

Chapter Thirteen - Resilience – A New Edo Era To Come?

Peak Everything – Why Cats & Dogs Fight – The Sustainability Time Warp

An unscientific observation suggests that dogs and cats often fight because their body language is opposite. When a dog's tail is straight up and not wagging, he is aggressive and when down, he is submissive. Cats are happy when their tails are up and therefore perhaps inadvertently they send a signal to a dog, they are an aggressor and not happy but looking for a fight...and that's when the fight started.

Humans and Mother Nature too might have signal issues. Humans live 80-100 years and mostly think in terms of their bucket list for even smaller increments of time. If we are achieving what we want in these timeframes we are the happy tails up cat. Mother Nature, is to some degree, the happy go lucky dog but she acts in terms of the 500 years it takes to grow an inch of topsoil or the 1000 years it takes to grow a tree thirty stories high and fifteen plus feet in diameter or even in the millions of years it takes to store sunlight as natural gas, coal or oil. Much of the time, she won't pay much heed to the pilfering and lack of stewardship that humans are undertaking in their 100 year or less outlook, but when she does notice our tails up and takes an exception, it is a flood, hurricane, tornado, pine beetles, energy crisis, famine or what have you and the fact is, mostly it isn't much of a fight – she just opens a big can of whoop ass! Cats with wisdom learn their place, read the signs and behave in Mother Nature's timeframe (wait for the cuckoo to sing) – endangered cats insist it's their tail, that they have better technology and they can do with it what they please (see <http://www.theatlantic.com/science/archive/2015/12/a-warning-system-built-into-nature/421836/>).

In *Dirt: The Erosion of Civilizations* by David Montgomery and citing Lowdermilk: It's estimated that a foot of topsoil had been lost from hundreds of millions of acres of northern China. He found exceptions where Buddhist temples protected forests from clearing and cultivation; there the exceptionally fertile forest soil was deep black, rich in humus. Lowdermilk described how farmers were clearing the remaining unprotected forest to farm this rich dirt, breaking up sloping ground with mattocks to disrupt tree roots and allow plowing. At first, plowing smoothed over new rills and gullies, but every few years erosion pushed farmers farther into the forest in search of fresh soil. Seeing how colonizing herbs and shrubs shielded the ground as soon as fields were abandoned, Lowdermilk blamed the loss of the soil on intensive plowing followed by overgrazing. He concluded that the region's inhabitants were responsible for impoverishing themselves – just too slowly for most of them to notice.

Every economic boom in history has ended in bust because renewable sources of energy ran out: timber, crop land, pasture, water, peat. All self-replenishing, but far too slowly, and easily exhausted.

Even a casual reading of history shows that under the right circumstances any combination of political turmoil, climatic extremes, or resource abuse can wreak havoc on a society. Alarmingly, we face the potential convergence of all three in the upcoming years as environmental, economic and depleted energy supplies collide.

The Japanese in the Edo Era had the collective wisdom to understand the issues and took care of their commons. There is much wisdom we can and must learn from history collectively and most importantly – act on it – in a hurry!

Civilization, like life itself for all species, has always been about capturing energy. For some 2 billion years, life has flourished on earth based on one source of energy: solar radiation, the same energy that powers a forest, a prairie, a marine ecosystem or a caterpillar (with very few exceptions). By contrast, 80 percent or more of our energy within the Industrial Age Bubble comes from burning fossil fuels (an ancient treasury of sunlight).

The impacts the Industrial Revolution (modern period) have had on quality of life are undeniable. As industrial expansion continued into the twentieth century, life expectancy in the industrial world roughly doubled, literacy jumped from 20 percent to over 90 percent, and benefits hitherto unimaginable sprang up in the form of products (from private cars to iPods), services (from air travel to eBay), and astounding advances in medicine, communication, education and entertainment. With this kind of success, it is little wonder that the side effects of the Industrial Age success story went largely ignored for not wanting to acknowledge any downside. For most of us, the endless litany of environmental and societal crises is overwhelming, both emotionally and cognitively. It is no wonder that so many simply “turn off” when confronted with another story of environmental degradation, water shortages or toxic waste. The first problem to deal with is simply “How do I take all of this in without frying my circuits?”

