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Beyond Sustainability:

From Scarcity to Abundance

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Conversations on sustainability can often be quite depressing. You know the story: ecosystems in decline, species loss, water scarcity, climate chaos, spread of diseases, and then all of the social and economic turmoil that results from these conditions.

There is a common thread to these grim stories as you might expect, and this thread carries over to the solutions we often find ourselves seeking. I believe it is also the reason we find ourselves so discouraged over our chances for turning things around in some sustainable fashion.

This common thread has been referred to in words such as scarcity and limits, and in themes such as entropy, closed systems, and carrying capacity.

We've all been drilled in the absoluteness of limits. A lot of very good science is telling us more and more precisely just how little there is left, just how much we have to cut back, just how prone to decay and unraveling our natural world is, and just how austere our future will have to be compared to the extravagant present.

Our policy tools reflect this sense of austerity: we strive to reduce, reuse and recycle as if keeping all those molecules of fiber, glass, metal, and such out of the landfill a few extra months is what it is all about. We encourage resource efficiency, as if getting another few percent out of our throughput of these materials somehow is enough. We struggle to add a few more jobs as we make these reuse, recycle, and efficiency measures stretch our resources a while longer.

But when we settle for a higher recycling rate, or reduced industrial emissions, or a few more jobs (usually low paying), or a little less of a rate of decline in ecosystem integrity, we are really just postponing our own collapse.

Meanwhile, the more we stretch our resources through efficiency gains, the faster others seek to use them up - as if our savings become their withdrawals. It all looks like a cruel zero-sum game that we are destined to lose in the end. No wonder there is talk of austerity and apocalypse. Who can be cheerful or encouraged about any of this?

I believe there is an austerity all right, but it is an austerity of imagination. All of it is fueled by the premise of scarcity in nature.

I propose that there is an abundance to nature that, in our ignorance and even arrogance, we are only beginning to fathom. In fact, it would be arrogance to claim even that much. Our microbiologists, botanists, biologists, mycologists, wood chemists and geneticists are only now scratching the surface of this great diversity and plenty. What we don't understand, we can't possibly explain, value, or protect.

We have identified only the smallest fraction of the species of the world, particularly in the fungi, algae, and bacteria kingdoms. Much less do we understand all of the wealth embodied in these mystery species - which by the way dominate the living world. We don't exactly have the plant kingdom figured out either. Taxonomically speaking, we aren't playing with a full deck. And even with the cards we have in our hand, we're not using them very wisely.

A typical coffee business uses 0.2 percent of the coffee bean to produce a cup of coffee. This means 99.8 percent of the coffee bush becomes "waste."

When we make a so-called green detergent from palm oil, we use only 5 percent of the biomass from the plantation; the rest is treated as waste.

When we ferment barley and hops to make beer, we take out only 8 percent of the sugars. the rest is treated as waste; the same for the proteins and fibers.

Something less than 3 percent of the original Btu value of a lump of coal makes it out as usable light in our lamps, similarly low percentages exist for energy conversion in transportation and industry.

Studies show that between a half and three-fourths of the materials used in our industrial economy are generated and treated as waste before ever entering the economy. They are not seen or treated as commodities and aren't valued as such.

Where else can we get away with such foolishness?

Imagine being a dancer and told you could only use 10 percent of the stage to perform! What if writers could only use declarative sentences and no more than three parts of speech? What if you were a homebuilder and were limited to only a hammer and a saw to do your work? Foolish, right! Why? Because we know we have so much more available to us to practice these arts and tasks.

When it comes to seeing the abundance available to us in nature, we are simply not there yet. Until we do we will be no closer to sustainability than we were a decade ago.

The key to the challenge is this. When we fail to see all of the wealth that nature gives us, we quite readily see ourselves with less.

When we see ourselves with less, we find it easy to believe in scarcity and limits.

When we admit to scarcity, we create economic and social and political conditions that allow some to have and many to go without.

And when many go without, we create a damaged and sad - not to mention dangerous - world.

Solutions grounded in the premise of scarcity will never result in sustainability.

Through clever resource efficiency and technology substitutions we may do a better job - for a while - of managing scarcity, but we will not even come close to sustainability. We can only get there, and beyond, by seeing our circumstances through the lens of abundance.

So, how do we begin to see and then capture this abundance? It begins with nature and with seeing the system of nature. But few of us operate with a systems view of the world. Instead, we routinely compartmentalize and optimize the individual sub-components of nature.

We optimize corn production, for example, all the while poisoning our soils and leaving the groundwater in Iowa undrinkable. All because we refuse to put the same effort in to understanding soil health that we do into developing stronger pesticides or genetically engineered strains of corn.

We don't consider the system of soils and their nutrients, bacteria, fungi, soil pH, lignin chemistry, not to mention worker safety, aquifer integrity, farm community security and more because for the most part we aren't even looking for it. Worse, we may not even care. We are only concerned with the abundance of one thing, in this instance, bushels of corn. Meanwhile we create scarcity in so many other ways by refusing to value the other components of the system.

And this leads to even further scarcities being created, for our systems are all themselves interconnected. Our agricultural system and our water systems are connected to our industrial meat production system, in turn connected to our transportation system. And on and on.

