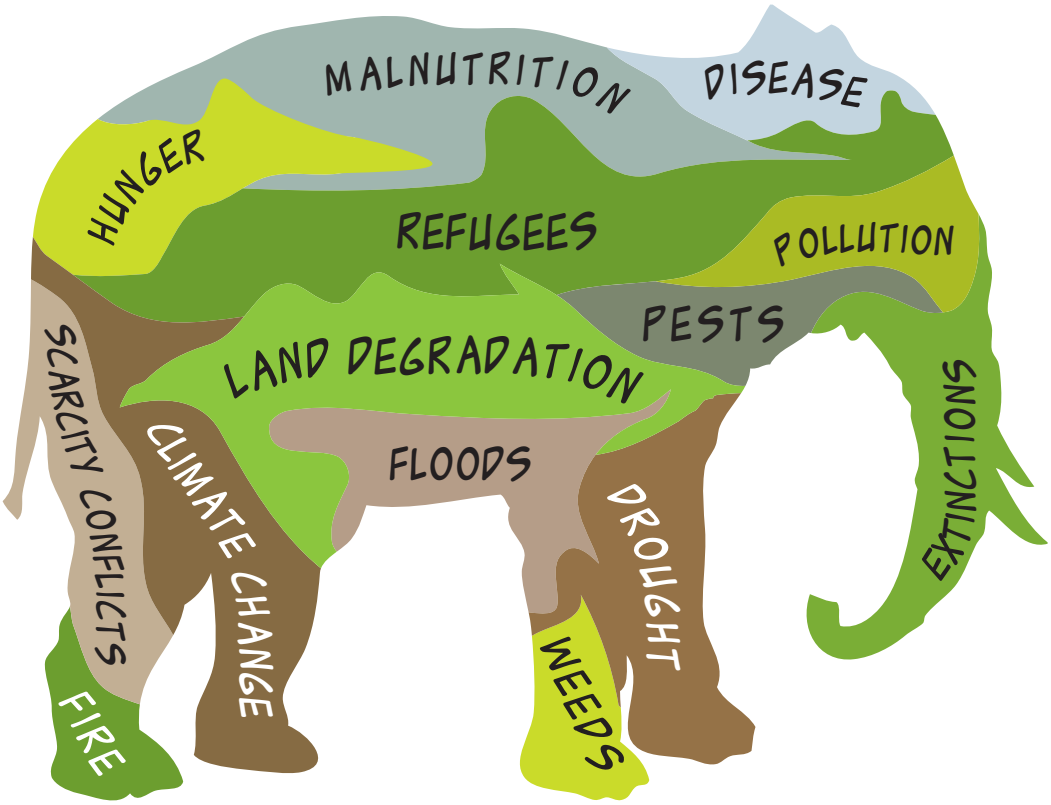
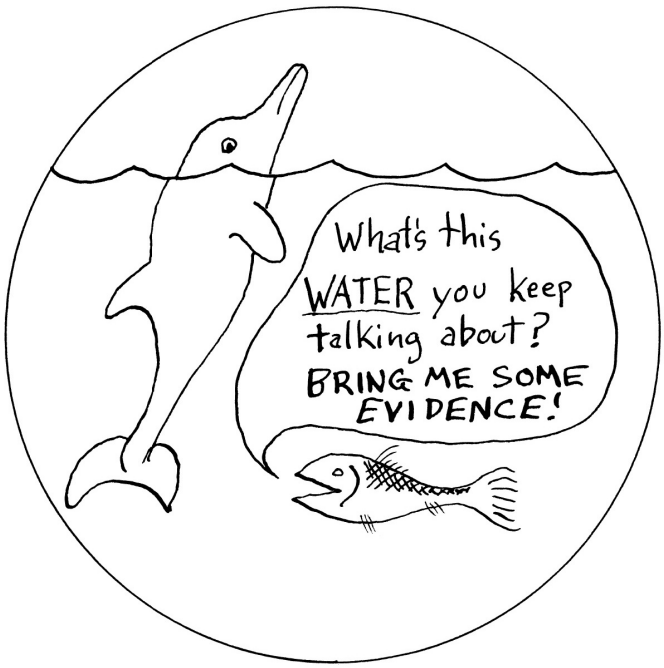
Recognizing the circle of life: the most powerful and creative planetary force



Peter Donovan

version: July 2018 for
Thousand Hills Cattle Co.



