduction of feeding.

If one wants year-round continuous digestion in temperate climates, supplemental heat must be provided. How to accomplish this in a regenerative fashion? How to design for symbioses among digesters and other components of permacultural endeavors? OARS (Omega Alpha Recycling Systems, my biogas consulting entity) has always considered greenhouse-digester integration most obvious. Greenhouse temperatures tend to vary greatly. If the excess heat could be transferred to the digester's thermal mass, greenhouse temperatures could be greatly moderated and the digester would be warmed. A well-integrated digester would return this heat to the greenhouse when necessary.

So, yea—the gas is groovy, but the NUTRIENT RECYCLING aspect of digestion provides even greater benefits. Dragon husbandry is a great facilitator of organic materials recycling.

Some notes on biogas possibilities

Nearly all non-woody organic materials may be feed in moderation to an anaerobic digester. All of the above-mentioned benefits will accrue. I strongly suggest that, at a small-farm, homestead, or permaculture level, consideration of installing a digester should be highly analogous to taking on any other type of livestock. The development of smaller-scale digestion systems is quite akin to the domestication of dragons—and I note that there are hundreds of millions of folks worldwide currently participating in the evolution of this process.

Various digester feeds tend to produce varying quantities of biogas. All animal excreta contain lesser biogas potential because the original consumer used much (generally around 2/3) of the energy available (made available, lest we forget, by anaerobes in the animal's own gut!) Thus, there is significantly less biogas potential from manures than from uneaten, far less decomposed organic materials. But that in no way reduces the other benefits of digestion of these materials for nutrient conservation and utilization of the remnants of the embodied solar energy. Unless carefully managed, digesters fed solely on food scraps do have a tendency to go acidic when overfed. The addition of some manures does seem to increase the buffering capacity (pH resilience) of the beasts.

Highly concentrated fats do produce great amounts of gas, but over-feeding such rich materials tends to sicken most digesters not highly engineered and managed to handle them. Generally, dragon feed should have no more than about 5% total fat. Otherwise, goat-bloat-like foaming symptoms may well occur—longer-lasting lipid bubbles that can inhibit biogas release..

Small-scale digester development

I was introduced to biogas systems as a Peace Corps

volunteer in Nepal in the 70s. Since then, I've tried to participate in and keep abreast of worldwide development in the field. Currently, there are several hundred million folks around the world involved with development and maintenance/husbandry of smaller-scale digesters. Specific design approaches vary widely, with constant situational adaptation and innovation. However, a huge majority of smaller-scale systems may be encompassed within the following three design approaches.

In general, there are two primary design differentiations. The continuous or batch digester is fed and emptied on a regular basis, whether hourly, daily, or less frequently—more like us and other animals. A batch digester, on the other hand, is filled and emptied all at once (monthly, bimonthly, etc.). Of course, these design approaches are extremes of a continuum, with many viable extended-batch and semi-continuous options. At the extremes, mixed systems are generally large tanks (stomach-like) where all newly incoming materials fully mix with the partially digested material that is already there. Mixed systems have only an average retention time for feed materials, which can range from less than a day to many months. Plug-flow systems are much more like tubes (intestines), where all materials are roughly assured of gradually going through the entire process.

The solar housing is certainly helpful....

The Chinese design

By far the greatest efforts have occurred in China. Since the mid-1900s, China has installed many tens of millions of household-scale digesters, as well as tens of thousands of commune-, community-, city-, and industrial-scale systems. Larger systems have varied considerably in design, but residential-scale has focused largely on a masonry-based, fixed-dome design.

Early on, primary motivations were the sanitation and nutrient conservation aspects of these systems, but the biogas potential soon became a priority. The in-ground masonry-tank system configuration that was developed provides a vessel for digestion as well as adequate gas storage and gas-pressurization for local, household use.

Over the decades and around the world, there has been much success with this design approach. In China, the design has gone through several generations of development. Local stone and brick construction has been replaced by re-usable steel forms and concrete. There have also been tens of thousands of these systems built throughout Asia and beyond.

When well-constructed, this in-ground design can provide very long-term service. But since anaerobic digester activity is so dependent on temperature, these largely buried tanks do best when they are surrounded by warmer earth and air.

The Indian design

This design evolved from British sewage treatment systems of the 19th century and includes a floating drum covering a well/container of organic slurry. These systems may range in size from <55-gal. (200 L) drums to multi-million gallon tanks. The floating drum approach offers gas collection and storage, with adequate pressurization for even community use. Plastic construction has presented many opportunities for smaller-scale systems. There are many concerned Indian and Asian entrepreneurs who are proliferating these digesters.

A recent evolution of this approach has included the replacement of the floating drum with a slightly expandable "fabric," secured to the top of the rim of the tank. This approach has primarily been utilized in electricity-generating medium- to large-scale systems, especially in Europe. However, there have been several efforts at smaller-scale applications. The trick is to get a long-term gas-tight seal between the top of the digester vessel (whatever the material and shape) and the fabric cover. I'm currently working with a farmer in central PA on the installation of such a system in summer 2017, which will be a masonry trough with an EPDM cover.

