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per resident per day.

In dry lands, the roof and walls would be designed with trellises and dense vines to keep the building surface shaded. Beneath these, intensive annual crops could be tended in planters with buried drip irrigation—no surface watering at all. In humid, hot climates the roof would have an 80% opaque, reflective top and be open to breezes on all sides, with insect screens. This limits growth to greens and other shade tolerant crops. But Zone 2, which we'll get to in a moment, will more than make up for that.

The next 3 zones are a lot less intense, so I'll spend less time describing them. The plantings in Zones 2 to 4 are a combination of personal experience and my notes from Geoff Lawton's online Permaculture course.

▲ Zone 2: Courtyard orchards

In Edenicity, every city block would manage its own Zone 2. Main growth would happen in a large outdoor courtyard between the buildings. You would also find plenty of food production in hedges and tree plantings between the buildings and the walkways and bikeways. A team of eight on-site professionals would maintain these gardens and systematically harvest produce, so none goes to waste. Even so, there would be plenty available for residents to snack on at will during the growing season.

Now, as I describe these gardens in detail, imagine being a child in this Eden-like landscape that literally feeds you without effort.

In cool and temperate climates, you would have orchards and hedges of mixed species for mutual support: legumes to fix nitrogen, plus apples, peaches, plums, cherries and nut trees with grapes climbing arbors and trellises within easy reach of several picnic shelters. Many blocks would feature natural swimming ponds. These are gaining popularity worldwide. They would buffer storm water, build soil faster than any other method (although you would need to dredge them to adjacent gardens from time to time), and they can produce an incredible amount of food, such as rice, wild rice or watercress. The ponds would use native fish for mosquito control. A Purdue Extension report found that well maintained ponds can cut mosquito populations by 90% or more. Shrimp and snails would clean the algae, and native submerged plants would provide aeration. For swimming purposes, the ponds offer clean, fresh water without chlorine. Of course, they would require monitoring, with backup ultraviolet disinfection if needed.

Now, in humid, hot climates, that center courtyard would feature large trees such as jackfruit, breadfruit, mango and Brazil nut with an understory of large bushes such as coffee and cocoa. In an understory, these plants yield less but last a lot longer and require much less maintenance than they would if grown in large, open field crops. You would also have vines from tropical yams climbing the trees. In the front, between house and street, you would interplant bananas and papayas, sugar cane and climbing yams in two meter mulch pits. Everything gets as much coarse woody mulch as possible. According to Geoff Lawton, who runs the Permaculture Research Institute in New South Wales, Australia, the banana circles consume half a cubic meter of mulch every 10 days. Rot is an issue, so you would need to keep the trees open at ground level for air circulation. Natural swimming ponds would also thrive in hot, humid climates, with really great year-round food production, including taro.

In drylands, though, there would be no swimming ponds at all. In the courtyard, you would have high, salt tolerant trees such as date palms, mulberry, fig, pomegranate. Along the walkways and bikeways, you would plant citrus. The high tree layer provides shade for small, sunken bed gardens with buried drip irrigation. You would catch and store runoff in large cisterns.

▲ Zone 3: Broadacre village crops

Let's move on to Zone 3, which surrounds each village of 25 blocks or 6,000 people. This is a 250 meter wide strip that looks a little more like a modern farm. Here you'll find your broad acre crops (such as corn, wheat, rice, soy), local super crops (such as quinoa and wild rice), and stands, rows and hedges of low maintenance trees, as well as ponds and rotational grazing for cattle and chickens. The cattle graze the grass and browse fenced off forest edges for a few days at a time before being moved on. Then compost piles are made in the field from grass clippings, kitchen scraps and manure. Chickens raid these for bugs, turning and aerating the compost piles in the process. Done right, these chickens don't need feed, and the compost is soon ready and enriched in phosphate for garden crops. After the chickens are moved, you plant your broad acre crops, and they do well because the chickens have removed many potential insect pests.

Zone 3 fills in the dietary gaps for staple crops, plus, if so desired, at least 20% of the animal products you would find in the typical American diet. The animal rotations also builds soil, though not nearly as fast as the Zone 2 ponds. Zone 3 would draw about three workers from each block, providing about 75 local jobs for each village of 6,000. That's how it would work in a cool or temperate climate.

Now, in hot, humid climates, there would be no animal grazing at all. Tropical soils are fragile, so animals must be penned and fed cut forage with manure removed to compost piles as I just described. The main feature here is large aquaculture systems, combining fish, rice, taro and waterfowl such as ducks in terraces or in a series of narrow ponds between mulch pit gardens. These are highly productive year round and would probably outperform the Zone 1 roof gardens.

