

**Show Transcript**  
**Deconstructing Dinner**  
**Kootenay Co-op Radio CJLY**  
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**Title: Are Agricultural Systems “Sustainable”? (Toby Hemenway on Permaculture)**

**Producer/Host: Jon Steinman**  
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*Jon Steinman:* Welcome to Deconstructing Dinner – produced at Kootenay Co-op Radio CJLY in Nelson, British Columbia. I’m Jon Steinman.

Much of the content of deconstructing dinner revolves *primarily* around the practice of *agriculture* (from examining the downsides and challenges of current agricultural systems to the *opportunities* and alternatives *to* those challenges). But in the end most of those *alternatives* that we examine here on the show are *agricultural* alternatives.

And so from time to time it’s important to step back and (in a way) deconstruct that very focus... asking the question, well are agricultural *alternatives* really an adequate response if they’re rooted within that same ‘agri’cultural box? ... In the past when we’ve brought up this question... we’ve often arrived at the subject of permaculture... creating systems that mimic natural ecosystems while providing for human needs. A much different approach than “agriculture.”

Here in North America, one of the outspoken voices advocating for permacultural systems is Toby Hemenway – the author of *Gaia’s Garden: A Guide to Home Scale Permaculture*. On today’s broadcast we listen to a talk he delivered in February 2010. Toby suggests that sustainable agriculture might very well be a misnomer and he reflects on the rise and fall of past civilizations that can help answer the question... how ‘sustainable’ is agriculture?

*increase music and fade out*

*JS:* Portland Oregon’s Toby Hemenway is the author of the first major North American book on permaculture, *Gaia’s Garden: A Guide to Home-Scale Permaculture*. He’s an adjunct professor at Portland State University and a Scholar in Residence at Pacific University. Toby and his wife spent ten years creating a rural permaculture site in southern Oregon. He was associate editor of *Permaculture Activist* between 1999 and 2004 and he now works on developing urban sustainability resources in Portland.

In February 2010 he spoke in Dover New Hampshire and this recording is courtesy of Making Waves – a weekly radio show out of WSCA, Portsmouth.

*Toby Hemenway:* The word sustainability has become a real buzzword. People are using it all over the place. Using it in many different ways and we talk about sustainable this and sustainable that. And all these things are now being done sustainably. So I want to unpack the word a little

bit. The formal definition of it, or at least as far as “sustainable development” is concerned, the United Nations uses “Sustainability” in this way: That Sustainable development is: we get to meet our needs and then the future gets to meet theirs.” Is kind of the phrasing of it and I think the key word in this statement is the word “need.” “Meet our needs.” Okay. So I want to go into the word “need” a little bit. I *need* in the morning my half-caff soy quarter inch soy foam chocolate sprinkles on top Starbucks latte, well actually I don’t get it from Starbucks, but you know, you *need* those things. That’s one way to use the word “need.” Or when I talk to my friends who drive great big cars, I know that they know the carbon foot-print, the environmental impact and all that of a gigantic car, but when I ask them, “So why do you drive a great big car?” They say, “Well, I *need* it because I run the carpool at work.” “I *need* it because my kid’s in a band and we have to fit all her equipment and the band members in the car.” Or “I *need* it because I’ve got a big family.” Or “I *need* it because I don’t feel safe in a small car with all those other big cars around.” So again, it’s this word “need” that gets used. Really, what is a “need.” Or agricultural people *need* large families because that is their work force and their security for the future. Or, “It’s hot outside so we *need* an air conditioner.” If you’re down in Huston or some place like that, those places are uninhabitable the way that they’ve been built now without air conditioning. So that word “need.” We get to meet our needs. Where do you draw the line on what a need is? So I don’t think that’s a very good definition of sustainability or sustainable development, talking in terms of needs.

So I want to look at sustainability a different way. I think of the word sustainable as being the midpoint, a half-way mark between things that are degenerative, things that break things down as they occur, things that pollute, things that fall apart or things that need constant repair. A lot of our activities in other words. And things that are on the other side of the spectrum that are regenerative, which are mostly biological processes. Things that make conditions better when they operate. Because sustainable is kind of right in the middle right? Sustainable just means, another working definition of it is you can keep doing it over and over indefinitely and you’re not going to use up all the resources, but it’s not really going to make things any better either. The way I think of it is if someone were to say well, “How’s your marriage?” “Well, it’s sustainable.” It’s not all that great, right? So we need....need right? There is that word. It would be great for us to be shooting for more regenerative systems. Activities that will build and enhance the environment, that will create conditions that are conducive for life rather than degenerative activities. So that’s where I want to go with the word sustainable.