Choices that reinforce the extractive “take-make-waste” economy are based on a set of assumptions, beliefs and ways of wanting to see the world that we have developed over time and that have by now become deeply embedded in modern society. For example: • Energy is infinite and cheap. • There will always be enough room to dispose of all our waste. • Humans can't possibly alter the global environment. • Humans are the primary species on earth; others are less important and many are

irrelevant. • Basic resources such as water and topsoil are unlimited. If limits or problems are encountered, markets and new technologies will reallocate financial resources so we can continue with our current ways of living and working. • Productivity and standardization are keys to economic progress. • Economic growth and rising GDP are the best way to “lift all boats” and reduce social inequities.

By contrast, life beyond the Bubble (modern period) will be based on choices reflecting very different beliefs, assumptions and guiding principles (renewed wisdom), such as: • Live within our energy income by relying on forms of energy that come from renewable sources such as solar, wind, tidal and bio-based inputs. • Zero to landfill. Everything, from cars and iPods to office buildings and machine tools, must be recyclable, remanufacturable or compostable. • We are borrowing the future from our children; we have to pay it back. Our first responsibility is to leave a healthy global biosphere for our children, their children, their children’s children, and so on. • We are only one of nature’s wonders. We are just one of the species that matter, and we all depend on each other in ways we cannot even imagine. • Value the earth’s services; they come free of charge to those who treasure them. Healthy ecosystems are precious and must be treated as such. • Begin to see the possibility of evolving a new life-style, with new methods of production and patterns of consumption: **a life-style designed for permanence is the definition of sustainability.**

A sustainable future will entail collective creating of every imaginable sort. It will involve bringing into existence, as quickly as possible, a new collective energy system, renewed types of buildings and transport and new ways to dramatically reduce waste and toxicity — based on new products and new processes for making things and new business models.

Most people think people only do things for money. Then you ask them, ‘Why do so many people recycle, even if it means hauling old magazines and soda bottles to the recycling center on Saturdays?’ Often, making money is not the reason. This is but one example, of many, of collective wisdom.

My additions and edits to a wonderful Ugo Bardi essay.

It is often said that history does not repeat but it does rhyme. Collective wisdom and foresight are required for our future to rhyme with a poetic period rather than a heinous one. Looking at the history of several islands gives us some insight and perspective.

The Japanese Heian age gave way to a period of civil wars; the *sengoku jidai*, the period of the Samurai. Many movies have shown it as a romantic age, but likely the people who lived in it didn't find it very romantic; it was a period of continuous wars. That historical phase ended when Tokugawa Ieyasu emerged as the winner of the struggle and he became the *shogun*, the ruler of all Japan. That was around the year 1600 and it started the “*Edo*” period which was much quieter. The Edo period lasted until Commodore Perry arrived with his “black ships” in the mid-19th century and that started the modern period.

Cornelius Vanderbilt, about 50 years after Commodore Perry arrived in Japan, was by far one of the wealthiest Americans as well as richest in the whole world in the early 1900’s. Today, of Americans officially designated as “poor”, 99 percent have electricity, running water, flush toilets and a refrigerator; 95 percent have a television, 88 percent a telephone, 71 percent a car and 70 percent air conditioning. Cornelius Vanderbilt had none of these! The Commodore (as he had come to be called) had lived in relative modesty considering his enormous means.

Consider the energy use of the above appliances and then consider in monetary terms that the same amount of artificial lighting cost 20,000 times as much in England in the year 1300 as it does today. This gives monetary perspective to the miracle of fossil fuels in the modern period.

Today, the average person on the planet consumes energy (not just light) at the rate of about 2,500 watts (despite about 1/3 of the world’s population not having electricity), or put in a different way, uses 600 calories per second. About 85 percent of that comes from burning coal, oil and gas, the rest from nuclear and hydro (wind, solar and biomass are mere asterisks on the chart, as is the food you eat). Since a reasonably fit person on an exercise bicycle can generate about 50 watts, this means it would take 150 people working for you, working eight-hour shifts each, to peddle you to your current lifestyle. (Americans and Canadians would need 660 such workers, French 360 and Nigerians 16) Next time you lament human dependence on fossil fuels, pause to imagine that for every family of four you see in the street to maintain their current lifestyle, there would need to be 600 unpaid slaves back home, living in abject poverty: if they had any better lifestyle, they would need their own slaves. This would require close to a trillion people.