Moreover, while we are optimizing the output of feed corn for cattle; they themselves are being optimized at the cost of growth hormones and antibiotic resistance in consumers, water and air quality degradation, nutrient loss and damage to distant ecosystems.

Our inefficiencies and manufactured scarcities cascade through and across systems of systems. And we want to teach this to the rest of the world?

The economic model that makes all this not only possible but necessary is failing us. While we focus on higher yields of single crops or single industrial products, we cling to the core business model to get us there. We are in the beef business, the corn business, the aluminum business, and the timber business. Many of these businesses even say they want to become sustainable businesses. I don't think so.

We forget that nature does not have a core business, except that of diversity, abundance, and continuance. We cannot see abundance when we are purposely generating scarcity with our intentional optimizing of individual products and processes.

Looking carefully, the abundance of nature is staggering. So-called waste biomass, biomass of all kinds, contains nutrients, vitamins, enzymes, anti-oxidants, and more. Creative entrepreneurs are accessing and valorizing these constituents through simple separation and reformation processes, yielding additives for food, cosmetics, pharmaceuticals, dyes, and hundreds of other end uses. We haven't begun to tap the wealth of even a fraction of the biomass abundance nature provides.

People in Morocco have struggled to find a way to keep their native argan forests from disappearing under the relentless pressure of firewood harvesting. The key has been to find value-added uses for the tree that give people a stake in its survival. Researchers first found that they could extract an oil for use in cooking and traditional medicine. Exports to Europe followed. But they now know that the tree contains more than this. It offers extraction residues that have value! as anti-microbial agents and antioxidants. The potential is just unfolding.

The perception that the tree was useful only as firewood created an artificial scarcity that overlooked the abundance of value added-products produced by the tree. A women's cooperative is now helping stabilize the forest ecosystem and deriving income, jobs, and hope in a setting that previously had little of any of these. Scarcity becomes abundance when we see more clearly what we have in front of us.

In the industrial setting, the issue is put to us differently. We have a perceived scarcity problem of elements and materials only because we aren't very good at taking things apart. We have mastered the creation of alloys, polymers, synthetics, and composites of all type and combination. The simplest of these lend themselves to capture and reuse with comparatively little entropic loss, aluminum for instance. The more complex of our manufactured products we bury and burn or if we are clever perhaps turn into some temporary product - that in a few years itself must be buried or burned.

Where we have failed and where the abundance of this non-organic world awaits is in the development of separation technologies. We need to free up for reuse the constituent elements of the most complex compounds and composites that we have created.

A glimmer of hope in this area comes from Japan where scientists are now working on methods for separating tricky composites such as DVDs, CDs, and printed circuit boards into their constituent elements: polycarbonates, aluminum, chromium, gold, plastics and more.

What is most intriguing about these separation advances is that the processes being developed are conducted at ambient pressure and temperature using combinations of algae, bacteria and enzymes. This is a far cry from what is normally used in materials separation - physical and chemical destruction using strong acids and bases, high temperatures, and high pressures. Nature takes things apart every day (and puts them back together) at ambient pressure and temperature. We must learn how to do the same.

Biological separation provides one solution. Another way is to design our materials and products in a way to ease separation and recovery of valuable input materials.

Imagine recovery technologies so effective and complete that all the necessary elemental material for industry could be recaptured from the disassembly of end-of-life products, buildings, machinery, vehicles, furniture, etc. We could continually harvest these technical, inorganic nutrients, integrate them

into all the wonderful products we care to design, and then separate them at the end of product life to where they can be used again and again.

Suddenly and hopefully, all of the once-gospel conditions of scarcity, limits, and closed systems are turned upside down. Nature will give us nothing more. That much we know. Instead we must do more with what nature has already given us.

But we can only get there if we seek and embrace abundance. For only then will we be motivated to seek out all that is possible and not be satisfied until we find it. When we concede to others the issue of scarcity, we cannot expect solutions that do anything but allocate that scarcity. And the allocation of scarcity is not sustainable.

Frances Moore and Anna Lappe' wrote in their book "Hope's Edge" that "To question ideas that have long given our lives coherence and meaning is just about the scariest thing that any human can do."

So it is up to us. What will it be? Will we settle for scarcity or seek out and embrace abundance? How much of the stage will we use?

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Since 1995, David Schaller has served as Sustainable Development Coordinator in the Denver office of the U.S. Environmental Protection Agency. In this capacity, he has helped promote the broad tenets of sustainability within the context of EPA's core regulatory, research, education, and outreach missions. David has also served as international coordinator for EPA in the Denver office and has delivered technical assistance and capacity building on sustainability themes in over twenty countries. He was a member of the U.S., delegation to the United Nations World Summit on Sustainable Development in Johannesburg in 2002. In 2003, David became a certified practitioner of the Zero Emissions Research and Initiatives (ZERI) methodology. David has worked for EPA for over 25 years. He has also worked at the National Renewable Energy Laboratory (then SE! RI) and in the private sector on a range of renewable energy issues. He also served as a Peace Corps Volunteer in Micronesia. David has a BS in Geology and a MA in Environmental Policy, both from the University of Arizona.

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