And when you start asking okay, “What is sustainable?” you have to really ask, “What’s the time frame?” Life has been on this planet, here’s a spiral of life on the planet going in fact 3.8 billion years and I think we can pretty well figure that nature has learned what sustainability is, that life knows how to be sustainable. So we take our cues from living processes. But looking back on that time frame, we’re really talking about human beings. It helps me to get a grasp on being sustainable, you know, how long have human beings been around? And how much longer can we be around? Because we’ve been around for a while, and so I’d like to look at that. A sustainable human culture. What would that look like? So if we look at how long has human culture been around we can begin to get some picture of what a sustainable human culture looks like. So some guesses, or just a way of ball-parking how old human culture is, the first tools show up about 2 million years ago or so. So that’s something really noticeably human, I mean there are a lot of animals that use tools, but it’s something really noticeable that our ancestors

began doing about 2 million years ago. So there's 2 million years of tool use, about 500,000 to 800,000 years of controlled use of fire, and that's another activity that's really kind of a hallmark of something that we recognize as human. Even though the ancestors that were using these things pre-date the genus homo, in some cases, but it's a hallmark of our kind of culture. Or if you look at the evolutionary history, the lineage, of the various human and pre-human ancestors, the genus homo shows up between 1 and 2 million years ago.

I'd like to take a million years as a good middle ground as to how old human culture is. How long our ancestors were doing things that we would recognize as human activities, as part of human culture. So where I'd like to go with that is I have a little prop here and it looks like a ball of yarn, it's actually a time machine and we're going to use it to go back a million years. The way that's going to work is, this ball of yarn is 100 feet long which means if this is a million years then each foot of it is 10,000 years. So there's 10,000 years of our history, just zip, went back 10,000 years. 10,000 years takes us back to the dawn of agriculture. So there's 10,000 years. So what I'm going to do is hand this out and have you pass it around the room. And we're going to see at 10,000 years per foot, or what's that...800 years per inch. There's 800 years, that's a bunch of human life-times, that's like 10, 12 human lifetimes, right there. Just get an idea how long that is.

What I want to do is, while that is going around, the distance between each one of you is probably 30,000 years or so, that's another way to think about that, 30,000 years or so between each person, 3 feet. So how long have we been doing things like weaving baskets together? There is an element of human culture, sitting around doing crafts together. That's a long, long time, hundreds of thousands of years, or we could say, again, a human activity that we've been doing for about a million years give or take. And we're still sitting around communally doing crafts together, sitting, chatting, making things together. We've been playing and making musical instruments, I mean, probably the human voice has been used to make music ever since we started making sounds. It probably pre-dates the genus homo, certainly. So music, a very important part of human culture, art. This is a cave painting from Lascaux, it's only about 40 or 50,000 years old, but there are bits of art that are far older than that and I'm sure people were making wood figurines and clay figurines for a very long time. Things that we have done that make us human. Where's that ball of yarn at this point? It's made it around here, we're what, like half way? So we're 500,000 years back at this point, sitting around doing all these things together. So making shelter both individually and communally, we're still doing barn raisings together, we're still building shelter all the time. Again it's really nice to be in this good old building here. Food gathering, food preparation, food production, another really important, incredibly important piece of human culture and we've been doing that since before we were human because all animals gather their food and do food production, food gathering. And raising children of course, another "older than we are" part of human culture.

That yarn is still going around. It's actually a little bondage game we're going to tie up the whole room. No, not really. Is it ok to say that on the East Coast? I know I can get away with it in California, but... (laughter in the room). I actually was born in Connecticut, so I'm an old New Englander from way back. It's fun to be back here for sure. The landscape really pulls, this glaciated, rocky, hardwood terrain, it's like that's in my bones.

All these activities are things we know as human beings and we've been doing them for a million years or so is what this ball of yarn is saying. It's *still* wondering around the room, so I'm trying to use up a million years-worth of time here and talk about human culture.

While this ball of yarn is finishing up and you're getting an idea of how old a million years is, how old we've been doing all of these things together, where I want to go is, the last foot that I am holding, here is the dawn of agriculture and here is all of agriculture right here, with 990,000 years or so of foraging, horticulture, all the other ways of making a living. But that's all that agriculture is. We really think of agriculture as being at the heart of what we are as human beings. The creation of civilization and all that, it's a tiny little gloss on top of all those other things that are in our bones really, really deeply that are much more important parts of being human. So that's what I want to talk about tonight, is agriculture and all the other ways of being human and where that takes us.

There was an anthropologist in the 1970s named Yehudi Cohen and he was trying to look at how we differentiate the different cultures. What makes people really different from one culture to another? What is a different human culture? He talked about the three basic human needs of food, shelter and reproduction. And he said shelter, it doesn't figure that largely into differentiating cultures because you build a shelter and it lasts for years, or however long, a pretty long time. One shelter lasts a long time. Same with reproduction, one sexual act can, well if you're lucky or unlucky (depending on how you want to look at it) result in a child and so even though we're obsessed with sex as a culture, it doesn't really define culture because it's not at the heart of differentiating cultures. But food it turns out, the way that a culture gets its food makes big differences between...like people who are foragers as opposed to agricultural cultures are really really different.

