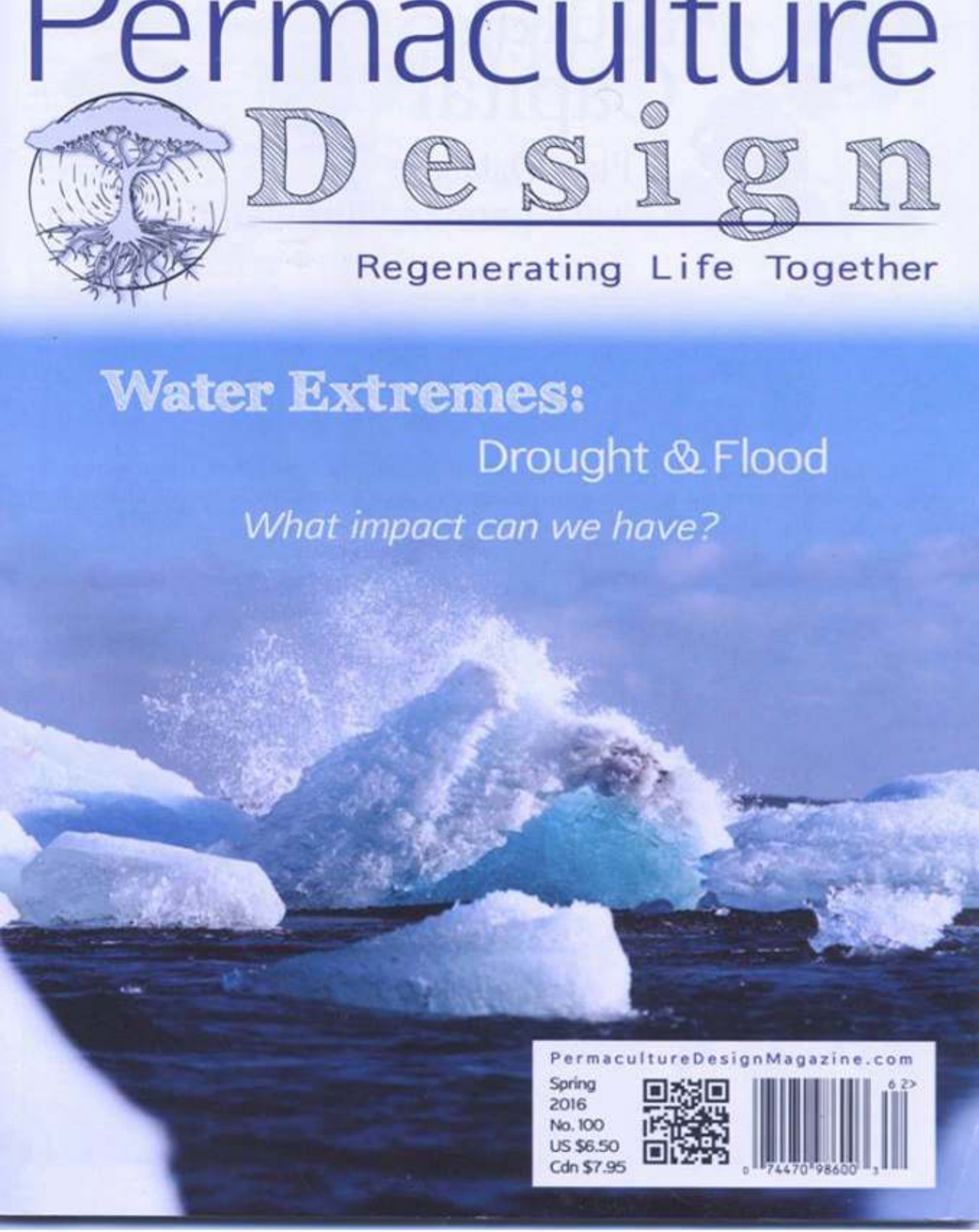
Permaculture Design

Regenerating Life Together

Water Extremes:

Drought & Flood

What impact can we have?



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Lessons from Water

Bonita Ford

I FIRST MET FRANCINE PAYER, an Algonquin-Anishnaabe Grandmother, at a Permaculture Convergence that we hosted in Ottawa a few years ago. Last year, we organized an event on "Permaculture and Aboriginal Knowledge," and Francine came to lead a Water Ceremony and give a keynote address on water.

I've learned from Grandmaman Francine that for the Anishnaabe, women are the keepers of the water—it is our role to protect and take care of the water. As women, the water in our wombs brings new life, and we therefore have a sacred relationship with the water. Water is life.