The sausage design

OARS currently prefers a "sausage" design, where anaerobic re-composition is a multi-stage biological process carried out by a huge variety of microbes, all feeding off the organic residues left by their predecessors, digesting organic materials in sequence. Both the Chinese and Indian designs (and all mixed-tank, stomach-like systems) result in considerable mixing of newly introduced feed materials with those that have been digesting for some time, with a bell-shaped average retention time. In contrast, the intestine-like, sausage approach assures that all feed materials go through the entire re-composition process. Also, while digestion does offer significant sanitation benefits (short of outright sterilization), these benefits correlate strongly with actual time spent within the anaerobic environment. The sausage approach offers far greater assurance that all feed materials experience the desired retention time. For instance, cholera vectors are destroyed by 14 days in a digester—but how to assure that within a mixed digester? While there is some gas storage capacity in the tube, this design does require extra consideration of gas storage and pressurization for use.

This design approach is proliferating around the world—Asia, Africa, Latin America—and it's the basis for the Dickinson College Farm digester discussed below.

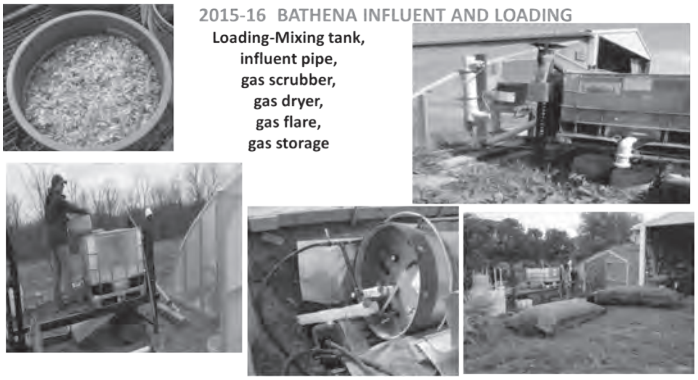
Feasibility of "backyard biogas"

Needless to say, backyards vary tremendously around the world. There have been tens of millions of "home-scale" units built in Chinese agricultural villages. These beasts are generally feed all organic residues from the household—food scraps, field residues, humanures, swine and poultry manures, etc. There are

perhaps hundreds of Indian and Southeast Asian entrepreneurs developing backyard, residential, and roof-top variations of floating-drum systems for their domestic markets. African Flexi-Biogas tubular digesters are testing out well in Nepal.

55-gallon drum and inner tube digesters do fine for demonstrating the principle—but so do lighting farts. Gas production from these systems will suffice for boiling water for tea, and they do provide some high-quality liquid fertilizer, but I doubt they are really worth the effort in most situations.

The past 5-10 years has seen the development of smaller systems that may fit into the backyards or basements in residential communities in more (over-)developed areas of North America, Europe, etc. Solar Cities Biogas has largely pursued a DIY approach based on re-purposing international bulk carrier plastic cubes (IBCs) for both digestion and gas storage. The design is constantly evolving. In the Northeast,



Latest biogas system installed at Dickinson College Farm (2015-16): Bathena.

it seems that, when nearly 95°F temperatures are maintained, two IBCs fed all food scraps from a household of four seem to suffice for production of adequate cooking fuel, plus the effluents for regeneration. Hestia offers a geofabric covered tank, which also may suggest much to DIY-oriented folk. And, there is the HomeBiogas System developed in Israel/Palestine—small, well designed system for recycling kitchen scraps at a small-scale. This system is already being copied and marketed in China. The solar housing is certainly helpful and may suffice for warmer latitudes, but without significant heating, these systems will certainly hibernate during cold seasons.

Certainly, loading and unloading a gas-tight vessel is more complex than managing a compost pile! I maintain that, regeneratively speaking, it is well worth the effort. I suggest that a 2 m^3 digester system is the lower end of what might be considered viable backyard biogas-scale.

The Dickinson College story

Through a 2010 David House *(The Complete Biogas Handbook)* workshop I co-organized near Philadelphia, Matt Steiman (Assistant Manager, Dickinson College Farm) and I re-initiated collaboration on biogas efforts.

I have left description of these efforts to Matt, who has overseen the chores required for managing the systems. My assistance has been largely through perseverance in advocating various aspects of the OARS' approach, such as maximizing use of greenhouse heat to warm the digester and making use of digester effluents within the greenhouse.

The second Dickinson beast will have been installed by the time of this reading. It will include some changes based on learnings from the last year's experiences. But it will certainly not be the "final" design—just another step toward learning about intricacies of dragon husbandry.

While I/OARS have been able to contribute bits of labor and a few bucks to Dickinson's efforts, I would hope that my greatest assistance might be seen in the symbiotic approach to digesters/greenhouses—and a bias toward worm-shaped digesters, the next leap forward from the sausage design!

We learned that silicone caulk was not adequate for a long-term seal between the EPDM tubes and the polypropylene endcaps. After I cleaned all this gunk off, Weatherbond water cut-off mastic caulk, carefully applied, has held for over a year. We learned to consider alternative digester heating systems. We learned that gas production can be prodigious. We have not yet learned much of effluent management within the greenhouse…. we have not learned about electricity generation… and many other things. But we figure to keep at it. What else to do?

Resources

Since 1978, the best English-language introduction to biogas systems has been David House's *Biogas Handbook,* although I do have some picayune caveats! I can offer no extensive, meta-references that deal with full utilization of dragon effluents. However, I must reiterate that ALL nutrients (except for a little sulfur) fed to a healthy digester are conserved in the liquid and sludge. Highly diluted (10-20:1) effluents are sufficing to replace chemical alternatives in hydroponic and aeroponic systems. Guess I've been figuring permaculturists would recognize the potentials for dragon husbandry and help manifest and spread word of the possibilities. There are innumerable civil and agricultural-engineering tomes available for far more money. But nearly all their focus is on large-scale systems.

