Jenna Kay

From: Monica Zazueta <zazuetamonica0813@gmail.com>
Sent: Monday, July 1, 2024 6:21 PM
To: Jenna Kay; Amy Koski; Ben Duncan; Sylvia Ciborowski; Dana Hellman; tlunsford@parametrix.com; Nicole Metildi; Harrison Husting
Subject: Podcast Edenicity transcript & link

Listen
https://www.edenicity.com/e11.html

Sustainability through Massive abundance.
Episode 11: Feeding the World in Style

How a human-scale food system can feed 10 billion people on 97% less land than we use now, with higher quality and social justice than the world has ever known.

Transcript
Could you grow all the food you need to survive?
Intro [music]
The Big Lie of agriculture
Subsistence Farming For Billionaires
What’ s Wrong with Market Gardens?
Farm-to-Table Advantages
Block-to-cafe advantages
Tour of Edenicity food system
Zone 1: Rooftop gardens
Zone 2: Courtyard orchards
Zone 3: Broadacre village crops
Zone 4: Forest belts around towns
Zone 5: Wilderness
Role of automation
Social distancing (epidemics)
The sixth function of design
Close [music]
Sources

▲ Could you grow all the food you need to survive?

Do you know how much space you would need? How much material and equipment would you need? What would it cost? How much time would it take?

As a former market gardener, let me set the record straight: subsistence farming is hard. It takes a long time to learn, and it takes skill and capital. Worse, as any economist will tell you, doing it all yourself is a ticket to poverty, renouncing as it does the benefits of specialization.

But what about the other extreme: feeding the world? What comes to mind? Do you picture giant fields stretching past the horizon? Combines and harvesters with wheels as big as houses? Huge warehouses full of chickens, pigs, roaring machinery, hundreds of workers rushing around in the dusty half light with baggy clothes and sharp tools: killing, cutting, cleaning, sorting, drying and bagging?

For the past 70 years in the United States, most schoolchildren have watched films, draped in the language of science, explaining how the inefficiencies of subsistence farming can't keep up with the growing world population. The situation, we're told, is getting more dire every day, so apparently the solutions must become ever more extreme until the only thing efficient enough to feed 3, 6 or even an unimaginable 8 billion people is ever more gigantic, mechanized, noisy, smelly and terrifyingly inhumane agriculture. "Got a problem with that? Shut up!" we're told. "your life and everybody else's depends on it."

But... what if this whole picture is wrong? Not just wrong, but exactly backwards.

In Episode five, I observed that the second function of design is to resolve false dichotomies. What if industrial versus subsistence farming is really just another false dichotomy? Not just that, but also, when it comes to food, big versus small, local versus global, specialized versus not, mechanized versus not.

What if the world's food system is ripe for redesign? And what if it turns out that the designs that shatter these dichotomies look like the most beautiful greenhouses? The prettiest kitchen gardens, the most glorious orchards, the most refreshing swimming holes, family farms or forests you ever saw?

▲ INTRO [music]

Cities designed like modern Edens for economic and ecological abundance. I'm Kev Polk, your guide to Edenicity.

Welcome to Episode 11 where we'll take a deep dive into the edenicity of food production.

▲ The Big Lie of agriculture

Let's start out by calling out the big lie of agriculture: that you must "go big or get out." That's a direct quote from Earl Butts, Secretary of Agriculture under Richard Nixon in 1971. It's shaped agricultural policy in the United States ever since, and it's a plausible idea, deriving as it does from the very real industrial phenomenon of economics of scale.

The idea is, if you have to make just one of something, say, a screwdriver or a canned beverage, it's very expensive. We're talking thousands of dollars. But if you make millions or billions of them, you can learn a great deal about the process, streamline the tooling, and bring the cross down to a buck apiece or less.

The problem is, crops are living things and therefore subject to the ecological principle of interdependence. In Episode two, I mentioned how it's rare to find an ecosystem that remains stable when any one species has exclusive use of more than 2% of the energy and resources.