In the last couple of years, we've also been collaborating with an Anishnaabe group, called the Debajehmujig Storytellers, to bring together permaculture and traditional teachings. While permaculture offers some useful tools and approaches toward a "permanent agriculture," I'm finding that the teachings from our Anishnaabek friends fill in some big gaps on how to live as a "permanent culture."

I share this because I am keenly aware that my relationship with water includes physical landscapes and ecosystems, as well as personal, spiritual, and cultural dimensions. I know that water makes life on Earth possible; my spiritual connection with water has helped me connect with the Deep Generosity that supports our lives in a multitude of ways. The cultural teaching of being a woman and a caretaker of the water calls me to a greater level of commitment and action.

Floods and droughts that cripple nations

In 2010, we went to work in Haiti several months after the earthquake. Most of the trip was a shock to me. I had never before seen buildings flattened like pancakes, or neighborhoods packed with rows upon rows of tents. Relief agencies provided water only for the short term. People who could not afford to have a water truck fill a cement cistern would buy drinking water in small plastic sacs. Throughout the city, dry and eroded river beds were filled with water sachets, trash, and organic waste.

So when it rained, my heart spilled over with frustration and despair, mixed with a tiny glimmer of hope. It seemed like an impossible nightmare that potable water was falling to the ground unused, soaking tents, flooding roads, eroding bare soil, and carrying trash and excrement through camps and into the ocean. I had seen only a few families harvesting rainwater with tarps and barrels.

The following year, while visiting a small village in the northwest of Haiti, it was heart-wrenching to see water from the hot springs rushing through the street, and just outside the village, gouging holes into the dusty bare earth. Many people did not have a secure source of food. Again, it seemed terribly unjust that water was going to waste when it could have been redirected to gardens to help feed families.

...to reforest and feed Haiti requires that larger scale challenges be addressed.... which nullify small-scale efforts in the long run.

Make-shift rainwater catchment from roof. Port-au-Prince, Haiti.

Mass deforestation is a major factor—Haiti has "an annual deforestation rate of 5.7%, [and its] remaining 880 km^2 of forested land is gravely threatened" (1). In permaculture, we understand that trees have multiple functions: they cycle water and help create rain; they build and protect soil. No forest means less rain. No forest cover also means less protection for the soil when heavy rains do come, and less organic matter to soak up all the water. The widespread removal of forests contributes to more severe droughts and more destructive floods.

My permaculture work in Haiti was mainly with agronomists and school teachers. We focused on simple and important things like separating organics from the waste stream and composting them in the garden, installing simple water catchment structures, chopping and dropping vigorous pioneer plants to build soil

fertility, and working with annual and perennial polycultures. This work was just the tip of the iceberg—to reforest and feed Haiti requires that larger scale challenges be addressed, including immediate pressures for food, livestock forage, and cooking fuel, which nullify small-scale efforts in the long run.

After Haiti, I came back to the US and Canada, where I was shocked to see again what we do here with water. Public water fountains provide free drinking water, and most of us take them for granted. In some countries, a free source of clean drinking water would improve the health and quality of life of an entire village, and here, I've seen bubble gum and cigarette butts in water fountains. More significantly, we flush toilets, wash cars, and water golf courses and lawns with our clean drinking water, and our waterways are laced with human and animal excrement, pharmaceutical compounds, and household, industrial, and agricultural chemicals. To see this, one might think that people in our society do not drink water or require water to live.

It will take solutions on all levels—from spoons to backhoes.

When I was learning permaculture in the San Francisco Bay Area around 2003, I remember saying naively, "It's not dry here—we usually get enough rain. Why harvest water?" That was before I learned to look at water and landscapes from a much larger spatial and temporal perspective. The idea of planning for extremes was also quite foreign to me. At that time, I'd seen at least a couple of reasonably wet and lush winters in Northern California.

Given that California has been in drought since 2012, "usually getting enough rain" has not been true. Even now, as climatologists hope that the extreme El Niño will save California with significantly increased precipitation this winter, the recharging of aquifers is a gradual process that requires the slow infiltration of water (2). Millions of trees have died or are at risk of dying from the drought and from bark beetle invasion (3). The loss of so many trees does not aid water infiltration.

Haiti is currently in its third year of drought, and 3.6 million people are facing food insecurity (4). Although many of us on continental North America may not think of ourselves as food-insecure, California's severe drought impacts us all. In Canada, most of our vegetables are imported from California: 84% of broccoli and cauliflower and 69% of carrots, turnips, and other root vegetables (5). As a society, we are teetering on the edge of food insecurity. Perhaps many of us are still as naive as I once was; perhaps we do not yet fully grasp how our lives are intimately connected to clean water, healthy forests, and a stable climate.