Now, the two centuries and a half of the Edo Period are very interesting in terms of sustainability. It was not just a period of peace; it was also a period of a stable economy and of a stable population. When Japan's population arrived at about 30 million, it stayed nearly constant for almost two centuries. It was an example of what we might call a “steady state” economy.

The reason why most societies can't manage to reach a steady state is because it is all too easy to overexploit the environment. It is not something that has to do just with fossil fuels. It is typical of agricultural societies, too. Cut too many trees and the

fertile soil will be washed away by rain. And then, without fertile soil to cultivate, people starve. The result is often collapse – a common feature of most civilizations of the past. Jared Diamond wrote about that in a book of a few years ago; titled, indeed "Collapse".

Now, there is an interesting point that Diamond makes about islands. On islands in most eras of the past, he says, people had limited resources – much more limited than on continents – and their options were limited. When they ran out of resources, say, of fertile soil, they were less likely to migrate or attack their neighbours to get resources from them. So, it was adapt or die. Diamond cites several cases of small islands in the Pacific Ocean where adaptation was very difficult and the results were dramatic, such as in the case of Easter Island. In some really small islands, adaptation proved too difficult, and those human populations simply disappeared.

Pollen preserved in lake sediment records an extensive forest cover when a few dozen people colonized Easter Island. The conventional story is that Polynesians arrived in the fifth century and over the next thousand years cleared the forest for agriculture, fuel and canoes as the population grew to almost ten thousand in the fifteenth century. Then, within a century of the peak in population, a timber shortage began forcing people to live in caves. Although recent reanalysis of radiocarbon dating suggests colonization may have occurred centuries later, pollen and charcoal from sediment cores indicate the island retained some forest cover through the seventeenth century. The island was virtually treeless by the time the first Europeans arrived. By then the last trees lay out of reach, sheltered at the bottom of the island's deepest extinct volcano.

Soil erosion accelerated once forest clearing laid the land bare. Crop yields began to fall. Fishing became more difficult after the loss of the native palms. As access to food decreased, the islanders built defensive stone enclosures for their chickens - the last food source on the island not directly affected by loss of trees and topsoil. Without the ability to make canoes, they were trapped, reduced to perpetual warfare over a diminishing resource base that ultimately came to include themselves as their society unravelled. At least that is the interpretation of most archaeologists.

Japan too is an island, of course, although a big one with many small ones. Some of the problems with resources must have been the same as for most islands. Japan doesn't have much in terms of natural resources. A lot of rain; mostly, but little else and rain can do a lot of damage if forests are not managed well. And, of course, space is limited in Japan and that means that there is a limit to population; at least as long as they have to rely only on local resources. So, at some point in history the Japanese had reached the limit to what they could do with the space they had. Of course, it took time; the cycle was much longer than for a small island such as Easter Island. But it may well be the civil wars were a consequence of the Japanese society having reached limits. When there is not enough for everyone, people tend to fight. At some point the Japanese had to stop fighting, they had to adapt or die – and they adapted to the resources they had. That was the start of the Edo period.

To attain steady state, the Japanese had to manage well their resources and avoid wasting them. One big effort was to maintain and increase their forests. You can read something on this point in Diamond's book. Coal from Kyushu may have helped a little in saving trees, but coal alone would not have been enough – it was the management of forests that did the trick. Forests were managed to the level of single trees by the government; a remarkable feat and carried out to this day. As well, the Japanese managed to control population.

The Japanese have been producing wood for 700 years without cutting down trees. In the 14th century, the extraordinary daisugi technique was born in Japan. Indeed, the daisugi provide that these trees will be planted for future generations and not be cut down but pruned/coppiced as if they were giant bonsai trees; by applying this technique to cedars, the wood that can be obtained is uniform, straight and without knots, practically perfect for construction. A pruning as a rule of art that allows the tree to grow and germinate while using its wood, without ever cutting it down. Extraordinary technique.



