The Sustainability Factor
What Sustainability Means and Why You Need to Know

by Aaron Turpen
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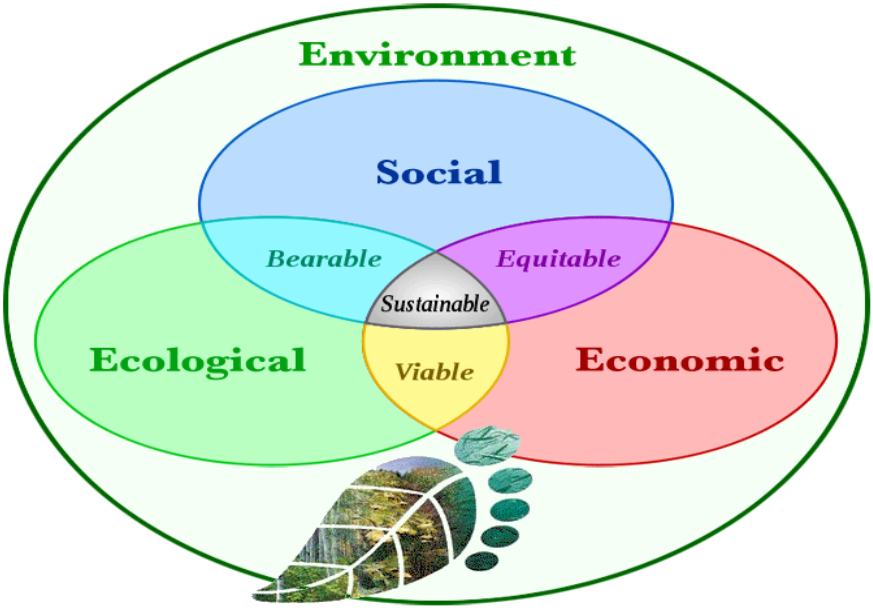
Putting the *Mental* into Environmental



About the Author

Aaron is a professional writer living in Wyoming, USA. He is a former truck driver, computer geek, and political rabble-rouser who enjoys gardening, cooking, reading, and his family's goofiness. He is co-founder of a local animal rescue group (GatewayAnimals.org) and is enjoying his journey of discovery and a return to a simpler, less impacting, and happier lifestyle.

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What Sustainability Really Is

The term “sustainability” or “sustainable” is used a lot these days, almost always in relation to something that's considered green (ecologically non-impacting, or at least more so than the alternative). It's often used wrongly, especially when it's used to tout products or services.

The problem with the word “sustainable” is that while it's easily defined, it is hard to quantify with so many things in today's consumerist world.

By definition, sustainable goods and practices are those that can be perpetuated almost indefinitely without lowering the future potential production of the good or practice. Until recently, the term was used most often to describe an agricultural method or technology. It is often used by economists to describe an economic trend or practice as well.

Using nearly any measurement, the sustainability of our current technologies and lifestyles is not feasible. While Al Gore and the other global warming hypsters go on about our pending doom with the planet's atmosphere, they ignore something more fundamental and far more seriously threatening. They ignore peak production and extraction models.

This idea has been around, generally on the fringe, for a long time. We've heard about Peak Oil and Water Shortages, and all the rest. These are almost always laughed off by the main stream because they are, to put it bluntly, impossible to really quantify and come to grips with.

Those two issues are deservedly on the fringe. Peak Oil will not be an issue so long as we are willing to go to great lengths to get the crude. Including warfare and monetary disaster. Peak Water, similarly, is most often presented as only an issue in the foreseeable future in those areas that we don't generally worry about (meaning: somewhere that's not right here).

The problem with reaching peaks in any resource is that the individual resource is often not likely to reach a peak. Oil, for instance, can be infinitely available for as far into the future as we wish to project, provided the other resources that make it possible to get the oil are still easy to extract. Conversely, so long as we have cheap energy (oil), we can raise the amount of our reserves for any other resource because it becomes possible to extract it almost indefinitely.

Eventually, however, we're going to hit a synergy where we won't have one or the other to rely on for supplying our usage. We'll eventually reach a point where oil is too hard to get because we just can't afford the cost in oil to extract the metals required to make the machinery for extracting the oil; or the phosphorous for fertilizing our fields to make the food to supply the workers to get the oil.

All of our resources are not in a chain, but a web. Just like the synergy between foods, markets, politics, economics, and so forth the resources of our planet are also tied into a web. Each affects the other either directly or through a chain of connections.