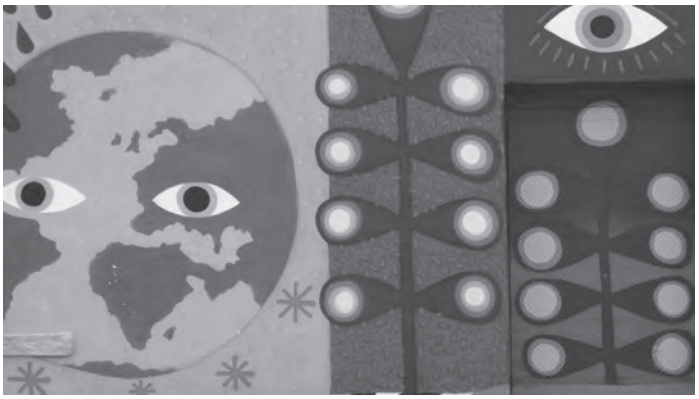
The web offers innumerable and endless research possibilities—just google "biogas." I still consider my omega-alpharecycing.com and dragonhusbandry.com sites worthy of brief historic review and ideas for the future. I also recommend beginning with the contacts and information available through Facebook's "Solar CITIES Biogas Innoventors and Practitioners"—especially for residential systems.

For general and primarily large-scale system information, the US EPA's Agstar website may still be functional, and the American Biogas Council website is expanding (www.americanbiogascouncil.org). Δ

Biogas Bob is the director of Omega-Alpha Recycling Systems (omega-alpharecycling.com) and Dragon Husbandry (dragonhusbandry.com). He promotes regenerative systems like biogas: natural gas without fracking. "Biological Repair NOT a Technological Fix!"

Less is More

Carlos Cuellar Brown



WEALTH IS A CONCEPT that refers to an enhanced perception of well-being. This experience is often mistaken as the accumulation of things and objects. In the West, the accumulation of valuable resources and material possessions equates to being wealthy. The individual's or nation's wealth becomes a quantitative measure of stuff. More of this for the individual is less of the same for others. Our industrial infrastructure has manufactured an incredible amount of stuff, often useless and intrinsically obsolete. This unending capacity for manufacturing surplus reflects the wealth of modern nations. But how about the wealth of beautiful pristine alpine vegetation, or the wealth expressed by brilliant ideas, or the treasures left by the Michelangelos and Mozarts of Europe. How about the wealth of exchanges that bond mother and child? Wealth can also be defined as an inherent feature in the fabric of reality. With its infinite possibilities for shapes and form, the self-organizing universe is nothing but a wealth of options, teeming to become. You could also say that we humans are blessed with wealth, as we are born into this reality with incredible abilities and functionality. We do not do anything to acquire this, it's built into the biological system. The ability to perform simple logical solutions suggests a wealth of measuring tools inherent in our sensory apparatus. The sheer size of the universe and all the stuff in it implies a bountiful wealth of energy and information spinning and buzzing everywhere. In this sense, wealth is equal to abundance.

And how would we measure the wealth of a system, say the wealth of a small community? By the size of its houses; by the relationships among its people; by the sizes of the lawn mowers; by the basket of peppers in back yard gardens; by the local farmers' market or by the super-sized box store outside of town; by the giant flat screen TV or by the slow food potluck around the fire? Would we measure wealth by the five hours of "Nintendo" a day or by the walk in the chirping meadows with friends at sunset; by a homemade apple pie or by frozen microwave pizza; by raw milk, cheese, and custards or by the pasteurized long-shelved denatured milk? Should we measure wealth by the smiles and laughs of people at a town square dance or by the mega-surveillance TSA pat-downs at super-bowl franchises; by the rosy cheeks of country children or by the "saggy pants" of teen gang rappers of East New York? Might we measure wealth by acres of small-scale organic perennial farms or by miles and miles of parking lots?

How do we keep measuring the wealth of a nation, when it ranks first in cancer, diabetes, child obesity, heart disease, ADHD, and autism? When it ranks high in the poisoning of rivers, oceans, and the air we breathe. How do we measure the wealth of a nation when most people work in dead end jobs and can't pay their mortgages, credit cards, and health costs? How can we measure wealth when an individual prefers a bag of deep fried chips over a nutritious wheat grass shot or crunchy seaweed? Do we measure wealth by having three jobs or by having more time with our children; by a healthy hardwood forest or by chicken coop concentration camps; by the number of strip malls or by the massive number of displaced farmer suicides in India? Is wealth what is good for Wall Street? Perhaps instead wealth measures the non-quantifiable gifts of friends and family. Maybe wealth is what's in it for me rather than what is left for the benefit of all. Do we measure wealth by the GDP to debt ratio or by the fisheries left in the northern deep seas?

