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Soil Power (Part One)

I was very eager to listen to Thomas mention the loss of top soil on the Thursday show. Modern agriculture is a program and it was a part of the harvesting plan of the 'social parasites' in many ways. Yes, the farmlands of the world are being depleted of their topsoil at an alarming rate. It is a large problem that we will have to solve going forward.

The majority of modern farms the world over are simple self-destructing. The problems are many and as most things in our modern world, the systems were designed to fail. To put this in perspective, here is some data from Canada on farming profitability. In Canada, between 1985 and 2016 a net 1.35 trillion gross income was achieved as a direct result of farming. In that same 32 year window, the net costs for farms was 1.32 trillion. If you do the math, that is 98%! In those 32 years, farmers have been asked to live on 2% of their gross income. Where did the 98% go? The answer is to fertilizer, fuel, farm machinery, agro-chemicals, seeds and other 'inputs' to the farm. What other business in the world can operate at such low margins and thrive? The answer is none.

In 2022, fertilizer costs in the US are expected to be at least 65% higher while commodity prices, although higher than the previous few years are still at the same levels of 2010. In other words, at the very minimum farmers will need to absorb at least a 25% pay cut to continue farming this year. And all of the above was estimated BEFORE the entire Uk-Rain and Russia distraction. The increases to fuel costs will make that 25% seem small in comparison.

Change is not always a conscious choice and farmers today are in such financial pain that change is not only welcome, it is the only thing they can do. Fortunately, there are many thought leaders in the world preparing the rural communities for this change. Regenerative agriculture is likely the only viable business model modern farmers have left. The beauty of such a change is that it is 'disruptive'. If you are a farmer and you can increase your bottom line AND grow much

healthier disease free food WITHOUT killing the life of your soil and without the need to go to the bank for a loan each year, why wouldn't you continue such practices for the rest of your life? Farmers who have made this switch are now running thriving and sustainable businesses. The only real question will be how many farmers make such a transition before they 'lose the farm', literally.

Soil is the lifeblood of civilizations. Not one society has outlived the destruction of their soil. So what are the soil-lutions (sorry, could not resist a pun).

There are 4 guiding principles that we as a society need to adhere to for sustainable soil management.

- a) have a living root in the soil as long as possible
- b) minimize and if possible eliminate soil disturbances
- c) maximize the diversity of life in your soil (plants and animals)
- d) maximize soil coverage

I was re-reading the articles from Nicolai Levashov recently. He was tearing down the 'legacy' of Albert Einstein because his theories were based on 'postulates' that were proved to be false. A postulate is a 'statement of fact' that is assumed to be true in order for a theory or experiment to maintain its validity. Levashov wrote at length about postulates and how true science seeks to REMOVE postulates instead of adding them to increase knowledge.

In soil science, there are a number of postulates that need to be pruned from the tree of knowledge. They include:

- a) plants compete for resources so weeds are a bad thing
- b) plants need extra fertilizers to be healthy
- c) plants need outside protection from pests to be healthy

These three simple postulates allowed the agro-chemical industry to flourish post WW2. In brief, they are all false.

- a) plants COOPERATE for resources and do not compete
 - a 10+ year long study of plants in Germany (the JENA experiment) has shown postulate a) to be false. In short, plants share resources and work in harmony to make soil more fertile. In addition, the native prairies of the world are some of the most

productive soils ever created by nature. Before the European invasion, the North American great plains was estimated to have at least 400 different species of grasses and herbs growing in a single season. Nature embraces diversity. What's more, the JENA experiments have shown that plant diversity can overcome drought and flooding, something we are seeing more and more of recently.

b) the air is 78% nitrogen. Why do plants need external nitrogen added when such a huge resource is quite literally in the air? The answer is they don't need it at all, especially when per acre, there is 190,000 tons of nitrogen in the air above ground. Second, the mineral profile of most soil is complete enough that the biology can mine for minerals and essential elements for many many decades without running out. Healthy soils have healthy populations of symbiotic bacteria and fungi who work with the plants to the benefit of all life. Plants grown in biologically active organic rich soil do not need to be fertilized.

c) plants grown in healthy soils have more energy available to create phyto-chemicals and oils and waxes that are simply indigestible for non-animals. Nature is always giving you feedback. If pests are eating your plants, the soil is weak and so nature wants to cycle nutrients faster and faster to improve the health of the soil. That is the role of pests in an ecosystem. They are the decomposers. And from an insect point of view, the current estimate is that for every pest, there are literally hundreds and sometimes thousands of predators that eat the pests.