Now, in dry lands in Zone 3, you would have tree belts on swales, and these are the contour irrigation ditches that concentrate water that I mentioned back in Episode 10. The tree belts provide enough shade and wind protection for broad crops grown in the rainy season, and you could rotationally graze the area in between with tight-packed animals, building soil. This is the Allan Savory Method mentioned back in Episode 10.

▲ Zone 4: Forest belts around towns

Zone 4 is a 760 meter wide forest belt surrounding each town. That's, like, half a mile wide. Recall that in Edenicity, each town includes 9 or so villages of 6,000 with a total population of about 50 to 60,000 people. While the Zone 4 forest would definitely be a pleasant place for a walk, it's not wild, like Zone 5 that surrounds the city. Zone 4 is farm forestry with a mix of timber species. These supply edible fruit and greens and mushrooms. The trees are thinned annually for vigor and harvested selectively starting at about year 25. It would establish and grow up to twice as fast as natural forests in a given climate because the ground would be prepared with earthworks such a swales, the occasional large water feature and careful succession plantings, meaning an over abundance of pioneer species such as nitrogen fixers. You thin these periodically during the first five years to provide mulch and growing room for the productive trees. The big picture here is to keep all available niches filled with support species and productive trees from day one.

Now, Zone 4 would be a place of absolute delight and rejuvenation. Some of my happiest memories are playing in tropical ponds and waterfalls, picking mango, passionfruit and strawberry guava in the semi wild woods. More recently in the woods near my market garden in Ohio each spring, I looked forward to harvesting ramps (which is a garlicky spring green) and chanterelle mushrooms in late summer. In Edenicity, this lifestyle would be more deliberately productive and accessible. Zone 4 would be less than a six minute bike ride from any home.

▲ Zone 5: Wilderness

Zone 5 is the wild area beyond the city. In all likelihood, these are lands previously damaged by large scale crops or overgrazing, perhaps for many generations. Restoring it may involve removing toxic waste, then a few decades of successional plantings or grazing. They should be designed to pay for themselves with some economic returns. Depending on the climate and the location, this could look like Allan Savory's tight-packed cattle grazing strategy or the Caribbean pines that provided valuable resin and habitat in Gaviotas, Colombia, as I mentioned in Episode 10: Greening Urban Deserts. But the goal for Zone 5 is to reestablish wild, diverse native habitats as soon as possible so we can end the mass extinction.

Zones 4 and 5 would employ upwards of 225 people per town, or 22,500 people altogether per city. The roster would include permaculturists, hydrologists, foresters, ecologists, logistics experts, arborists, cattle handlers, machine operators, planters, loggers and foragers. For the first five years or so, 90% of their efforts might focus on Zone 4 in town and 10% in Zone 5 in the surrounding region. Then, for the next couple of decades, the labor might split more like 50/50 between zones 4 and 5. If you're moving to the city from subsistence farming or herding, these jobs, along with Zones 1 to 3, provide a generation of good jobs that build on your existing skill set. Now, over the course of a couple of decades, as Zone 4 matures and Zone 5 gets restored to healthy wilderness, a city of five million might lose about 11,000 agricultural jobs. But this gradual loss would give people time to learn new skills, and there would still be some 440,000 absolutely steady agricultural jobs per city in Zones 1-4.

▲ Role of automation

Eventually, though, some jobs in Zones 1 and 2 will no doubt be displaced by automation. I'll give you an example. I know from experience how labor intensive it is to keep birds out of your blueberries. Netting is a lousy solution. I've had to free snakes caught in it, and birds tend to snare their feet in the nets, too. It's demoralizing. I've even gone so far as to encase individual baughs in row cover fabric, which keeps out

the birds without collateral damage. This gives great yields, but it's very labor intensive, and I've seen wild birds plunder tree crops like apple, peach, cherry and especially serviceberry, a delicious and prolific springtime tree fruit, to the point where they're just not viable crops. Remember, Zone 5 provides plenty of wild habitat, so wild birds will not go extinct if we exclude them from our gardens. Short term, the humane solutions are labor intensive and happily provide jobs for those moving to cities from subsistence farming (Episode 8 describes just how vast this trend really is), but long term, I'm sure we'll see swarms of small drones picking berries or applying and removing fabric covers.