So Cohen divided up cultures into five different forms based on how they get their food. And the oldest, the one that really makes up a lot of this purple part of the yarn is foraging or hunter gatherer and that's essentially how animals get their food and we just kept on doing it up until fairly recently. So there's foraging cultures, there are horticultural peoples. And I'm going to talk more about this later, but it's essentially gardeners instead of farmers, or people who are tending plants and maybe even animals but not really domesticating them that much. Then there are agricultural peoples, we recognize that. And those are really kind of the big three. And the remaining two cultures are subsets of agriculture but they're different enough in the way people make their living that they're considered different cultures. So number four is "pastoral people" and I put it in parenthesis because it is kind of a subset of agriculture, usually nomadic but people who are herders, and the reason it's a subset of agriculture is because you have to domesticate livestock first and that's kind of a mark of agriculture, is domestication. And then the last one, last but not least, is industrial cultures, but you need agriculture again to generate the population levels and the food production and all of that to support a large culture with all the stuff that industrial cultures need.

So where did it end and where has it been. Wow, it made it all the way back to there again, I just saw it over here. So that's a million years. And here's agriculture, pretty small. So maybe we could do things other than agriculture. I want to look at agriculture a bit because we do regard it so much as the root of who we are. Really, we think of agriculture and civilization pretty much

linked, that you can't have civilization without agriculture and vice versa. The Latin root is cities, gatherings of sedentary people over bigger than village size, and usually differentiated where there's a real separation of labour. Civilizations would be large gatherings of people. What I want to distinguish is that civilization and culture are two different things. I'm going to go there a little bit.

So here is the Fertile Crescent in Iraq or what used to be Mesopotamia and this is the juncture of the Tigris and Euphrates River in Iraq, it used to be called the Fertile Crescent which is kind of a cruel joke at this point from what it looks like, because after about 3,000 years of agriculture there and probably some climate shift, but 3,000 years of agriculture, that is what it looks like, and it's looked this way for about 7,000 years, so it hasn't come back. So there's the ancestral home of much of agriculture. There a number of ancestral homes, but this is the ancestry of wheat and a lot of domesticated animals.

Here is Greece. This is an eroded gully in Greece. If you look at the writings of ancient Greeks, writing like 500 BC, or 400 BC or so, they talk about the Verdant forested hill sides of Greece and the brooks and rivers running every where and it was a green and lush land with thick deep soils and three or four hundred years after those folks were writing it looked a lot the way Greece looks today. Those of you who have been to Greece, or even just seen pictures, it's this white glaring, nearly treeless, badly over grazed landscape. So it took about 500 years for Greece to no longer really be able to practice much agriculture, they had to expand into other areas to get their food after about 500 years. And then there's the US dust bowl which was about 150 years of agriculture before it got to this state. And we've managed to power our way out of this cycle because of fossil fuels in that we can now apply so much energy to our land that they don't degrade as quickly.

One of the things that's fun about being back in New England, my mother was raised in Connecticut and I always heard two different stories about all the stone walls everywhere in New England. One was, they were always there because the soil was always so rocky that farmers had to put up stone walls as soon as the Europeans got here, so they're very very old. And then the story that came down from my mother's side of the family, because she's half Irish was, well the Irish built those stone walls. And I was like, the Irish didn't come over until 1820, 1830-40 that sort of thing, what's the story. And I just found an article in the Journal of Science about a year and a half ago, that said, indeed, most of the stone walls in New England were built between 1800 and 1850 because that was when the top soil disappeared. It took about 150 years of agriculture in New England to knock out the top two or three feet of topsoil and get down to the rocks. So the Irish happened to be the immigrant population that got stuck with the grunt work of building many of those walls. So those walls that feel like such an innate part of New England are really a sign of the degraded landscape.

*JS:* This is Deconstructing Dinner. Today's episode is archived on-line at [deconstructingdinner.ca](http://deconstructingdinner.ca) and posted under the July 15<sup>th</sup> 2010 broadcast. You're listening to Toby Hemenway author of the book *Gaia's Garden: A Guide to Home-Scale Permaculture*. Toby was recorded speaking in February 2010. Toby believes that the term 'sustainable' agriculture might actually be a misnomer, suggesting that agriculture itself might not be sustainable. In this next clip from his talk he reflects on the historical tendencies of agricultural societies to often be

conquering societies, and he says that it was the practice of agriculture that has fuelled that conquering.

*TH:* It makes me wonder, is the phrase “sustainable agriculture” really doable? Is it an oxymoron? Can we actually have a sustainable agriculture? So I want to look at what agriculture does. One of the things that agriculture does, it structurally must increase population because it increases the food supply so drastically. It works like this, more food allows more people to breed. It’s a signal that the environment is great, so let’s have more babies. All animals do that. In high resources, the birth rate goes up. And then more people will need more food. So it’s this positive spiral of more food, more people, more food, more people. And that’s one of the reasons the population rate sky rocketed starting about 10,000 years ago with the dawn of agriculture. Another really important piece to population boost is that once we shifted over from meat and tubers and vegetables, protein meat, although it’s great for building muscles and structure, it’s not that great for converting into energy. Grains are much more easily converted into calories, into energy and it’s energy that really gives you the signal that it’s a healthy environment to have babies in. Not so much protein, but how much energy you have. So grains are very easily converted into calories, so the domestication of grain was a really huge piece of that. Another piece about grain is that soft food means you can wean your children much earlier than you can if you’re trying to feed them meat and tubers and vegetables. So women who are nursing tend not to get pregnant very easily so the lag time between pregnancies decreases *drastically* once you start weaning your children much much younger on soft porridges which are available with grain. So interval the between pregnancy really decreased, population just goes up inexorably. You can enact laws about birth control but when you’ve got all the food in the world, it doesn’t hold very well.