Obviously, when you measure a nation's wealth with some of these indicators, you realize that far from wealthy, we currently consist of a collection of very poor and unhealthy nations. Crumbling before our eyes, our economic system has failed, and it does not generate real wealth for anyone. Perhaps, after all, less is more, especially when the qualitative value of less has much more intrinsic meaning than the quantitative wealth based on things and units of possession. We need the kind of wealth that can be measured as quality of our life, quality of our food, quality of our relationships, our waters and habitats. True wealth comes from the partnership with community and mother Earth; with a wealth of information at our fingertips serviced by our technology. We will calculate wealth in acts of kindness; by the celebration of our bodies and gifts in the commonwealth of knowledge and beauty; by the celebration of life, art, and music and the scent of wildflowers blooming in the fields of pure potential. How about calculating wealth as the ability to love? When we love, we are giving the best of ourselves. This is the kind of wealth that will knit the new fabric of the cosmic human.

To generate real qualitative wealth, we need to invest in community building, with communities that meet most of their local needs, while being interconnected to the global informational village. In a system like this, wealth becomes common to everybody. Plugged into county town jurisdiction and cooperative networks, we can begin to invest in the restoration of soil, water, and forest systems. We can invest massively in diverse cultural treasures that honor individual groups and ethnicity. We will invest in a new system of schooling that de-schools dogma out of the classroom and frees learners of grade work.

We will invest in local infrastructure that eliminates long distance commuting and restores the character of town and social architecture. We can invest in sharing the wealth of know-how,

and advocate people's efforts in designing perennial agriculture and Earth-friendly homes. This is a way of redefining wealth in the laid back but efficient reality of system design. We must invest in developing creativity and leisure. A wealth of unknown forces will emerge out of this capacity for exploration. The imaginable will emerge from the unknown.

This kind of wealth system deals with maximizing the human potential of the local cooperative system of interconnected villages. Individuals, towns, and corporate sized operations are experiencing this vision unfold. Conscientious corporate leaders stripped of their unaccountable status, will promote ideas and put their energies into small community cooperative entrepreneurship. Corporations will reform their profit margins and cost benefit schemes, goals, and objectives. They will not be quantifying monetized digits on a computer screen but rather measuring the capacity for self-reliance of the people.

Those of us who have not unplugged off-grid are behind the curve caught in a dying system. Communities will rediscover their center around a wealth of gifts for each other. Is this not what we ultimately long for? We long to give back to society; give back to nature; and give back to ourselves, longing to love unselfishly. Δ

Carlos Cuellar Brown is a New York City writer. His essays have been posted online by Opendemocracy, The Global Dispatches, The Pelican Web, Kosmos Journal *and* Stardrive. *In 2013 his essay "Intermedial Being" was published by* A Journal of Performance and Art PAJ #106 *MIT Press Journals. He was nominated for the 2015 TWOTY awards for his essay "Blueprint for Change." Carlos is a gardener and permaculture enthusiast, he obtained his PDC in 2016. His book "In Search for Singularity" is available at http://carloscuellarbrown.wixsite.com/author*

You're Invited!

Don Hall

US TRANSITION MOVEMENT HOLDS 1ST NATIONAL GATHERING!

A LITTLE MORE than a decade after veteran permaculture teacher Rob Hopkins established the frst "Transition Town" in Totnes, England as part of an efort to bring permaculture principles and practices to a wider audience, Transition US will host its first National Gathering in St. Paul, Minnesota this July. The timing couldn't be better. Over the past ten years, the grassroots movement that Hopkins helped launch has now grown to include thousands of local initiatives on every continent (except Antarctica). These mostly volunteer-run groups have already accomplished much: spearheading successful local food campaigns, community energy cooperatives, alternative currencies, Energy Descent Action Plans, and more. However, this is only the beginning. As the Transition Network's recently-published
Essential Guide to Doing Transition explains: "Transition is deeply ambitious. It wants to change the way the places we live in feed themselves, house themselves, employ themselves, and power themselves. That's a big ask."

This "big ask" requires that we engage in a process of continual learning and evolution, which is refected in the theme we chose for our upcoming Gathering: "Growing a Movement for Resilient Communities: Broadening, Deepening, and Scaling Up." Based in part on Hopkins' under-appreciated *Transition Companion,* this framework for sustainable growth in three dimensions merits further elaboration:

Broadening: While it's clear that permaculture, Transition, and other related movements have their own unique identities, we are also part of a much larger historical push to create a world that is more conscious, just, and regenerative. Realizing that we are smarter and stronger together, Transition US has been busy inviting allied individuals and organizations from all over the country to participate and present at our gathering, regardless of whether or not they consider themselves "Transitioners."

Deepening: One of the key insights of Transition is that "how you do your projects matters as much, if not more, than what the projects are." To put this another way, the ability of our groups to afect positive change is intimately connected with who we are as individuals and the cultures we create. Emphasizing this point, our gathering this summer will focus as much on what we call the "Inner Transition" and the stages of group development as it will on the latest climate change statistics and homesteading how-tos.

Scaling Up: By expanding our social capital and tapping us into the true source of our collective power, broadening and deepening hold the keys to scaling up. Reaching out to kindred movements and paying attention to personal and social transformation not only increases our capacity to do good on the local level, it also lays the foundation for greater regional, national, and international visibility and impact.
As I experienced at the North American Permaculture Convergence last fall and in recent conversations with US Transition leaders, both of our inter-related movements currently fnd themselves at a pivotal moment. Having raised awareness among our early adopters, honed our skills through long experimentation, and implemented practical examples of our ideas, we now seem poised to make a quantum leap forward.