Currently, we are seeing two major changes in that web that are affecting everything else: economic upheavals are changing the landscape of oil's availability as the largest purchaser on the market is replaced by another, who stands on slightly firmer economic ground. This upheaval is causing big changes in other market sectors as food production, which requires a large influx of oil to power its machinery, shifts towards using food itself as a fuel. This shift causes the food to become a hotter commodity on the market, making it more expensive to get. In turn, other markets are being affected as the economics all bump into one another vying for their new position in the web.

It's my belief that long before the claims of doom and destruction from Al Gore and the global warming parade come to pass, we're going to face something much more sinister and much more telling. We're going to see the collapse of our industrial agriculture and thus will be facing starvation on a planetary scale.

I know that sounds extreme, but the evidence is all there if we just look for it. We're reaching a "tipping point," to steal one of the favorite climate change phrases, wherein we will not only reach Peak Oil, we'll reach Peak Everything.

In this discussion, we'll look at the various aspects of the resource web and how they're changing and beginning to play against each other. Rather than supporting each other in a balanced web of usefulness, they are now pulling against one another and will eventually collapse—likely nearly all at once.

We will look at peak water, minerals, fertilizers, petroleum, etc. Then we'll talk about what needs to change and how it can be done. That change won't come from where you likely believe it would.

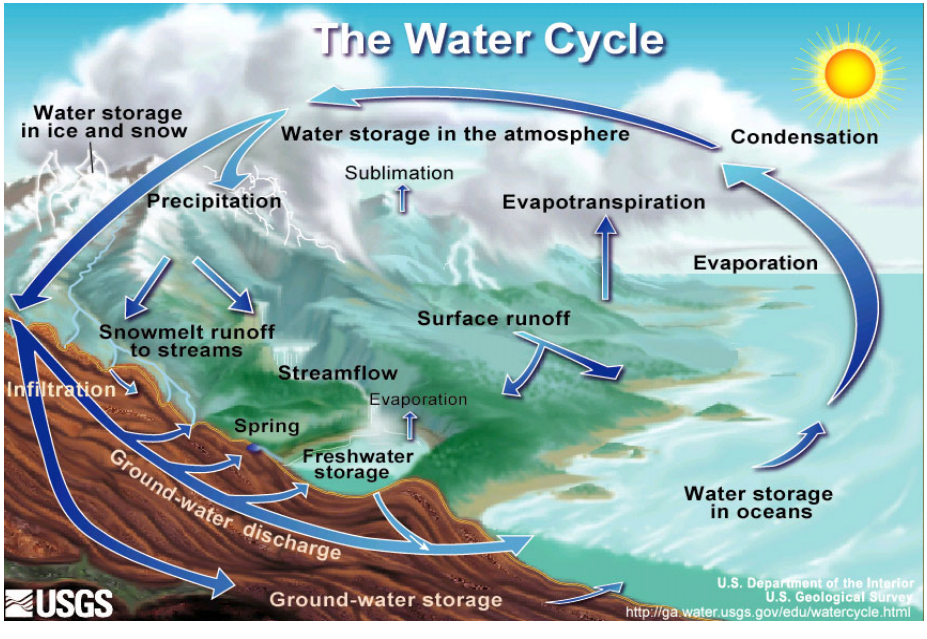
That's getting ahead of ourselves, so let's first look at how these various resources are beginning to waver.

Peak Water

This is a notion that has been getting more and more attention lately, largely due to the long drought which has been hitting much of the world's agricultural production areas. The United States' Midwest region has been in drought for about a decade, though the cycle may be moving towards more precipitation now. This will not change the Peak Water problem, however.

It's likely that the drought is a result of two things: natural weather patterns, which we know have been in cycles of drought and abundance almost perpetually through the Earth's existence; and over-use of water resources, which we have been doing for some decades.

Consider that although water covers 70% of the plant, only a given 2% of that water is “fresh” and immediately usable water. This changes perspectives on water being “everywhere” a little bit. Then consider that most of that is tied up as ice and snow in glaciers and polar caps.



What Peak Water means is not an end or lack of water, it means a lack of usable, fresh water in any abundance. Most of those who have finished grade school are aware of the water cycle. It rains or snows, water flows downhill and eventually into the sea. Along the way some of it evaporates and still more evaporates from the oceans. This goes into the air, comes back down as rain or snow, and the cycle repeats.

Most of our water is used and re-enters the cycle. This is usually not a problem. Even our sewage is not necessarily bad water. The good stuff can evaporate off of there.