To grow healthy soil, only one thing is needed, healthy plants (and patience). The primary indicator of the health of soil is something called the 'organic matter percentage'. Many people think that 'adding organic matter' such as compost and mulch is all that needs to be done. In reality, a living plant can add as much as 30 times more organic matter in a season than adding compost and mulch. Adding compost takes work and often involves importing materials which have costs (hidden and visible).

This does not mean compost should be ignored. Compost does serve two purposes. First, it adds a fuel source for the biology in the soil to use, especially at times when conditions do not support a growing plant. Second, high quality compost serves as a bio-stimulant and inoculant to seed the soil with the diversity of bacteria, fungus and micro-biology that is the start of the food chain in the soil. There is type of cold compost made from worms that takes about a year to 18 months to be fully mature. It is made using something called a Johnson-Su bioreactor. The compost from this home made device has thousands of different species of bacteria and fungi. It is best used as a bio-stimulant when planting seeds and has been shown to be able to grow as much plant material in the desert as is being done in the rain forests.

Integrating ruminant animals can also greatly speed up the process of making healthy soil. Their waste is loaded with a wide range of microorganisms and partially digested plant material that serves as 'fertility bombs'. This is spread by the ground dwelling insects and worms, etc, to further inoculate the soil.

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A four pronged approach entails adding compost and/or mulch, having living plants as long as possible, integrating grazing animals (where possible) and not tilling or disturbing the soil at any depth more than a few inches. This will build soil in harmony with how nature does it. This is how the great prairies of the world became so great. This is sustainable, very inexpensive and has the added benefit of being less work in the long run.

Additionally something incredible happens when soil organic matter gets to 3% and higher. It becomes almost self-sustaining and the productivity of the soil increases. At the threshold of 3% soil essentially becomes a sponge and holds on to an astounding amount of fertility and moisture. By implementing the four methods of sustainable soil management farms can sequester an enormous amount of carbon and water very quickly. Every time 1% of organic matter builds up in a soil, that soil will now be able to hold an additional 15,400 gallons of water per acre (about 1/2 an inch of rain) and store another 59 tons of CO₂ per acre.

As an example, Gabe Brown, a regenerative farmer in the US saw a major shift on his land once he passed the 3% threshold. It has been estimated that he sequestered the equivalent of 31 tons of plant matter per acre each year for 20 years. He started with 1.7% organic matter and as of 2013 he was over 11%. To give you an idea, 31 tons per acre is about as much as you can grow with a fully fertilized and irrigated corn crop. This means that after harvesting his crops and allowing his animals to graze the land in the winter, he still had an additional 31 tons of carbon added to the soil by the living plants with no need to import compost.

So, what can we do with this knowledge? If you grow your own food, you now have a four management practices to learn and use so that your soil can become healthier and more sustainable. If you are not growing your own food, maybe now is the time to start? If that is not an option, you could find a local regenerative farm and support them with

your purchases. You could contact all the farms in your area that sell locally and ask them to consider switching to regenerative practices. You can research and share the financial data available as well, since many management decisions come down to profitability. As an aside, Gabe Brown shares that he started selling direct to customers and depending on the item, had profit margins as high as 85%. That is a far cry from the 2% Canadian farmers are seeing in conventional operations. There are many other things you can do, if you put some energy and thinking into it.

Some thought leaders in the field of regenerative agriculture include: Elaine Ingram, Christine Jones, Dan Kitteridge, Gabe Brown, David Johnson and his wife Su, and John Kempf to name just a few.

"The nation that destroys its soil, destroys itself." - Franklin Delano Roosevelt