Another thing about agriculture is the land use. It doesn’t just use the land that you visibly see that crops are being raised on, there is a huge amount of land invisibly, at least before the oil age, it’s been calculated that if you are raising all the feed for your animals, or all the compost crops that you need, you need roughly three to four times as much land for that as you do for growing the food that a farmer who is raising animals needs a lot of pasture space, animals for labour and that kind of thing. We were able to shrink that footprint when we started using oil in agriculture because we no longer needed to use animals, but a big footprint because of the animals, a lot more land for forests, for the mines, to extract ores, for timber, for fuel, those kinds of things, and a bunch of land for the workers and their housing and their needs as well. So huge land footprint, far beyond what you see in just the crop land in agriculture.

Really what agriculture is doing is turning ecosystems into people. It’s not really compatible with intact ecosystems. A corn field is not an ecosystem. A wheat field is not an ecosystem. So farming destroys functional ecosystems, it’s just not compatible with them. And the issue there is that if you’re a forager, if you’re going out hunting deer or gathering greens or something like that, you get feed-back very quickly from the landscape when you have over harvested. You start getting hungry because there isn’t anything out there. So it’s really quick feedback, and you slow down. Whereas it *is* the degradation of a landscape that is the sign that you’re being successful in agriculture. You cut down the trees, you start mining the soil for food, and the feedback you get is you’re doing a good thing for a while, and then after whether it’s 50 years or 500 years, *then* things start to slow down because you’ve mined out the nutrients in the soil. So you don’t get

feedback very quickly that you have harmed the ecosystem. It's absolutely the opposite with agriculture, whereas foragers get feedback very quickly.

Then there's this other myth, it was Hobbs who said savage people, the pre-agricultural, non-agricultural people, life for them is nasty, brutish and short. It turns out that that's absolutely the opposite of what is true. I don't want to paint pre- or non-agricultural people as they have a wonderful happy life where tra-la-la. There were definitely problems that they have as well, but it's a myth that suddenly we got much better health when we got agriculture because there are sights, there's one called Dixon Mounds in Illinois, and there are a bunch in Turkey, those are the best studied, where they actually have skeletal remains from pre-agricultural people and then right into the transition, right there in the same space, into agriculture. Abu Hureyra in Turkey and Dixon Mounds in Illinois are two of the best studied ones. And they find some really interesting things in checking the skeletal remains.

One is that lifespan drops. Pre-agricultural people in Dixon Mounds had a lifespan of about 35 years, which was pretty typical for people up until about the 1800s or so. Lifespans in ancient Rome were around 40, and even in the middle ages were not much more than 40, so 35 is not that bad an average lifespan. It didn't mean you were old at the age of 35, it just meant that most people died young, and some small percentage made it to 65 or 70. So lifespan drops from 35 to 29 when agriculture comes along, average lifespan at these sights. That's a big drop. Far more degenerative diseases that all sorts of injuries and spine problems, hip problems, things like that occur, arthritis, many degenerative diseases, spine problems, wrist, things like that all show up, particularly in women.

Epidemics. Those of you who have read Jared Diamonds really great book *Guns, Germs and Steel* know that most of our epidemic diseases come from domestic animals. Chicken pox, small pox from cattle, measles and mumps from pigs, living with domesticated animals, spread far more epidemics, I mean there are others, bubonic plague comes from fleas and rats, and there are others that didn't come from domestic animals, but lots of them do. So far more epidemics.

Regular famine. This is a real myth about agriculture, is how we can store food so we won't go hungry. It turns out that foragers can almost always find food, hunter gatherers can almost always find food under any conditions, they might be hungry but they can find something. And their population levels are small enough, so they can find food. Whereas agricultural people famine was a really regular visitor.

Smaller stature. People got shorter. The average height before agriculture in these Turkish sights was five foot nine, went down to five foot four after agriculture and people in Turkey are just now getting back up to five foot nine in that same region with a diet that has a lot more meat. Not so good on the health front.

Then we discovered agriculture and it freed us up to do all these other activities and things like that, agricultural people worked really hard compared to lots of other folks. A skilful forager really only needs a few hours a day to gather a week's worth of food whereas farmers generally need half of their week just for their basic food needs and then some more to pay the rent on the land or taxes that they have. So farmers work much harder. What's the line in the bible about "in

the sweat of thy face, thy shall eat thy bread.” Agriculture is hard work. That’s when we were sent out of the gardens, you are going to sweat for your food now.