What is bad is when compounds and chemicals that change the water or contaminate it are added. Those flow into the ocean, can stay in the water, or can cause changes that don't allow the natural cycle to continue. Worse, they can affect the habitats around the fresh water cycle and change them, altering the cycle itself. A discussion of one of the worst of those will be forthcoming in the next section of this paper.

Some of our uses of water do not return it to the natural cycle. Our relentless pumping of ground water aquifers to feed our agricultural and other needs is done as a rate much faster than those can refill naturally. This is a well-known, but apparently generally ignored facet of Peak Water. Those aquifers refill at a set rate and no faster.

In other words, we're using more water than can be replaced. The last decade's drought conditions have exacerbated this issue.

Another problem is that where the fresh water is may not necessarily be where humans are in population. Locally, areas like Southern Arizona and California, much of Nevada, and so forth are examples of this. There is not much water there, but there is a large population of people.

By far, the largest element of Peak Water is contamination. Water is used for just about every industrial process we have and it is usually contaminated while being used. More often than we'd care to consider, that water is then dumped back into the cycle.

The reality of Peak Water is tangible. Scott City, Kansas sits on top of the Ogallala Aquifer and pumped billions of gallons onto record-setting crops in the '60s, 70s, and 80s. Today, the town is a dusty ghost town with few residents and no farming. Why? No water. Those who are still there have wells nearing 1,000 feet deep which are barely adequate to provide their meager homes with functioning toilets and showers.

This is beginning to happen in more and more areas throughout America's bread basket. We've run the wells dry and are beginning to suck air. According to the Pacific Institute, the United States has 3,069 km^3/year of fresh water. We use about 30% more than that. We aren't as bad off as China (yet), who uses about 50% more than what they receive yearly, but we're close enough to begin feeling the burn.

This is only the beginning of the situation. Those crops need water, but to continue our breakneck pace of high-output, huge farming enterprises, we'll need other things too. Like fertilizers.

Peak Agricultural Minerals (Fertilizers)

The minerals used in agriculture are diminishing rapidly. Besides the Big Three of the fertilization minerals (nitrogen, phosphorous, and potassium), there are numerous others being used. Nitrogen is, however, the King of the Fertilizers.

Nitrogen is used with abandon and could likely take the credit for much of the huge production yields in many of our crops. Mainly because nitrogen has made single-crop farming and non-rotational farming possible on a huge scale.

Phosphorous, of the three minerals, is the one most likely to run out first. Most grain crops require a lot of phosphorous to continue with their current, huge per hectare production. It's scarcity is already boosting prices by a huge margin.

Finally, potassium, of the three, is the only one that seems to be still easily gotten and will be for the foreseeable future.

Nitrogen, King of Life and Death

As stated earlier, the role of nitrogen in most of our non-organic crops has been possibly the largest driving force behind the huge success of industrialized farming's large yields per hectare. Nitrogen is very abundant, but not always in a useful way. There will not be a Peak Nitrogen in the respect that it will become hard to find. There is another, more problematic worry with it, however.

Currently, most nitrogen used as synthetic fertilizer for farming comes from a process called nitrogen fixation, invented after the turn of the 20th century. Bacteria do this naturally, but not on a scale or at a speed suitable for production and use in large scale fertilization.

Nitrogen is important to plants in the same way it is important to all life: it is the backbone of DNA and RNA and is the very building block upon which all living things grow. The problem is that nitrogen, like anything else, can be too much of a good thing. Too much nitrogen begins to create problems all its own.

Most of our commercial crops, such as corn, use a lot of nitrogen in their growth process. The reason for this is the growing methods themselves: they require fast growth, shallow rooting, and a lot of soil turnover. This leads to a large amount of nitrogen leaching (leaving) the soil as runoff during rains, watering, snow melt, etc.

That runoff nitrogen eventually makes it to streams, rivers, lakes, and the ocean. In relatively still waters, such as lakes or oceans, the nitrogen spurs the rapid and incessant growth of algae. That algae robs the water of its oxygen, thus cutting off its use for other species, which either die or leave.

It's important to understand that phenomenon because there are currently huge "dead zones" where major rivers dump into the oceans. These inlets, such as the huge delta where the mighty Mississippi River flows into the Gulf of Mexico, have become giant dead zones. The Mississippi Delta has a dead zone that spreads from Houston, Texas all the way to Louisiana and out into the Gulf about one quarter of that length at its widest point. Very little lives in those waters. Many of the other major rivers of the world have the same issue wherever they dump into the sea.