Transformational Thinking

We tend to see a steady state economy as something very similar to our society, only a bit quieter. But Edo Japan was very different. Surely it was not paradise on earth. Nevertheless, the Edo period was a remarkable achievement; a highly refined and cultured society; a society of craftsmen, poets, artists and philosophers. It created some of the artistic treasures we still admire today; from the *katana* sword to Basho's poetry.

The Japanese succeeded in creating a highly refined society that managed to exist in a steady state for more than two centuries. Why did Japan succeed where many other societies in history had failed? Perhaps being an island was a major advantage. It shielded Japan from the ambitions of their neighbours and from the temptation that the Japanese might have had to invade their neighbours. They concentrated on sustainability and on managing what they had. They managed their commons. Then, of course, when Commodore Perry and his black ships arrived in Japan was not an island anymore; in the sense that it was no longer isolated from the rest of the world. So, growth restarted.

Another case study, the environmental and cultural history of Tikopia, a British protectorate in the Solomon Islands, provides interesting insight particularly when compared to Mangaia an island with a very similar background. With a total area of less than two square miles, Tikopia is smaller than Mangaia. Even so, the two islands supported comparable populations at the time of European contact. With a population density five times greater, Tikopia sustained a relatively stable and peaceful society for well over a thousand years. This tiny island offers a model for sustainable agriculture and an encouraging example of cultural adaptation to limited resources.

Land use on Tikopia began much as that on Mangaia did. After people arrived about 900 BC, a shifting pattern of forest clearing, burning and cultivation increased soil erosion rates and began to deplete the island's native fauna. After seven centuries on the island, the islanders intensified pig production, apparently to compensate for loss of birds, mollusks and fish. Then instead of following the path taken by the Mangaians and Easter Islanders, Tikopians adopted a very different approach. In their second millennium on their island, Tikopians began adapting their agricultural strategy. Plant remains found in the island's sediments record the introduction of tree crops. A decline in the abundance of microscopic charcoal records the end of agricultural burning.

Tikopians turned their world into a giant garden with an over story of coconut and breadfruit trees and an understory of yams and giant swamp taro. Around the end of the sixteenth century, the island's chiefs banished pigs from their world because they damaged the all-important gardens. In addition to their island wide system of multi-story orchards and fields, social adaptations sustained the Tikopian economy. Most important, the islanders' religious ideology preached zero population growth.

Arrival of Western missionaries upset the balance between Tikopia's human population and its food supply. In just two decades the island's population shot up by 40 percent after missionaries outlawed traditional population controls. When cyclones wiped out half the island's crops in two successive years, only a massive relief effort prevented famine. Afterward, the islanders restored the policy of zero population growth.

After deciphering the environmental history of both Tikopia and Mangaia, Patrick Kirch suspects that geographic scale also influenced the social choices that shaped these island societies. Tikopia was small enough that everyone knew everyone else. Kirch suggests that the fact that there were no strangers on the island encouraged collective decision making. By contrast, he suggests, Mangaia was just large enough to foster an 'us versus them' dynamic that fuelled competition and warfare between people living in neighbouring valleys.

So perhaps the fact of being an island doesn't explain everything about Japan's Edo period. It seems it would not have been possible without a certain degree of wisdom. Please, understand that I am referring to the Edo Period. I know very well that, today, Japan has just as many challenges as most places in the world – polluted, overcrowded and full of inefficient buildings. As far as I understand, the Japanese attitude at that time was as far as possible from that monstrosity that we have today; that of the golem we call "*homo economicus*" who seriously thinks that a tree is worth nothing unless it is felled.

Neoclassical economists argue that technology and markets will magically overcome depletion and even resolve dramatic losses in energy gains, the heartbeat of every civilization. But Charles Hall in his book *Energy and the Wealth of Nations: Understanding the Biophysical Economy* says that's bunk. He argues that current economics – which is currently touted as a social science, is really about "stuff" and how people change the natural world to get stuff. Not surprisingly, he wants to reconnect economics with the reality of resource depletion.