One simple way you can get involved in making this leap is to join us in Minnesota this July. Throughout the gathering, we will deepen our bonds with each other, broaden our understanding of potential challenges and solutions, and scale up our vision for what's possible. Like Transition itself, it will be inspiring, participatory, and fun. If you're intrigued by what you've read here, you'll fnd much more information online at www.transitionus.org. Δ

Reviews

From the Ground Up: A Blueprint for Farming Success

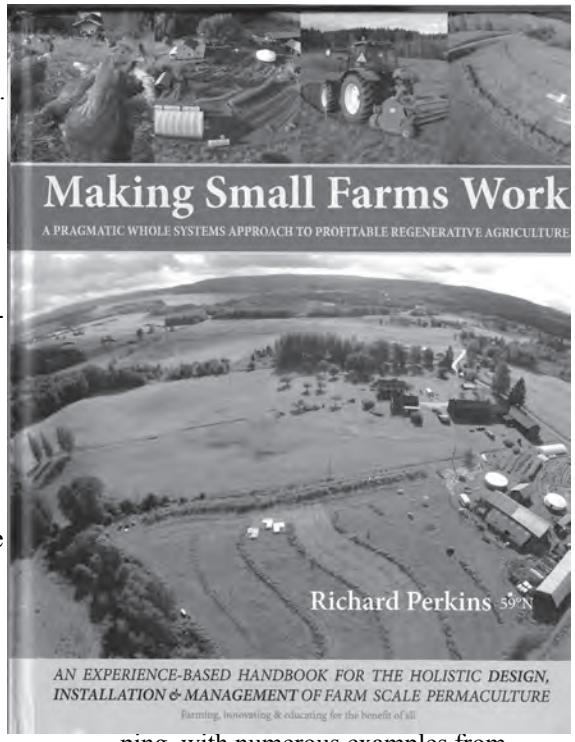
Review by John Wages

Richard Perkins
Making Small Farms Work:
A Pragmatic Whole Systems Approach to Profitable Regenerative Agriculture
Ridgedale Permaculture (www.ridgedalepermaculture.com). Västra Ämtervik, Sweden.
310 pp. Color photos. Hardcover: $58.00. pdf download: $40.00

REVIEWING THIS BOOK about permaculture design as applied to small farms seems appropriate, as part of *Permaculture Design* magazine's issue on Design Process. While not a permaculture book per se, *Making Small Farms Work* draws heavily from Mollison & Holmgren's permaculture, Alan Savory's holistic management, and P.A. Yeomans' keyline design. Much has been said about the lack of profitable small farms that are actually based on permaculture. A lack of a relevant road map may be one reason for this. Much of the permaculture literature is written for the homesteader or backyard gardener. Richard Perkin's book fills this gap like no other book I've seen.

Making Small Farms Work isn't about what could be done. It's about what is already being done. Ridgedale Permaculture isn't in a tropical paradise—it's in Sweden at latitude 59° North. There's some innovation, but most of the details could be gleaned from pre-existing works. Its strength is in its organization and the way it speaks from experience to alert the young farmer to potential mistakes and pitfalls.

This book covers everything, and it starts at the beginning: purchasing farmland, then "Clarifying Objectives." The history of Ridgedale illustrates how one goes about looking for property that's potentially profitable and not a money pit. What are the most appropriate site selection criteria? There is a checklist. A number of climate maps give the global and continental context. Some of these are likely unfamiliar to American readers, who are more familiar with USDA zones, but all maps are referenced, and the context is sufficient to understand everything.



A sector analysis for the Ridgedale site has considerable detail on rainfall, degree days, weather extremes, soil, etc. A total of 22 photos from the initial site visit cover the next two pages, along with the Site Data Collection Checklist that they used to be sure to collect all the information they would need during the site visit. A few pages later, more photos document the first six months on the land. A whole chapter is dedicated to clarifying the vision for the farm, routes to decision-making, and the importance of documenting and monitoring the effects of those decisions.

Chapter 3 begins with mapping and segues into the design process. Advice abounds: "Cheap is the new expensive... buy the best tools and gear you can afford," obviously spoken from experience. Don't buy things you don't need—sounds like Joel Salatin or Gene Logsdon. The importance of workshop organization is duly noted. Backup crucial infrastructure and processes. The design process presented here is strictly practical. Rather than getting bogged down in details to the point one cannot make a decision, keep it simple, and move forward to actualize the design. "Analysis paralysis" leads nowhere.

Keyline design is covered in detail, with maps, a discussion of relevant topography and geometry, with admirable clarity. The author covers the use of a penetrometer, which measures soil compaction by registering the pressure needed to force the probe into the ground. These data can inform the farmer whether subsoiling or chisel plowing is really needed. If keyline is appropriate for your site, or if you need to deepen your understanding for teaching purposes, this chapter alone may be worth the cost of the book.

A chapter on agroforestry is quite comprehensive. Details on alley-cropping, with numerous examples from Europe, are presented, along with color illustrations. Species lists accompany recommendations for pruning trees in alley-cropping systems to give maximum lumber value. Presentation of general principles and examples are followed by detailed instructions on how to design and implement an alley-cropping system. Succession in silvopasture systems, with accompanying discussion on bacterial-fungal ecosystems, completes the picture. Silvopasture lanes are the key land-use pattern at Ridgedale, and this chapter documents the establishment and ongoing maintenance of these areas. Silvopasture zones at Ridgedale were originally pastures, whose soils had become compacted by heavy machinery use over many years. One of the first steps in their regeneration was to use a Yeomans chisel plow (subsoiler) to rip through the plow pan and jump-start the loosening of the soil, plus assist the new trees with rapid root development. To address Sweden's problem with spruce plantation monocultures ("vertical deserts," in the author's words), strategies to convert these monocultures to more productive and diverse agroforestry systems are discussed. Converting the pine plantations of the Southeast could be acccomplished with much the same approach, with higher value accruing to the landowner and the ecosystem.