Potassium, The First to Go

The other major ingredient of industrial farming is potassium (commonly called "potash"). This nutrient requires mining and extraction and is a primary ingredient for all cereal grains such as wheat, though it is needed by all plants. Current wheat yields through industrialized agriculture are producing about 8 tonnes per hectare world wide. Most of that wheat is grown in the United States. If phosphorous were to become unavailable, that commercial growing would drop down to 2.5 tonnes per hectare.

Organic farmers, however, produce about 6 tonnes per hectare and were phosphorous to be removed from the market, they would still produce 6 tonnes per hectare. Why? They aren't dependent on

artificial sources of mined phosphorous as their industrialized colleagues are.

We're already seeing the demise of phosphorous right now. Between the 2006 and 2008 growing seasons, the price of phosphorous fertilizer increased by 500%. As reserves continue to diminish, as energy prices continue to rise, and as competition for what phosphorous there is available heats up, the price will only continue to go up.

Eventually, it will hit a point where it breaks the cost:profit barrier and farmers will have to make a hard choice regarding their agricultural practices versus their needed profits.

Thirty years ago, scientists said that we had 500 years of phosphorous left. We've raised our usage to 125 tonnes per year as more and more agricultural systems in developing nations are switching to a more industrialized process, requiring more and more synthetic fertilizers. This raises the demand for phosphorous.

Current estimates say that we will reach a peak production of phosphorous in about 2040 and it will take only a few years after that, perhaps twenty at most, for that production to deplete all easily-available phosphorous deposits. Then production will drop as more and more energy is required to extract what's left, which will eventually become so expensive that farmers and food markets will not bear the burden.

What's worse is that genetically engineered crops (GMO or GM foods) are becoming more and more common as the seed of choice for industrial growers. These crops require more fertilization and more stable conditions to grow well. It's possible that their new-found prevalence in the past decade may speed up the phosphorous death clock.

Agricultural Conclusion
It's obvious that current methods of agriculture cannot continue for much longer without seriously destabilizing not only the planet's ecosystems, but our own food dependence. If any of the Big Three nutrients becomes unavailable, there is no substitute for it and industrial agriculture stops immediately.

We are heading towards a point where phosphorous and possibly nitrogen will face a dead zone of their own. They aren't alone.

Peak Minerals of All Kinds

We are fast approaching a point where many of the base metals we rely on for nearly everything we manufacture will become harder and harder and even virtually impossible to find. In a paper titled *Minerals scarcity: A call for managed austerity and the elements of hope*, Dr. A.M. Diederen, Msc of the TNO Defense, Security and Safety (defense contractors in Holland) published his findings regarding minerals scarcity.

Being interested in rare metals, those being his line as a mechanical engineer for TNO, he looked into metals availability as part of the defense requirements for the Dutch military. What he found was that rare metals were becoming nearly non-existent in much of the market and other metals are beginning to follow suit.

His conclusion is that in the face of a nearly unlimited energy supply, as we've had for several decades, the extraction of metals was limited only by the total amount of metals available. In that scenario, the scarcity of the metals posed no danger of reaching an end point in any measurable extent. However, when the energy becomes more expensive, then limits are put on how much can be used to extract those metals. Eventually, a peak is reached wherein the energy value to the metals extracted becomes even and so going to greater lengths to extract the metals means a net loss.

Analyzing oil and gas production profiles, which most analysts think are in their peak now (dates range from 2006-2010), petroleum-based resources will taper off, dropping steadily as the price of extraction becomes too costly.

Unless something changes quickly, this will herald downward changes for the extraction of all other minerals, especially rare metals. In fact, iron, magnesium, and aluminum are the only common metals not likely to be very much affected by this.

The first to be effected will be consumer electronics, specialty electronics, and most newer vehicles. This as rare metals required for most electronic production will become too rare to be cheaply used and for which no current known replacement is to be had. Metals such as indium, tantalum, and platinum will be early on the list of those to fail.

This would also mean that most alternative electricity sources, especially storage mediums, would be effected.

Next comes more common metals such as tungsten and molybdenum, both of which are used extensively in manufacturing to prolong tool life as well as in ceramics. After that, nickel, cobalt, and copper are next in line to go.

By 2050, at current extraction rates, we will have hit peak on most rare and many of the common metals. Recycling only prolongs the inevitable.

Peak Everything

There are many other aspects of our consumptive uses of basic resources that could be analyzed here. The bases are covered, however, and should prove the point: the largest of the basic elements of modern human existence are disappearing. Individually, these peaks and changes aren't of much concern, but working together, they quite literally spell disaster for humanity.