If we're not careful, these could cost not only jobs but mental health. To offset the lost jobs automation should be, at the very least, subject to an asset tax that directly returns value to people via universal basic income.

As for mental health, UK studies in 2004 and 2007 suggests that inhaling the soil bacteria mycobacterium Vaccae stimulates the release of serotonin and possibly other beneficial neurotransmitters, both in humans and rats. Actually, I'm guessing it's true for dogs, too, as my crazy shepherd-chow mix used to spend hours with her snout jammed in gofer holes snorting and snuffling like an addict.

Anyway, the researchers found that the soil bacteria lifted people's mood and cognitive abilities. Zoe Schlanger provides a nice summary of these findings in qz.com, also known as Quartz, May 30th 2017.

So if we do automate agricultural work, we need to do it in such a way that it doesn't prevent children and adults from picking fruit or digging or playing in the dirt.

▲ Social distancing (epidemics)

One more thing. When you go to Edenicity.com and download that reference design, you'll notice that there is more than twice as many people per square km as the typical American city such as Columbus. Does that make you uneasy? As I record this, we're still in the early days of lockdown and social distancing as part of the coronavirus epidemic. I went to the grocery store this morning and was so glad it wasn't crowded. The checkout clerk screamed at me to unload my groceries as far as possible from the person she was helping. So right now, population density doesn't seem like a friend at all. An epidemic would seem like the one type of disaster where the social connection and social capital I mentioned in Episode 4 would hurt rather than help you.

But it's not so cut and dry. Epidemics tend to occur in clusters, so the risk to most people is distant exposure, that is, encountering people from a region where the virus has become widespread. Air and sea travel, we all know, have done a lot to spread the virus. Therefore, it seems to me that if your city is laid out so you have to travel long distances to meet your routine needs, the layout of the city itself will expose you to different population clusters.

That creates more opportunities for the virus to spread from one place to another. Think of the people who touched that gas pump or shopping cart and draw an imaginary circle around all of their homes. It's a large circle. In Edenicity, each city block is a lot more self-sufficient than they are in any modern city. This alone would slow long-distance spread of disease. Under a shelter in place order, I imagine the cafes would close their dining areas, but still deliver meals house by house within a block. There would be no gas pumps or grocery shopping, so again there's much less distant exposure. Some blocks would be hard hit, of course, but there would be very little opportunity for a virus to spread beyond them.

And once again, good design resolves a false dichotomy: the convenience that density provides versus safety.

▲ The sixth function of design

Let's go back to those factory farms I mentioned at the beginning. You know: the ones with all the noise and pollution that were supposedly the only things that could save us all from starvation? Do they sound like something that's gonna last?

Team Human's Rushkoff was amazed that even billionaires felt powerless to stop the world's biggest systems from ultimately crashing and burning. But are they—or we—really powerless? In Episode 5, I observed that the first function of design is to embody intention. The food systems of the world didn't just happen. They were designed, and they embodied the collective intentions of their creators. If these systems are becoming evermore inhumane, it's because their creators' intentions are based on inhumane assumptions. In other words, false dichotomies.

Not that I blame them. Most of us, if put in their place, would do no better because these same dichotomies are rampant in our culture. That's why so many revolutions overthrow despots only to prop up new ones. The purpose of design is not to identify bad guys and try to thwart them. We need to outgrow that infantile level of thought.

As I mentioned back in Episode 5, the second function of design is to identify and resolve false dichotomies. It does this by arranging interactive elements in space. That often has the effect of completely rearranging boundaries. Hmmm... maybe that's the sixth function of design!

Anyway, that's what we did today. Instead of thinking about the food system as out there on distant farms, we brought it in close to where we live. Instead of working small or working big, Edenicity does a lot of both where it makes sense. Zone 1 integral to our homes; Zones 2 to 4 at distances appropriate to their use.

▲ Close [music]

Now consider this: the Reference Design would easily support 500 million people in the United States—or a global population of 10 billion people. It would do this on 1.4% of the land, which is 97% less than we use now. Yet it wouldn't feel crowded because of how it chunks living space by desired degree of intimacy (I explained how in Episode 7). This lets us return 98.6% of the land to the wild again, while all 10 billion of us enjoy the security and delight of a garden to cafe lifestyle with the highest quality and abundance of food the world has ever known.

If you enjoyed Episode 11, please be sure to subscribe so you don't miss a show. You can download a copy of the Reference Design at edenicity.com. And please join me next time when I'll discuss the edenicity of transportation. I'm Kev Polk, and this has been Edenicity.

▲Sources

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