Maintaining many square kilometers of a single crop, as big farms do today, is an obscene violation of that law. Think of the landscape is a massive quilt of niches or opportunities for different species to thrive. Every undulation in the land, every layer of soil or tiny variation in soil chemistry, every nook or cranny in the foliage, every open space, no matter how small, creates its own microclimate. No single species can fill them all. When these niches remain empty, the surrounding ecology will do its best to restore the balance. Its tools? Those detritovores and pioneer species that we call pests and weeds.

Therefore, it should come as no surprise if we discover that smaller farms, which typically grow a wider variety of crops and cause less of a disturbance, are more efficient at growing living things than the big farms. The data agree. GRAIN, an international rural nonprofit, crunched the land use numbers from the United Nations and various world government agencies. On May 24th 2014 GRAIN.org released a report titled Hungry for land: small farmers feed the world with less than a quarter of all farmland. GRAIN found that subsistence farmers and small scale family farms still feel 80% of the world, and they do it on 24% of the farmland. Depending on in the region, that works out to about 2 to 6 times the yield of commercial farms.

This is not new news at all. More than a century ago, in 1909, Franklin Hiram King, an accomplished professor of agricultural physics at the University of Wisconsin Madison, spent 9 months touring and assessing land practices in Southeast Asia. He wrote up his travels, which his wife, Carrie Baker King, published after his death in 1911. The book was originally titled Farmers of 40 Centuries or Permanent Agriculture in China, Korea and Japan. But it was rereleased in an unabridged 2004 Dover edition under the title Farmers of 40 Centuries: Organic Farming in China, Korea and Japan.

I like the original title better. Of course, I would, as permanent agriculture is the etymological root of permaculture, which I'm twice certified to practice. A lot of what I'll be talking about today is straight up permaculture.

Among other things, Professor King was concerned with conserving soil and soil fertility, which American settlers had degraded noticeably in just a few hundred years. By contrast, Asia had fed a lot more people on a similar amount of land for more than 4,000 years. On page six of his book, King writes: "Nearly 500 million people are being maintained chiefly upon the products of an area smaller than the improved farmlands of the United States. Complete a square on the lines drawn from Chicago southward to the Gulf and westward across Kansas, and there will be enclosed in area greater than the cultivated fields of China, Korea and Japan and from which five times our present population are fed."

▲ Subsistence Farming For Billionaires

Subsistence farming is a fact of life for billions of people to this day. But weirdly enough, it's not just the poor who think about it. Survivalism has long been a popular hobby in the tech world. It gets more intense at the high end. When Team Human podcast host Douglas Rushkoff was invited to consult at a conference of billionaire hedge fund managers in 2017, he found them obsessed with emergency bunkers and what to do if civilization collapses and their

money loses its value. He wrote an article about it in onezero.medium.com and 2018 with the title "Survival of the Richest. "

Remember, these are the guys (yes, almost entirely guys) who are making the biggest investments in every industry, including agriculture. Now I'm not against an opportunity structure that can create billionaires, at least temporarily. See Episode 8 for more about that. To paraphrase from that episode, money has more value when it circulates. Right now, though, interest rates are as low as they are, in part because the world is awash in savings. The money is just sitting there, and that's a design problem to be solved.

Still, for the billionaires who are listening (you know who you are!) let's answer some of those questions about growing your own food. According to Joel Salatin, author of You Can Farm, it does take years to learn. According to David Duhon's book One Circle, published by Ecology Action in 1985, you can grow a complete diet for one in 100 to 400 square meters, but it won't be easy. You'll be using bio intensive gardening, which involves double digging 100 to 400 square meters of garden beds per person. I've only ever prepared 40 square meters using that method, and I don't ever want to do it again. It's back breaking work. So, Rich Bros, Take Rushkoff's advice and be good to your staff! Treat them like family, because nobody else will work that hard for or with you if money should lose its meaning.

▲ What’ s Wrong with Market Gardens?

Now that I've sung the mixed praises of small farms, let me also point out some of their limits as practiced in the United States today.

Of course, everybody loves a farmer's market. In Athens, Ohio, it's the cultural event of the week: a pageant of produce, a place for commerce and stories and recipes and gossip, a celebration of everything wholesome and quirky.

When I started bringing my produce to market by bike, my hippie customers shied away. I was getting too weird for them, but old timers loved it and started buying all my Kentucky Wonder beans and iceberg lettuce, week after week, swapping recipes, even trying my Thai basil and lemon cukes.