Agricultural societies are not very diverse. They look pretty recognizable from one place to another. Foraging societies are wildly different. The Sun Bush people of Africa are so different from the Yanomami in South America, from the Inuit in Alaska. They’re really really different, different people. And the surplus that agriculture generates, someone’s got to control it right? You’ve got a big store of grain, someone’s got to protect it, make sure your neighbours don’t take it, so it’s the beginning in a way of the police state because you need an army to protect it, you need someone who gets to be in charge of it. Right, you have the beginning of larger scale war. There’s definitely been fighting. But you get class differences. In forager societies, usually the leader rules by charisma and personal magnetism, rather than a bunch of guys who will hurt you if you don’t accept their lead and you get far more hierarchy than that in agriculture. Usually in horticultural and foraging societies you can actually go and talk to the head person, which you certainly can’t do, it’s hard to even meet with the mayor in these small towns let alone talking to Obama.

And the other piece about agriculture in just its movement is that it’s very portable. If you were a forager, you know the rivers, you know the creeks, you know the spirits who live in your valley, you know where the food is, you know when the game come in, you know when the birds migrate, you know what’s in bloom when, what’s in fruit when. So why would you leave? Leaving means you leave all that behind, moving somewhere else and also the population pressure is much less. With agriculture you clear the trees, you plant the wheat, you can do it anywhere the climate will support it. So agriculture is much more portable. And when they track the movement of agriculture across say Europe it’s not agriculture alone that moves, it’s the agricultural people that move, the genetics continue to move, so agricultural people tend to be conquering people because they’re populations are expanding and they can move agriculture very easily into habitats.

This is a graph out of Joseph Tainter’s book, *The Collapse of Complex Societies* showing that there’s a point of diminishing returns. We’ve all heard the story of how a typical potato contains ten calories of oil for one calorie of food energy that it gives you. It turns out you reach that break even point, the point of diminishing returns, of one calorie in, one calorie out, right about the time you start using animals in food production. As soon as you start using draft animals to pull ploughs and produce manure and that sort of thing, you have to include the animal’s energy budget in your equation. To be fair about it you have to include all the energy it takes to feed the animal because that’s part of feeding you and that’s right about when you reach the point of diminishing returns. In other words plough agriculture, right about then.

Foraging and horticulture seems like it’s pretty renewable and once you get over that bringing animals in, you’re putting more in than you’re getting out. It’s just that it didn’t matter because we had a whole planet to keep moving to when we used up too much of one area.

Let’s look at that, let’s look at moving around with agriculture. So here’s the movement from the dawn of agriculture, at least the agricultural centers in Turkey and that area, the spread of the Persian Empire moving out across so much of the Mediterranean and the Middle East, about 500

B.C. was when they kind of reached their peak. They pretty well exhausted a lot of land, about 500 B.C. was when much of their land was no longer viable for agriculture, so they kind of passed the torch to the Greeks. The Greeks moved from the Greek Isles to a lot of low lands around and did a lot of their agriculture here, as they had used up much of their land. Then we move to the Roman empire who kind of picked it up next, started in low land Italy but very quickly exhausted that. I think a lot of us have heard this expression, “the Northern Africa was the bread basket of Rome.” First it was forested, they cut the trees down to build their ships, and then they planted grain in Morocco, places like that that are now desert, but it was the bread basket of Rome. So Rome expanded through much of the Mediterranean, imported lots and lots of food. There were about a million people in the city of Rome alone, which took food imports from a lot of places. So then, agriculture spread through the rest of Europe and the rest of Europe spread all over the planet, and this is driven by their ability to produce so much food.

And then the same thing you can see in the United States starting with the settling of New England. One thing that really intrigues me, after the Civil War folks rode home and said, “hey, there’s no rocks in soil here so let’s all move to the Midwest.” A lot of farms were abandoned around 1900, 1880 or so in New England. An interesting fact is that most of the vegetables grown in this country are grown in the last soil to be cultivated by European methods. The Central Valley of California produces enormous amounts of the vegetables because vegetables have really fastidious soil requirements, they need a lot of minerals, they need really good soil. So this is the last place we can really grow good vegetables. You can grow grain anywhere where you can put in Nitrogen and Phosphate, Calcium fertilizers. But vegetables require a lot of minerals. So we pretty well depleted most of the soils in the rest of the country to beyond the point where without very special care they can grow vegetables.

What changed things for us, because there were all these dire predictions, those of you who are old enough to remember the 1970s, these predictions that there were going to be hundreds of millions of people dying because of famine that didn’t happen because Norman Borlaug and a group of other people discovered how to turn oil into food, and the green revolution came along. What’s interesting is looking at the graph of wheat yields from 1950 – 2004, and you can see it’s this greatly rising curve. If you look at oil production for the same time, it’s really similar in graph. We learned to turn oil into food. And population does something very similar, you can see things are levelling about here, as oil production has been for the last few years. So we’re kind of reaching, maybe, who knows what the future will bring, I’m not going to predict, but the trend is pretty clear. So the green revolution allowed probably 2 billion more people to be born on the planet because it fed so many more folks.

Here is the green revolution now. This is a field in India that was farmed for about 20 years using irrigation of very salty water from wells and lots and lots of fertilizer. Unfortunately the subsidies ran out and so these guys don’t get green revolution crops and fertilizers anymore and this is totally salted soil, it is not going to come back without being flushed with immense amounts of fresh water, which they don’t have, or very very deep mulches which is really hard to come up with as well. So this soil is kind of out of the picture for a long time. So there’s the long term picture of the green revolution, once you run out of money to subsidize it, because it’s very expensive.