Proper management of any trees whose final intended use is lumber involves pruning to generate tall trunks with limited branching.

While farming so far north comes with its challenges, a diverse topography with plenty of water gives more options for things like ram pumps and microclimates. Not to be forgotten, a nearby peat swamp, historically part of the village commons, provides ultra-local peat moss for planting mixes.

As I turned the pages of *Making Small Farms Work,* I realized that this is an authoritative work on whole-systems, permaculture-oriented farming. What is left out? Biochar, Jean Pain composting, mushroom cultivation, grafting—Richard Perkins covers all of these topics, with abundant illustrations, clear exposition, and notes from his own experience. Only a very little of the material is limited in applicability, such as the species lists for lower Sweden, which is probably of interest mainly for Canada, Alaska, and the northern tier of the US.

Infrastructure merits its own chapter. Upgrading the insulation in barns and workshops by a notch or two is critical for the far north, but buildings and sheds are important for any farm. Ridgedale, like most small farms, inherited several outbuildings. Retrofitting these was a first priority. Additional buildings generate income (a treehouse to be rented to vacationers), improve the quality of life (a sauna), support basic needs (composting toilet, a root cellar, mobile housing for poultry), or provide space for teaching (yurts, other structures). Fencing merits a short, seven-page chapter of its own, covering electric and high-tensile wire fencing.

Livestock is important at Ridgedale. Chapters discuss pastured broilers, pastured eggs, and grass-fed sheep and cattle. The author acknowledges the precedent of Joel Salatin's pastured poultry systems, and proceeds to cover misconceptions around fast-growing Cornish cross broilers, and the Ridgedale experience. Economic calculations pepper the text: how much does it cost to raise a broiler; how much does it cost to produce a dozen eggs under the author's system? Marketing merits extensive discussion, and calculation worksheets from the farm illustrate the records of feed used, other costs, and sales price, on each batch of broilers. Similar worksheets keep track of the egg business. Livestock interfaces with the other systems on the farm—for example, pastured broiler units and the mobile layer barn sit in the silvopasture lanes and are moved daily. The logistics and regulatory aspects (in the EU context, of course) of building a slaughter facility are covered, along with floor plans and, as always, plenty of illustrations. In the EU, in contrast to the US, birds must be stunned prior to bleeding. During our brief foray into pastured poultry around 2004-6, we searched for the best way to do this but didn't find anything suitable. Ridgedale uses an electric stun unit that renders the birds unconscious before cutting them—a much more humane system.

The permaculture literature is full of interesting ideas and design. Unfortunately, too many of these have never been evaluated in any rigorous sense. As Richard Perkins notes, "We need many more working examples on the ground." With this handbook from a real-world, profitable permaculture farm (in the far north at that), we have one more example of what works.

I confess to considerable difficulty in writing this review. The book arrived in time for the Feb. issue, but other obligations required me to delay it until May. To compound the problem, every time I picked it up, I learned something new and went off on a tangent of learning—the use of bentonite clay-geotextile sheeting for lining ponds, electric stun guns for more human poultry slaughter, and some of the intricacies of agroforestry management that I hadn't appreciated. As a child, I spent a lot of time reading the *World Book* encyclopedia. Reading *Making Small Farms Work* reminds me of that, and writing a review seems a little like trying to review the encyclopedia! If you want everything in one place, with principles and discussion firmly rooted in (successful) experience, you need this book on your bookshelf. Anticipating heavy use, the publishers have thoughtfully produced it in hardcover. It's sure to last many years as you thumb through it, revisiting it in light of your own experiences from time to time. Δ

Write to us!

We love to hear from our readers. Tell us what you like and don't like, and what you'd like to see in the pages of upcoming issues.

editor@
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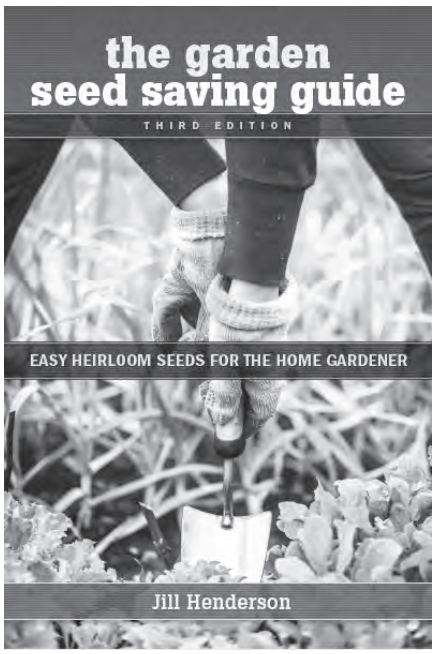
The Handbook of Seed-saving Essentials
Review by John Wages

Jill Henderson
The Garden Seed Saving Guide:
Easy Heirloom Seeds for the Home Gardener
Groundswell Books,
Summertown, TN.
64 pp. Paperback. $9.95