If you're an old enough market goer, you probably remember that moment when farmers markets won you over. It was a tomato, wasn't it? A giant, juicy heirloom beefsteak tomato with a fancy name like Hungarian heart. Or maybe a tiny super sweet Sungold. These are truly cultural artifacts, as delightful and shiny as any crown jewel.

The problem is, it's quite common for market gardeners to sell only half of the delicious produce they grow. When there's a glut of beans or lettuce or blueberries or, yes, tomatoes, even farmers with the better marketing, longevity and customer loyalty end up donating to a food bank at the end of the day. Some growers create value added products such a squash bread, barbecue sauce, jams, puddings, muffins. The list goes on. Been there, done that! These sell well and bring in extra money. But they take way more time to make than it takes to plant and pick.

And you're competing with supermarket prices, meaning products that used a lot of automation in their production. As cybernetics pioneer Norbert Wiener pointed out in 1948, automation is a form of slave labor, and competing with it ultimately means working like a slave.

The other problem with market growing is the market and the place where you grow are often far apart. You have to pick, clean, pack, drive many miles, unpack, sell, repack, drive home and re purpose whatever didn't sell.

What are the alternatives? Some growers create a CSA. That stands for Community Supported Agriculture, where they find out what people want to eat, grow it and let them come pick it up every week. That's better, but still inefficient. How many people have joined a CSA dreaming about tomatoes, fennel and leeks—only to find their bags stuffed with kale and just a handful of other items week after week? And you still have a lot of people driving to the pickup point and pouring carbon into the atmosphere. The economic answer is to specialize. With wholesale co-ops, full time retailers and professional freight services, growers can stay home and do what they do best, and customers don't have to make a special trip. But this much specialization requires a denser population than we ever had in Athens, Ohio.

▲ Farm-to-Table Advantages

Another approach is to integrate a farm with a restaurant. This has several advantages. First of all, there's a guaranteed market for the produce. The chef works in conjunction with the farmer to plan a season's worth of menus and of growing. There's far less waste. First of all, there's a lot less transportation if the farm is close to the restaurant. There's much less packaging because you're moving things in larger quantities in bulk, and so the surface area to volume ratio is smaller. The packages are larger, and if you add up the area of one large package versus a whole bunch of smaller ones, the larger package has less material. The compost from the restaurant can be reliably captured for use on the farm, as a natural part of that partnership. And waste water from the kitchen can even go back to the gardens if the climate dictates and the gardens are close enough.

▲ Block-to-cafe advantages

But Edenicity takes this one step further. In the Reference Design, which you can download from the news link at edenicity.com, you'll find that every block in the city grows most of its own food and serves it up in its own cafes. As is common in many parts of the world, Edenicity would be designed for people to get most of their meals at a cafe, pub, diner or restaurant within easy walking distance. This is also consistent with a long, gradual trend in the United States for each succeeding generation to cook less at home.

Edenicity would have 2 to 4 cafes per block, providing something like 34 jobs: six back of house staff, eight wait staff and maybe 20 agricultural workers. Private kitchens in the households would be, correspondingly, that much smaller.

This would be great news for climate refugees and subsistence farmers moving to the city. This is a skilled workforce. Their growing skills would be welcome on every block, and they wouldn't have to huddle in peripheral shanty towns that many urban migrants have to endure today, scrounging in town for menial work that requires a long commute.

▲ Tour of Edenicity food system

Let's take a tour of the Edenicity food system. This system is organized by permaculture zones. The concept is areas that need the most frequent attention with the highest yields are closest to where people live and eat. There are five zones ranging from Zone 1, right where you live, to Zone 5, the unmanaged wilderness between cities.

▲ Zone 1: Rooftop gardens

We'll start with Zone 1, rooftop gardens. Because this is the most intensive zone, this is also going to be the most detailed part of today's podcast.

Each row of five or so houses would share a common roof with some combination of agriculture, greenhouses and shade houses. These are the most productive part of the food system, and they require the most attention: about two full-time workers per roof. I'm pulling my labor numbers from Julie Marie Simonetti' s 2015 Master's thesis from the University of Florida.