Disaster on a scale that even the global warming alarmists can't fathom. When the web stretches to its breaking point, the stress will be felt by all of us. When it finally breaks, however, few of us will come out unscathed.

Historically, a lack of resources has always meant two things: massive suffering or death and warfare. With the peak happening with oil availability, we're already seeing the latter, which brings the first. As the trouble spreads, the warfare will become more and more rampant and involve more of us in its conduct.

The rampant consumerism is not only a Western cultural phenomenon, but is growing in many of the world's most populous countries such as China, India, and others. This consumerism uses resources on a massive scale and pours garbage into our landfills, oceans, and environments at such a fast pace that few would dare argue that it's sustainable in any way.

We will soon reach a point where we will literally not be able to feed, clothe, bathe, or otherwise take care of humanity. Those who are already in dire straights and dependent on the rest of us for their sustenance will be the first to go. Eventually, however, all of us will be facing hard choices of starvation and survival.

If that happens, blood will flow. Cities will become riot zones and areas of open barbarity and destruction. Nations who have the means will march troops and war machines into other nations, especially those with resources left, and subjugate them.

No mythical oceans rising, skies falling, or jungles in the Midwest will happen before these more barbaric realities hit home. Humanity faces nothing short of global genocide.

Unless we begin to make changes now.

The Changes Must Come, But Not From Where You Might Think

It's paramount that we, as humans, find a balance and make ourselves fit into the ecosystems around us and the planet as a whole. It's a rule of physics that energy comes from somewhere and always goes somewhere. It isn't created and it isn't removed, it's merely changed. By the same token, the energy and resources we use must come from somewhere and must be sent in the right directions when we're finished with them.

Minimizing our impact and using husbandry rather than consumerism is the key to this paradigm. A hundred and fifty years ago, for instance, farming was what we today call “organic” or “sustainable.” Back then, it was just farming. It was only with the advent of machinery and (especially) artificial inputs to improve the crop yields that farming became industrialized.

Most of the things in our modern lives are the same way. We don't have to go back to horse and buggies, fireplaces and wood stoves, etc. There's no need to revert to 18th century technologies in order to restore our balance.

We merely need to rethink what we do, at every level, and adjust. A large portion of our impacts are localized. Consider where your water comes from, where it's been before you received it, and what needs to be done to make sure that what's being used overall is not more than what's replenished.

None of this is easy, but none of it requires the heavy hand of government either.

Most of these changes can be made on a personal level. You can choose to become more ecologically sound, more sustainable in your own life and lifestyle. Then, by proxy, so will your family.

Eventually, so does your neighbor, then another, then another, and soon whole neighborhoods, whole towns, and soon enough, cities, counties, and whole nations are beginning to act this way.

The change that we need is cultural and personal. If we begin to personally make the changes and eventually create cultural phenomenons of change, within a generation we could be well on our way to true sustainability.

The core change is within ourselves. Most of us have traded our family and social lives for gadgets and consumerism. Rather than play with our children, talk with our neighbors, and live our lives, we instead watch television, eat fast food, shop for disposable gadgets, and otherwise lead empty lives.

No government agency, no law, no treaty, and no tax can make that change for us. We must choose to make the change ourselves, to live full lives that are more in tune with our environment and with one another.

The smallest things make huge impacts. Composting your kitchen scraps can eliminate up to 1/3 of your total garbage output. Using more efficient lighting and only when we need it can cut our electric usage by the same. There are many, many more of these actions that make for change.

Consider your place on the planet, your life, and what you want it to be. Once you experience growing your own garden, no matter how small, once you spend real time with your family and friends, once you stop living as a consumer and instead live as a human, once you spend the time to look at the stars and show the constellations to a child, once you do any or all of these things you'll begin to understand what it is really like to be human.

Your first organically-grown tomato out of your own garden will be the sweetest thing you've ever eaten. Your new-found health because you now walk through town with your family will be a revelation of what you've missed as a slave to horrible food and bad health. Your less stressful and shortened work hours because you don't have all those gadgets to buy, huge energy bills to pay, and useless payments to make on things you didn't need will mean more time to be happy.

In short, you will join the ranks of those who've stepped away from modern consumerism and found a better life as a freer individual. You'll join the family of people who've learned that owning things does not make you rich and the latest, greatest, shiniest thing you can own is your own happiness.

The answer to humanity's problems is not in any government, it's in all of us, as individuals.

The personal choices you make today will affect your life, your childrens' lives, the lives of everyone around you. The ripple effect will be amazing as those changes spread.

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