WHEN YOU LOOK CLOSELY enough, nothing is truly simple. Even an electron dissolves in a swirl of complexity under the lens of quantum mechanics. Seed-saving always seemed daunting to me. I like to try many different varieties, to see what grows best on the various soil types on my farm. The intricacies of seed-saving, from isolation distances to proper post-harvest treatment and storage, kept me away from this, for the most part. I tried saving seed in Zip-loc bags with silica gel desiccant to keep them dry so they will last longer. Even this turned out to be wrong, as one can over-dry seeds. That's why *The Garden Seed Saving Guide* is so refreshingly useful. It gives you just enough information to save the seeds of common vegetables and to understand the basics, without burying the reader in a vast bog of detail. This book was long overdue. At just 64 pages, the *Guide* is more of a long booklet than a short book and reads like a manual or handbook without a lot of superfluous information. It's what you've been looking for. Grab it and take it with you to the garden.

The *Guide* gives us a great, although concise, introduction to scientific names and why they're important, the perennials/biennials/annuals trichotomy, and flower anatomy with reference to the mechanisms of pollination. Approaches to maintain genetic purity fall into two general categories: physical and mechanical methods. Physical strategies include isolation of varieties by bloom time, growing only one variety, and of course, maintaining suitable isolation distances. Mechanical strategies including caging of plants or bagging of flowers to prevent pollination by insects or wind, and pollination by hand.

And what about selection? How do we avoid inbreeding depression? After reading other books that suggest you need hundreds of cabbage plants to avoid a



genetic train wreck, Jill makes it seem much more do-able. Yes, you do need more than one plant to avoid the genetic traffic jam, but the average backyard garden has enough room to do it right. After all, didn't our grandmothers save seed for generations? That's how we ended up with the tomatoes and cabbages we have today.

Harvesting some seed is as easy as drying them before bagging. Others like tomatoes need to undergo a fermentation process, in the presence of their own fruit. All of this is explained and illustrated.

Back to the issue of proper storage: Jill says, "The ideal moisture content for most seeds in storage is between 6-8%, at which point seeds can safely be packaged in airtight jars." She advises using silica gel to aid the drying process, but then to remove it for long-term storage to avoid over-drying the seeds. Seed longevity and simple germination testing are covered.

The book concludes with a section on plant profiles, usefully grouped by family and explaining specific practices for particular plants. All the common vegetables are usefully grouped into just seven profiles: Aster (lettuce), Brassicas, Legumes, Mallow (okra), Nightshade (tomato, pepper, eggplant, tomatillo, ground cherry, garden huckleberry), Chenopodium (spinach), and Cucurbits (cucumbers, squash, melons). The tomatoes profile sounds as if the author is speaking from experience—varieties differ in their ability to self-pollinate. Apparently, the broad-brush of "yes, tomatoes are self-pollinators," is an over-simplification. Some varieties, for all practical purposes, do not self-pollinate. There are less than two pages on beans—how hard can it be? Maybe I should try it. The section

on squash suggests that the four common species *(Cucurbita pepo, C. maxima, C. moschata,* and *C. mixta)* do not cross. Previously, I had read that they can cross, but that not all possible crosses are equally likely. Again, the *Guide* doesn't split hairs. If crossing is possible, but rare, the *Guide* suggests it's not likely to be an issue.

Recently, I had the misfortune of finding that my favorite hot pepper is no longer available. Sold as "Suryamukhi" by Craig Dremann's Redwood City Seeds, it seems to be one of many Indian peppers whose fruits grow in clusters. It may even be a generic name for such peppers. Regardless, Suryamukhi was prolific, and the fruits turned bright red without coaxing. Few vegetables are simultanously so edible and so ornamental. I had grown it in 2003 or so, but I failed to save seed! Now, it's nowhere to be found. I've found similar varieties and will trial them this summer, but it's difficult to imagine how any pepper could match, much less surpass, the beautiful Suryamukhi. Don't let that happen to you! If you want to save some seeds from your favorite varieties, and you don't have time to get a master's in plant biology, get this book, some airtight glass jars, and head to the garden. Δ

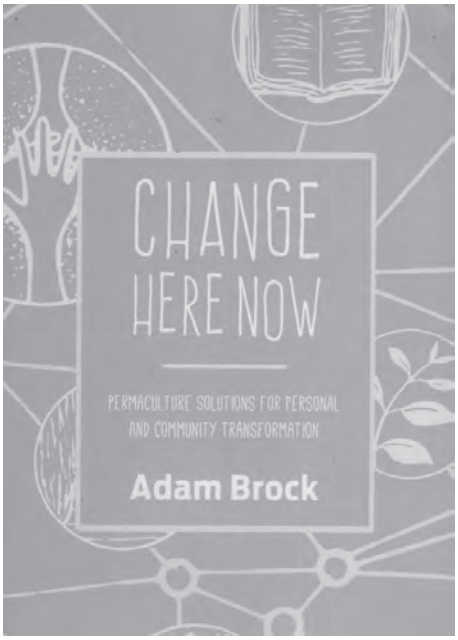
Leverage Points in the System
Review by Rhonda Baird

Adam Brock
Change Here Now:
Permaculture Solutions for Personal and Community Transformation

North Atlantic Books
Berkeley, CA, forthcoming.
366 pp. Paperback. $21.95.