I think a lot of you are familiar with peak oil, here's one of the kind of magnified graphs here of oil consumption. Oil production has been pretty flat since about 2005. So where do we go? In 10,000 years of agriculture we pretty well degraded...I mean, name one ecosystem that has had agriculture enter it that is better off for that. And then the next question is how long can we keep doing that? Well, we probably don't have another century of it.

*JS:* This is Deconstructing Dinner – a syndicated weekly radio show and podcast produced at Kootenay Co-op Radio CJLY in Nelson, British Columbia. I'm Jon Steinman. If you've missed any of today's episode, it is archived on-line at [deconstructingdinner.ca](http://deconstructingdinner.ca).

We've been listening in on a talk delivered by Portland Oregon author Toby Hemenway. Toby is an adjunct professor at Portland State University and a Scholar in Residence at Pacific University. Toby and his wife spent ten years creating a rural permaculture site in southern Oregon. He was associate editor of Permaculture Activist between 1999 and 2004 and he now works on developing urban sustainability resources in Portland. He's the author of Gaia's Garden: A Guide to Home-Scale Permaculture released by Chelsea Green in 2009.

In February 2010, Toby spoke in Dover New Hampshire and this recording has been made available by Making Waves – a weekly radio show in nearby Portsmouth.

In this last segment Toby's talk he introduces permaculture and horticultural based systems as (what he believes) are more sustainable models to produce our food and our needs.

*TH:* So this is a graph that David Holmgren, one of the co-founders of permaculture put together. And just looking at his idea of energy futures, and he's got four different scenarios. We're about here looking at consumption of energy.

Here's what he calls the techno-fantasy idea, little pejorative term so you can kind of get an idea of what he thinks of it. The idea that we will discover something, another highly concentrated energy source that we don't have right now, or manage to somehow make something work, so we'll just keep on going, which opens up a bunch of other problems.

Then there's the green textability, the idea that we will cover the planet with solar panels and wind generators and there'll be a little bit of a drop and then we'll kind of level out, hit a majority, keep going a little bit below where we are now.

There's the Atlantis scenario, that's it. Enough said.

And then there's the Creative Descent, sort of a permacultural future idea of learning to live within a solar budget over the next 50, 100, some period of time. And one of the things that I'm a little optimistic about, and when I get up on the optimistic side of the bed, is my background is in biology and I learned quite a bit about population biology when I was younger and when you look at population crashes, like when the rabbits die off because there's no food, or that sort of thing, population crashes are very rarely because of all the animals die, that kind of thing. It's that they run out of resources and they fail to breed, and that drops population really really quickly, simply through attrition. And if you do the numbers we're at 7 billion now and an

estimated peak of about 9 billion if things keep going the way they do. But if the entire planet paid attention to resource shortages which we're going to have to do I think. If the entire planet shifted over to the birth rate of what Europe is right now, which is 1.4 per woman, that gives us about a 2-3% decrease per year in population and in some places even faster. So we could be down within 80 years to between 2-3 billion people on this planet without the big die-off. Without the, "we're all going to die, we're all going to starve to death" simply through failure to reproduce.

One interesting archeological bit is that we've already been through a peak before. Peak Wood has actually occurred at one point, as opposed to Peak Oil. Anthropologists wondered for a long time, how come the Bronze Age ended? What happened and there were lots and lots of theories and one that is becoming fairly popular is that they ran out of wood. This is how it works, the Bronze Age preceded the Iron Age and yet Bronze is a much nicer metal than Iron, so why would people shift to Iron after Bronze, after this thousand year gap after the end of the Bronze Age? And this is one of the theories: Here is a Bronze plough, it weighs about a kilogram, about 2.2 pounds or so, six cubic meters of wood will smelt a kilogram of Bronze. So if you start running the numbers on how many trees it takes, six big trees to make that much Bronze. How many ploughs out there, how quickly you would go through all the forests on the island of Crete or somewhere like that. It's about 200 years to completely deforest. So I feel really lucky all this metal stuff that we have here, my belt buckle, is like probably half a tree to make something like this belt buckle. We get to use oil to do that, so we've been incredibly lucky. But we've already been through peak resource use before, several times, so that's kind of the nadir we're at the bottom, so let's come back out of this.

So we've got all this infrastructure is collapsing and garbage everywhere and soil erosion and climate change and all of this, is it the end? And this is where I want to look at permaculture. Permaculture, really I think is the restoration of, or an evolution to a horticultural society as opposed to an agricultural society. Let me just go through what I mean by horticultural society. It's from the word 'Hortus' for plant as opposed to 'Agros' in Agriculture which means field. So instead of creating fields, we're growing plants, and that's a different mindset. It's really about gardening rather than farming. So tool use, it's small tools as opposed to ploughs, it's more hand tool oriented, although it doesn't have to be. Smaller scale and using mixed crops rather than 10,000 acres of soy beans and that kind of thing. 10,000 acres isn't that big of farm in the Midwest.