Hall notes that neo-classical economic thinking is pretty much a by-product of hugely increased fossil fuel consumption. Prior to the fossil fuel age, which begin in the late 1850s, and didn't start galloping along until the 1900s, most people lived on farms and thought a lot about work, muscle and effort. As a consequence, earlier "classical" economists wrote about limits, scarcity and prudence.

But fossil fuel seemingly banished these conservative deliberations. Fossil fuels returned such extraordinary energy surpluses and so much easy wealth that economists became naive'. Thanks to fossil fuels they became a faith-based group that worshipped markets. Or as Hall puts it, "The abundance of oil allowed them not to think about energy."

EROI, however, explains a lot of dismal realities. On an island like Puerto Rico, where Hall has studied energy returns in the rain forest for years, the importance of EROI rolls sharply into focus.

Before the advent of oil, the island was a poor and hard-working village that sacrificed its forests for calories. But after oil and Operation Bootstrap, well, Puerto Rico became an industrial marvel in the Caribbean. Thirty percent of its forests grew back.

As oil prices again resume their upward trajectory and given that most of the island's power is generated by oil-fired generators, Hall wondered if the clock won't turn back. "I'm beginning to wonder when energy becomes less available if the same parameters that drove Puerto Rico development will run backwards." Puerto Rico's 2015/16 debt troubles strongly suggest a nasty, unfortunate reversion is underway.

From Japanese wisdom there is a story which exists in the form of a "*senryu*", a short poem that has to do with the warring period. The main leaders of the last phase of the civil wars in Japan were Oda Nobunaga, Toyotomi Hideyoshi and Tokugawa Ieyasu. Eventually, it was Ieyasu who became shogun and the leader of all Japan. The *Senryu* was about how he managed to do that. It says that one day Nobunaga, Hideyoshi and Ieyasu got together and they saw a cuckoo bird that wouldn't sing. So, Nobunaga said; "If it doesn't sing I'll kill it". But Hideyoshi said, "No; I'll convince it to sing" And Ieyasu said, "I'll wait until it sings". The intended moral of the story is that the winning strategy is not violence and not even manipulation or cunning. It is adaptation. The Japanese had understood that they could not force or cajole their island to behave the way they wanted – just as you can't force or cajole a cuckoo bird to sing. They had to adapt and they did. This is Edo period wisdom which we too are in desperate need of.

Now, one characteristic of wisdom is that it can be applied to different situations, different places and different times. Let's consider the stories moral in our age. Of course, we have big problems: not enough fossil fuel, not enough mineral resources, not enough water and not enough atmosphere to take in the results of the Industrial Age. So, how do we react? Well, a little like Nobunaga. We tend to use violence and not just in terms of "oil wars". We try to force the earth to produce what we want. In a sense, it is like telling the bird "sing or I'll kill you". So, it is "drill, baby, drill" and we are willing to do anything and use anything we can find to produce the liquid fuels we are convinced we absolutely need, even if we are going to destroy the land and the atmosphere. We are willing to build atomic plants, no matter what the risks involved and to do many other things to force the earth to produce what we think we need. Increasingly Mother Nature notices our tails up.

Then, there is a different attitude that looks truly sustainable. It is efficiency and wisdom. It says that if we can convince people to use resources in more efficient ways, we can still have what we need and save the earth too. Efficient lamps and small cars surely look much better than the "drill baby drill" idea but too many are not willing to change what we think we need. The American way of life remains not negotiable, apparently, just the way of obtaining it might be. (But when did the American dream devolve from freedom to consumerism?) It is a strategy that might even continue to work – for a while, at least. But can

we really find technological solutions to get all what we are accustomed to have – and for everyone? The recent case of the Fukushima disaster and many more we could sight should have shown to us that we are not as smart as we think we are.

The winning strategy is adaptation to what is sustainable. We need to adjust our needs to what this planet can give us. It's best us cats willingly put our tail down. It is what the Japanese did on their island and, after all, we are all living on an island, a gigantic, spherical, blue island floating in the blackness of space. It is up to us to manage the bounty that we can have from the earth and create something that could be as beautiful as the Edo Civilization in Japan. If the historical example of Japan counts for something, we may be heading in the right direction, if we can collectively and diligently employ a renewed wisdom to again hear the cuckoo sing.