I remember Larry Santoyo explaining that when we work high up in a watershed, we could use spoons to make changes

Winter 2014. Sébastien showing the level of the snow in our garden. Warm microclimate beside the garage that dumps snow from the roof (on left). Perth, Ontario.

and prevent or repair damage; however, the lower we go in a watershed, the more work and the bigger the equipment necessary to address the damage. What we see in Haiti and California are large-scale challenges that have eroded down through the larger physical and socio-political watersheds. It will take solutions on all levels—from spoons to backhoes.

Lessons learned: Preserve and protect healthy forests. On deforested and steep land, plant trees and choose polycultures; diverse species and forms are more resilient to unpredictable climate, disease, and pests. Food security and sovereignty require bringing food back into our own communities—grow more of our own food, store more food in cold climates, teach others how to grow food, and support local growers.

Droughts and floods in our home garden

On the home scale, I'd like to offer some observations and lessons from the place we live.

Our home is in a town called Perth, Ontario. This is unceded Algonquin territory, on a land-mass that is also called Turtle Island. We live on about 1/5 of an acre (about 0.1 ha), which is roughly 10 minutes on foot to downtown and 10 minutes to fields and young secondary succession woods. We are in a cold and water-abundant climate.

We moved to this land in 2010, and the following year we installed two 1,000 L (250 gal.) rainwater tanks (A friend was ordering some, so we said, "Why not?"). The summer of 2012 brought drought. We got close to the bottom of both tanks from watering our annual veggies and young perennials. We mulched like crazy, used town water to keep things alive (the plants don't respond as well to town water as they do to the rain) and waited for rain like everyone else.

However, in the last three summers, we've barely watered our gardens. Since that drought year, we've actually been removing mulch from our annual veggie beds, because the slugs have been getting more than their share of tender young plants

(in town, we have neither ducks nor chickens to lend a hand).

In the winter of 2014, we had a lot of snow, and an early warm spell brought a rapid spring thaw and flood that reached the 20-year mark. At a community edible forest garden project that we were facilitating, the site (a floodplain) looked like a lake. Even though we had considered wet conditions and spring flooding, we had not been extreme enough in our planning. None of us had been around long enough to see a 20-year flood. Mother Nature was quite clear—only wetland species in the lower part of that site, if we wanted them to survive and thrive.

In our own garden, which usually has very little visible runoff, it looked as if a small stream were running through it to the sidewalk and street. I discovered this in the middle of the night. I grabbed straw bales and set them up like gabions to slow down and soak up the water, and I mounded up some extra wood chips. My late-night erosion panic prompted us, later that spring, to install a small swale-like structure to help slow water and capture soil/silt.

Lessons learned: Plan for irregular weather patterns. Research longer-term extreme weather events and do your best to take them into account. Include swales, ponds, and other water-harvesting structures to store water in times of drought, and to buffer excess water during floods. If you learn a permaculture or gardening technique, consider to what conditions the technique is best suited—mulch and swales are not ideal all the time or everywhere.

Spring 2015 was unusual here—May was warm, and we had a late frost on the 23rd, which killed many people's recently transplanted tomato plants. June was very wet—the lower part of our second garden had standing water between the raised beds, and the beds themselves were soggy. Our heat-loving veggies, having been killed or delayed by the late frost, sat stunted in the wet conditions and were off to a very slow start.

Some plants did well, and others did poorly. Our Hopi pale grey squash plants were vigorous and strong; most fruit were about 15 pounds (about 7 kg), and our three plants yielded a total of 12 squash, which meant about 180 pounds (82 kg) of squash. Our three other varieties of winter squash, two varieties of cucumbers, and two varieties of melons did poorly. Our turnips, potatoes, carrots, garlic, summer squash, kale, and chard did well (not to mention the perennial greens like nettles, goji, and several alliums), making up for a smaller tomato and bean harvest. One red currant bush in particular gave about 5 pounds (2 kg) of fruit. And our Toka plum tree fruited for the first time and gave us over 12 pounds (over 5 kg) of harvest—they were the most fragrant plums we'd ever tasted! So all in all, our beloved gardens were generous, and our harvest will last us through the spring.

Flooding in spring 2014. Community edible forest garden, lower site completely submerged in about 1' (30 cm) of water. Perth, Ontario.

Lessons learned: Choose a diversity of annuals and perennials for food—a wide range of species and varieties will offer more resilience in the face of unpredictable climate, disease, and pests. Young perennials require water and attention until they are established; however, once established, during a drought, heavy mulching and spot-watering may be sufficient.

...get to know your neighbors. Share your extra eggplants....

Social capital in extreme snow & ice storms

It's ironic that as I'm working on this section, we are in the middle of an ice storm. Heavy loads of wet snow have been falling off our roof, crashing onto whatever was below. The power has been going off and on. Severe ice storms and snow storms can take out infrastructure, damaging homes and destroying plants. In the same way that flooding can bring things to a quick stop, so too can snow and ice.