Now I'm not a fan of high rise farms. In natural soil, it costs something like $5 per square meter to prepare a site for farming. A high rise floor across $1,000 to $1,700 per square meter to build. You would need 200 to 300 times better productivity than field agriculture to make that pay.

Actually, the craziest thing I ever saw was a drawing of underground farming beneath the skyscrapers in the Cities issue of National Geographic, April 2019. I mean, you have the cost of excavation or tunneling, then installing LED lights, air pumps, water pumps and the ongoing cost of electricity for lighting. If you powered it with solar, your solar panels would take up about 20 times the area of that underground farm. Bad idea! No, for a long time to come, most of the physical space dedicated to farming will be in some facsimile of natural soils under an open sky.

But a rooftop garden is an exception. The building needs a roof, but most roofs, at best, just look pretty and keep out the weather. So let's apply the fourth function of design from Episode 5: design factors redundancies. In other words, let's think about what else a roof can do. Well, it's exposed to all this light from the sun. What if we could use that to grow stuff? And, depending on climate and season, a simple roof can quickly add or steal heat from the building. But a greenhouse or a shade house could moderate these extremes, as I'll explain in a moment. Think of it as a hat for your building: keeping the heat out or holding it in is needed. This factors out some of the climate control a building needs. In other words, it makes air conditioning and heating work better.

In cool and temperate climates, the roof would have a transparent covering probably ETFE: ethylene tetrafluoro ethylene. ETFE is the same plastic you'll find on the Eden Project in Cornwall, England, the Beijing National Aquatic Center, the Banc of California Stadium in Los Angeles and especially the experimental media and Performing Arts Center in Troy, New York. ETFE lasts decades, and it is recyclable.

Under the ETFE cover, we can install an aquaponics system that uses fish to fertilize plants grown in water rather than soil. This approach recirculates water, reducing water demand—when you compare it to field crops—by factors of 10 to 50. The produce is not exposed to mammal contaminants such as E. Coli in the way that field grown food is, which factors out laborious cleaning. The roof's location makes the produce far more accessible to cafe kitchens below and keeps the processing and transport simple. This factors out the heavy equipment such as tractors, cleaning stations, conveyors, trucks and so forth that you would need for field crops, though you might need an elevator.

Now, you might wonder what the fish eat. Right now, the standard is commercial fish food, and organic is available in bulk today at $6 a kilogram. According to National Geographic, a kilogram of feed produces nearly a kilogram of fish. This is possible because a good chunk of the fish's weight is water and carbon from the atmosphere. But that same kilogram of feed would give you only half as much chicken, three times less pork or seven times less beef. Even so, the fish costs more than it would earn wholesale. But for each kilogram of fish, you also get 15 to 30 kilograms of vegetables. The overall yield is about 20 times better per square meter than field agriculture (here I'm using numbers

from friendlyaquaponics.com), so the cost is comparable to that of a normal roof plus an aquaponics greenhouse on the ground.

So for free, you gain convenience, factor out a lot of heavy equipment and factor out some climate control for the building. Let's examine that last item, climate control, in detail.

In the winter, the greenhouse roof would hold heat in during the day, giving it time to seep into the building and the water tanks. Water is several times better at storing heat than, say, rock. At night, the ETFE cover would dramatically slow heat loss from the growing tanks and the building (for you physics majors: it dramatically reduces convective losses and somewhat slows the radiative losses). As a result, the building spends significantly less energy on climate control, perhaps more than the energy required to run the air and water pumps. This is a classic wealth strategy of multiplying the value of imports—in this case solar energy—that I mentioned in Chapter 10.

In the summer, the greenhouse can have a shade cloth or act as a solar chimney, pulling air through buried tubes into the building and out through high vents in the greenhouse. Or it could blow hot air through insulated ducts down into a buried thermal mass with a cold air return. Again, any of these strategies employs the ecological wealth strategy of multiplying imports through reuse. So the output of this, per the Reference Design, is 1 to 2 kg (or 2 to 4.5 pounds) of greens, grains, or veggies per resident per day. The aquaponics tanks use fish to fertilize the plants, producing 50 to 70 grams (or 2-3 ounces) of fish