Horticulture encourages in many cases the ecological process of succession, the movement of annuals to perennials to forest. You can do gardening in an open forest garden. You don't have to mow down everything and plant annuals. So it allows succession, or actually encourages succession because you want to grow fruit trees and nut trees. That's a later successional phase. A really huge thing about horticultural systems is they allow the ecosystems to function. You can have a forest and get food from it and still have habitat and game and clean water and clean air and all of that in a horticultural system. So by horticulture I don't mean what we mean by horticulture when we talk about a guide to North American Horticulture. It's like horticulture meaning culture of plants, a society that cultures plants.

Hierarchies in horticulture societies tend to be much much flatter, same with forager societies. And this is really what got me started on this, I kept noticing in the classes that I was teaching, not so much these days, because permaculture appeals to a broader audience than it used to, but the classes that I used to teach, a huge percentage of the students, although they came from the Judeo-Christian background usually similar to mine, they were goddess worshippers, they were pagans and wiccans and people who believe if they had a spirituality was about earth spirits and that sort of thing. And I was like, “why are my courses attracting a bunch of pagans? What’s with that?” So a friend of mine who is a pretty good anthropologist said, “well you know agricultural peoples tend, with the possible exception of the Buddhists, they tend to worship a deity that is up there somewhere, it’s up in the sky, it’s invisible. And horticultural and foraging people, their spirituality tends to be earth based, that the earth, Mother Earth, the Goddess Gaia and animals all have spirits, places have spirits that we’re surrounded by Spirit and we’re just one other species that has spirit along with these others and we’re no more important than the others whereas agricultural society, mostly, we are a chosen species, we have been chosen by the deity to have a special role and horticultural and foraging people generally don’t have that. We are just one among many.

I realized that I’m seeing all these students who, what they’re really doing is they’re coming from more of a forager, horticultural background, rather than an agricultural background. Or they’re trying to move toward a horticultural society rather than an agricultural society. That was really what got me started on this. So really culture and agriculture are two different things. You can have culture without agriculture. A really influential and still controversial paper was written in the late 1960s called “The Original Affluent Society” in which Marshall Sahlins found how little foragers and horticultural people really worked and what a high standard of living they had compared to many comparable agricultural people. Showed that we work a 40 hour work week, they work an 18-20 hour work week, that kind of thing. So foragers and horticulturalists have all the things we consider part of culture.

So they have all these things that we consider part of culture. They do music and crafts and spirituality and they have medicine and all these things. So you don’t need to have civilization and agriculture to have culture. So what are we doing? How would we do this? Because we don’t go back. I don’t see, short of a global holocaust, I don’t see us going *back* to a forager society. What would these things look like? How can we create human productive landscapes or be a part of landscapes that produce things for humans and yet allow all the natural functions, what we now call eco system services, like clean water and clean air.

So one important piece of this is having to do with cities. We have these really really linear patterns in cities and if you look at older American cities like Boston for example, there’s anywhere streets meet there’s a square. There’s Copley Square and all these different squares, European towns are the same way. The grid doesn’t allow that, it doesn’t allow this gathering of people to occur. If you look at traditional villages, anywhere that streets converge, that paths converge, you have a public gathering place. But what I want to do is show you some models of non-agricultural societies. Horticultural societies, like the Amazon, those of you who read Charles Mann’s really great book “1491,” far more influences of people in the Amazon than anyone ever expected. And ecologists have censused a lot of the trees looking at species make up in the Amazon and have found that the fruit trees and timber trees and useful trees for humans

are way out of proportion to what you would expect them to be if they were just random assemblages of plants. The Amazon has been tweaked toward being a food forest, and yet it's the lungs of the planet, it's one of the most bio-diverse places on the planet. So I was in Bali many years ago, I took many pictures of rice paddies and then when I went back after doing a little permaculture I looked at this and said, "that's not just a rice paddy." This is a grain based agri-forestry system where all of these trees are food producing. These are pineapples and back here are some mangos, all of this stuff is food producing and yet there's lots and lots of wild life. There's lots of ecosystem services going on here.

Then if we move to temperate climates, because the tropics have got a lot of stuff going on already. The prairie, major river valleys all over North America were highly modified by the people who lived here before Europeans got here. They were in many cases, where there were trees there were food forests and they were preserved that way by fire and manipulation of environment and yet we hear these stories of the flocks of birds taking days to pass overhead, or salmon so thick that you could virtually walk on their backs to cross a river. So what we were seeing when Europeans first arrived, Verrazano and some of the early explorers who wrote journals in the 1500s said you could drive a wagon from where Boston is now to where Washington DC is now through the forest because things were so open, and yet game was so abundant and lush because these people knew how to work with the environment, to tweak it. Look at what the old forests used to be made of in the 1600s, 1700s, was White Oak, which is a very nicely edible acorn once you leach it a little bit, Walnut, Chestnut, Beechnut, Hickory Nut. All of these different nut trees were an enormous part of the over story and then crab apples and all sorts of other edibles underneath pawpaws, these sorts of things. This was a forest that had been manipulated and by the time Emerson and Theroux started writing about the forest, primeval, this dark tangled kind of scary thicketed place what they were looking at was a degraded food forest that had had its keystone species, the gardeners removed from it. It took about a hundred, two hundred years for it to degrade into this kind of scary wilderness place.