Many people in Ontario, Québec, Atlantic Canada, and northern New England can remember the big ice storm of 1998. I was living in the city of Kingston, Ontario at the time, and we were out of heat and power for about five days. Some people in more rural areas were out for weeks.

What stands out most in my memory was the ambiance: friends checked on friends, strangers talked to each other in the street, community shelters offered food and hot drinks, most people were on foot, and city neighborhoods were quiet. It's alarming now to think of the intensity of the storm. And yet, my actual experience was not filled with fear—rather, it was about community coming together. I don't mean to minimize the severity of the storm—conditions were life-threatening for some. I simply share this, because when we talk about "the sh*t hitting the fan," we seem to expect the worst of people and strangers. In my experience, it has been quite the opposite.

Recently, 51 cm (20 in.) of snow fell in one day here in Feb-

ruary (roughly the equivalent of one month of normal snowfall). When I told my mother about the "winter storm warning" that called for 20-30 cm (8-12 in.) of snow, she said "Do you think maybe you want to invest in a snowblower?" I said "No, we don't want to use the gas, and anyway, this only happens once or twice a year." As it turned out, my mother had the right idea: it might have taken me 8 or 10 hours to clear all that snow by hand.

This snowstorm taught me that a more regenerative investment of energy than a snowblower is cultivating good relationships with our neighbors. That might sound like an idealistic and "fluffy, feel-good" sort of thing to say, but I mean it in all seriousness.

During the snowstorm, I went outside to shovel at 2:30 PM and was flabbergasted to see that over 30 cm of snow had already accumulated and it was still snowing steadily. Our neighbor had just started at the end of our driveway with his snowblower. I hadn't asked for help; he just did it—no questions asked. I was incredibly grateful.

On my third round of shoveling that evening, another neighbor started to help me clear the sidewalk. Although she had just finished her driveway, and her snowblower quickly ran out of gas, her intention warmed my heart. I went for a walk to look at the snowbanks and houses; I heard that some other neighbors had cleared the driveway for a family with young children.

This is an average neighborhood—we're not living in an intentional community. Most of us are average working-class folks—our lifestyles are different, our hobbies are different, and we vote differently. And somehow, we've learned to be good neighbors to each other. This is exactly what surplus tomatoes and extra jars of turnip chutney are for: creating goodwill, fostering generosity, and making new friends.

Lessons learned: On the social landscape, get to know your neighbors. Share your extra eggplants and cucumbers. Smile at people, stop to say hello, and chat about the weather. Offer to help. Say thank you.

As I've seen less in permaculture literature about snow and ice compared to drought and flood, I'll share more here. On the physical landscape, think of snow load and ice load. Ensure that smaller structures like greenhouses and sheds can handle the potential load. Consider what heavy snow and ice could bring down. Keep trees trimmed back over buildings and overhead wires. If you have a choice, below-ground electrical wires are protected from ice-load and falling branches.

Consider relative location and unanticipated effects in different seasons. The side of our garage offers our warmest, wind-sheltered microclimate for two pear trees that we are trying to espalier. However, we had not realized that by replacing the asphalt shingles with metal, the roof which faces southwest, on a mild day, dumps most of its snow on those poor young trees. We've seen more of this phenomenon this winter, with more extreme fluctuations between very cold and mild temperatures. So before the winter, protect young trees from animal browsing as well as from potential snow and ice damage.

Be prepared for power outages and being snowed in. Keep water, food (dried, canned, or stored in a root cellar), warm clothes (wool is great), candles, and rechargeable batteries.

Permaculture course participants using a water level during installation of the small swale in our garden. Perth, Ontario.

Having a heating source that allows you to cook, as well as melt snow and boil water, is ideal. Or know neighbors in easy walking distance with a wood stove or alternate heat source. Snowshoes are handy to get around in deep snow.

Conclusion

Water is a powerful teacher and a force to be respected. Water touches so many aspects of our lives from our nations to our neighborhoods, and from our gardens to our hearts.

I give thanks for the water. I give thanks for the rivers, the lakes, and the rain here. I give thanks for the rainwater that grows the veggies we eat. I give thanks for the clean drinking water that comes out of our taps. I give thanks for the knowledge of how to take better care of water on the landscape and for knowing how to protect the soil. I know that Water is Life. I give thanks for All My Relations. Δ

Bonita Ford co-founded the Permaculture Institute of Eastern Ontario. Bonita loves her garden. She also enjoys facilitating courses and design-coaching. Bonita is collaborating with aboriginal communities in Ontario to bring together permaculture and traditional teachings. www.eonpermaculture.ca and www.livinghEARTH.net

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