THERE ARE SOME MOMENTS that set us on our path forward. For Adam Brock, an assignment in eighth grade to write about civilization in a million years set in light of Daniel Quinn's *Ishmael* was that moment. (Note the year was 2000). This is how Adam Brock opens the preface to *Change Here Now*—and it is a perfect combination of letting us know more about Adam Brock and the context that gave rise to the problem this book is trying to solve. Daniel Quinn's thoughtful analysis of the Westernized world in the classic *Ishmael* is further critiqued in *Beyond Civlization.* These were among the texts which informed my own academic query into sustainable living during my graduate seminar on "Modernism" in 1999. Much like Brock, the query merged sustainability, social justice, post-industrialization society, decolonization, and analysis of political economy that ranged over a broad ground of theory and practice. What was missing in my historical approach, was the application to current events and a theoretical basis to evolve the society we are immersed in—with all of its bouncing between local and global expressions.

Brock's response to the problem of social design is to articulate key patterns that people can reference when designing



(or redesigning) a project. In two main sections, Brock lays out the key patterns he has identified as relevant. The first set of patterns relate to permaculture design specifically. These are meant to help the novice begin to understand how permaculture can provide a framework for social and economic change.

Change Here Now is a delightful and sometimes challenging romp through Brock's collection of tools for helping us transform the civilization we've got rather than imagining what will be here a million years from now. In the beginning of each section, the preface and closing, Brock reveals his own perspective and his social agenda—true to his intelligent, earnest, and playful self. In this way, Brock becomes a guide to *Change Here Now*—which functions as a "choose-your-own-adventure" text. The book is a reference with 82 mix-and-match patterns to inform and improve your outcomes with the social structure of your project. This is an important offering to organizers, project coordinators, and activists of any kind.

Mainstream culture is becoming savvy to WHAT needs to be done (check out YouTube for the latest trendy video on any number of techniques); but even the best of us fail on HOW to get it done—especially when it comes to working with people and caring for ourselves. Gathering the right people, decision-making, developing the project, and maintaining persistent action over years require us to be flexible, responsive, creative, and caregivers with each other. This book will go a long way toward supporting not just the vision of your project, but the design of its long-term success—whether you are

Gathering the right people, decision-making, developing the project, and maintaining persistent action over years require us to be flexible, responsive, creative, and caregivers of each other.

just starting out with permaculture or you have been engaged in the good work for decades.

There are also aspects of the book that could be improved in the overall project. It might be confusing when Brock distinguishes between permaculture (and some of its accompanying pattern language which he includes) and pattern language (the second main section of the book which lays out patterns Brock identifies as relevant for social design). I would emphasize to readers that pattern language is a design tool to be incorporated in design process (see Peter Bane's article this issue). The project would be improved, in a second edition, if Brock and the publishers follow Christopher Alexander's example and reference other patterns in the book—creating the "hyperlink" effect which would help designers understand the logic and creation of pattern languages for their own projects. Brock mentions utilizing the index in such a manner in his opening matter—though this was missing from the advance copy. The Table of Contents provides a sense of the groupings and movement from larger to smaller and more detailed patterns. I will leave it to those of us who like to quibble about whether the right patterns were chosen and ordered correctly—the fact is Brock brought us a useful set with which to build a better, more just world.

There are several applications of principles and ethics to be applauded in *Change Here Now*. Using patterns as a tool to introduce and incorporate social design elements provides people with a framework for complex conversations. It also provides an opportunity to clearly (and optionally) situate spirituality and personal work into permaculture design with new language. Patterns like "Telling the Story," or "Grief" and "Role of Ceremony and the Sacred" and "Sankofa" (a Twi language word from Ghana meaning to "go back and get it" as in looking to our own cultural heritage to inspire and strengthen us) are exciting opportunities to bring key social tools into collective identity and action as a part of cultural repair. This is the same project which many in the Nature Connection world have been pursuing for a long period of time. Their work can deepen the initial sketches laid out in Brock's patterns. Look to Weaving Earth School, the Eight Shields Institute, the Art of Mentoring workshops, the work of Malidoma and Sobonfu Somé for starters and more support. The fact that Brock weaves patterns addressing spiritual and social health throughout the text at every level of social organization is an exciting and important addition to permaculture literature.

The fact that Brock weaves patterns addressing spiritual and social health throughout the text at every level of social organization is an exciting and important addition to permaculture literature.

The patterns move from global systems down to the personal—ending with personal vision. There are some critical reminders in here: about scale ("The Right Size") and interaction ("Relationship Zones") based in social science research that will help us to find the right leverage points in the system. Pattern 28, "Solidarity" contains key sections on working with privilege and power. Brock draws from Starhawk *(The Empowerment Manual*) and Looby Macnamara *(People and Permaculture)* as well as other permaculture-aligned literature. Consider the book a grab bag of the best ideas from many important contributors working the edges of social science and permaculture. The charts and graphs throughout provide appropriate and useful punctuation points and clarification of complex theories—making them more accessible.

I was not surprised to see Adam Brock offer a book on permaculture and social theory after he guest edited the issue of *Permaculture Design* on "Decolonizing Permaculture" (#98, Winter 2015). I am pleased that it is such a practical book with vision, intellect, and leadership in the field. I look forward to seeing further refinement of his thought in future books; and I encourage all serious permaculturists to pick up this book while working on design and redesign in their own practices. Δ

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