Let's look at the way that anthropologists looked at the transition from foraging to agriculture was that we were foragers for a long, long, long, long time, then there was this brief, like a week where we were horticulturalists and then we discovered agriculture. Not a week, but a really short period of time. Horticulture was this short little transition on the way to agriculture and it turns out that's not true at all. There have been stable horticultural, gardener cultures, not doing big grain crops, maybe a little bit of corn, domesticating a few crops, but mostly doing wild tending and doing gardening and minor amounts of domestication. The Hopewell people in New Jersey and Pennsylvania were there for at least 4,000 years as gardeners essentially. And doing some hunting and foraging and that sort of thing, but a stable horticultural society for at least 4,000 years which is pretty stable. So they were mound builders and they had this lovely sculptures, art that they did, these were a highly cultivated people, they had a great culture and it was a stable horticultural society. Just a few other stable, long term horticultural societies: the Northwest Coast people's, ancient Oaxaca, there were folks there who were at least 6-8,000 years of horticulture, not agriculture, but more than foraging. People called the Nuauulu in Indonesia was another several thousand year culture. The Owens Valley Paiute and the Kumbaya in California, a lot of horticultural peoples in the California area because it just was so lush and wonderful for them. So horticulture can be a stable way to have a society at least as much as agriculture is. It's clearly not just a transition on the way to agriculture. And to me, a horticultural society is one

that is more likely to be sustainable than an agricultural one. You can allow the ecosystem to persist while you still have a fair number of people in it.

A few models here, I'm just going to go through just a couple of ideas that we've got here in permaculture. The Bullock Brother's Homestead on Orcas Island in Washington State, 25 year old food forest that just knocks me out whenever I go there. It is so gorgeous, they get 50-60 students and residents there, living there for a month and there's still tons of fruit on the trees on the five acre site after 60 people wondering around grazing. It's on Orcas Island on the Northern part, the Bullock Brother's Homestead, their website is [permacultureportal.com](http://permacultureportal.com)

Penny Livingston's place outside of San Francisco in California is the Permaculture Institute of Northern California and the Regenerative Design Institute, an incredible food forest, really really productive. And there are many many many many other sites and here in New England we're lucky enough to have Dave Jacke and John Oniger and Eric Toensmeier. Eric and Dave are the authors of "Edible Forest Gardens" which is the like Bible of creating food for us now. It's an incredible book. Dave Jacke lives in Jaffre New Hampshire and Eric has a little urban plot in Holyoke. These folks are working out how to recreate these forest gardens, these food forests and horticultural ways of living.

This is a design by David Holmgren that we call the permaculture flower. And each peddle in the flower talks about a different element that we need in a sustainable culture. There's health, finance and economics, land tenure, nature and land stewardship, the built environment, tools and technology, culture and education, and then all the things that we do that support each one of those. And in permaculture we start closest to home, we get our act together in our own home, then in our neighbourhood, then in our community and then in the bio-region at large. We kind of spiral around working on all of these elements.

This is a road map. I really think of permaculture as one of the road maps towards real sustainability. When I got involved in permaculture eighteen years ago or so, I thought it was really cool because you could think in systems and you could do a really great food production and have these really neat looking landscapes and it was kind of a hobby because I thought it was a really neat thing to do and I felt better about shrinking my ecological footprint. But over the last bunch of years, I think we got a wake-up call, going back to the 70s during the OPEC oil embargo in 73', 74' was a message to anyone who was looking. Oil is a finite resource. We base our culture on oil, so let's start working on it. We kind of went back to sleep for 35 years and now we're getting a much bigger wake-up call I think. So it's no longer juts a hobby to do things like permaculture, we *need* it and I don't mean that in the former use of the word need. I think we have a planet that is asking for something like this. We're being called, we're being asked to step up to the plate and start doing these things and I think your appearance here and the size of this crowd here in Dover is a real indicator of how many people are looking for a different way of doing something. So I'm hoping that what I've offered you tonight is a hopeful message that there are ways to live sustainably, we can really open the doors to lots and lots of different ways of being. We have a lot of choices and I think we have a really good chance.

Today I woke up on the optimistic side of the bed and I'm going to try to do that again tomorrow. Thank you all very much.

*JS:* And that was Toby Hemenway speaking in February 2010 in Dover New Hampshire. Toby is the author of *Gaia's Garden: A Guide to Home-Scale Permaculture* released by Chelsea Green in 2009. Links to more information on today's show are archived on our website at [deconstructingdinner.ca](http://deconstructingdinner.ca) and the July 15<sup>th</sup> 2010 broadcast. A thanks to Making Waves based at WSCA Portsmouth who made today's recording available.

*ending theme*

And that was this week's edition of Deconstructing Dinner, produced and recorded at Nelson, British Columbia's Kootenay Co-op Radio. I've been your host Jon Steinman. I thank my technical assistant, John Ryan.

The theme music for Deconstructing Dinner is courtesy of Nelson-area resident, Adham Shaikh.

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