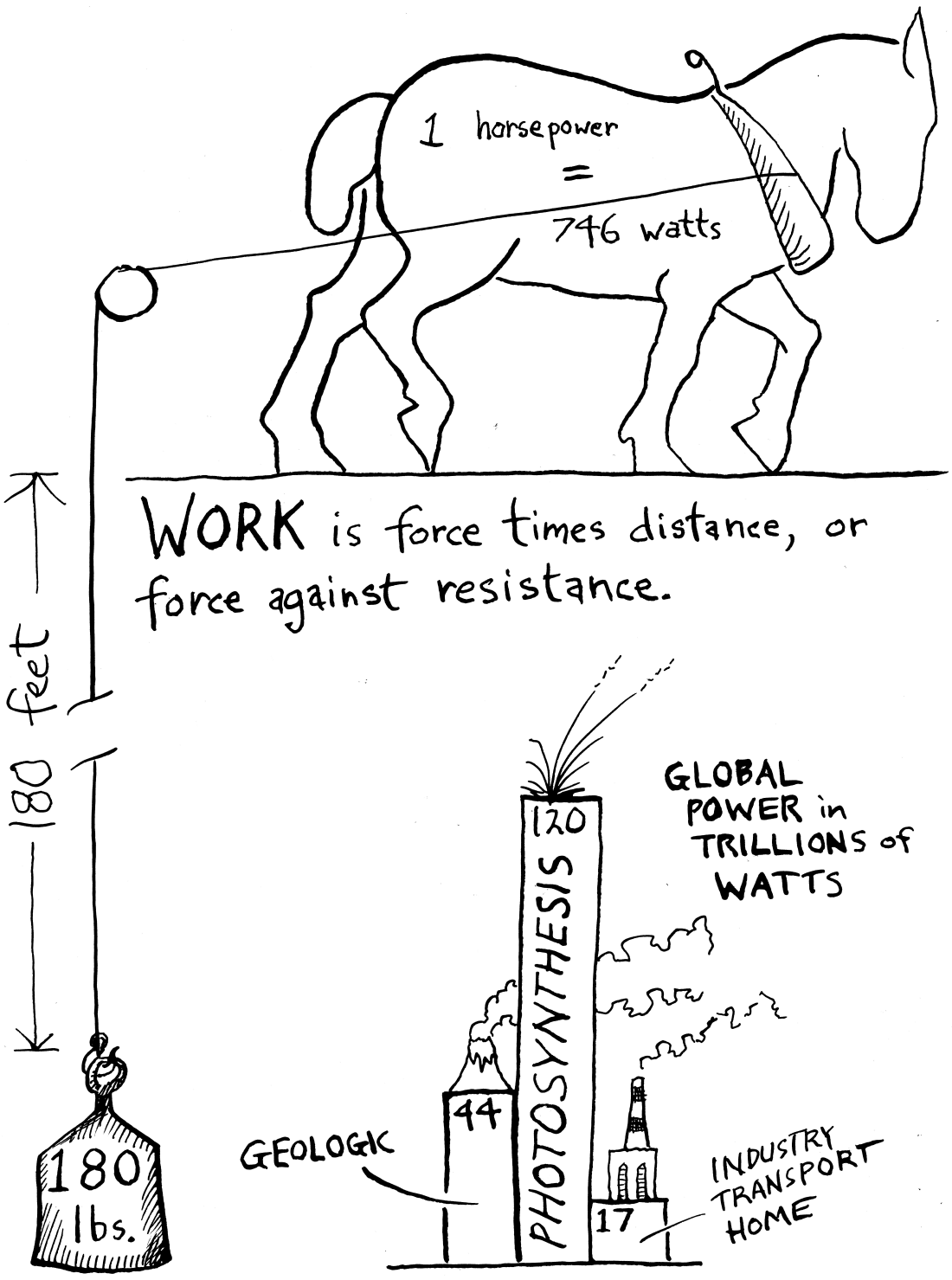
This booklet is aimed at helping you recognize the opportunity of working **with** the circle of life—the most powerful planetary force. When we're dealing with complexity, sometimes a lot of knowledge can get in the way of learning. So part of the goal here is to expand the quality and range of your ignorance. Good questions can help. What follows is a bit of background on asking some good questions, and making some quantitative observations.

> If you want to make small changes, change how you do things.
> If you want to make big changes, you must change how you see things.
>
> Don Campbell

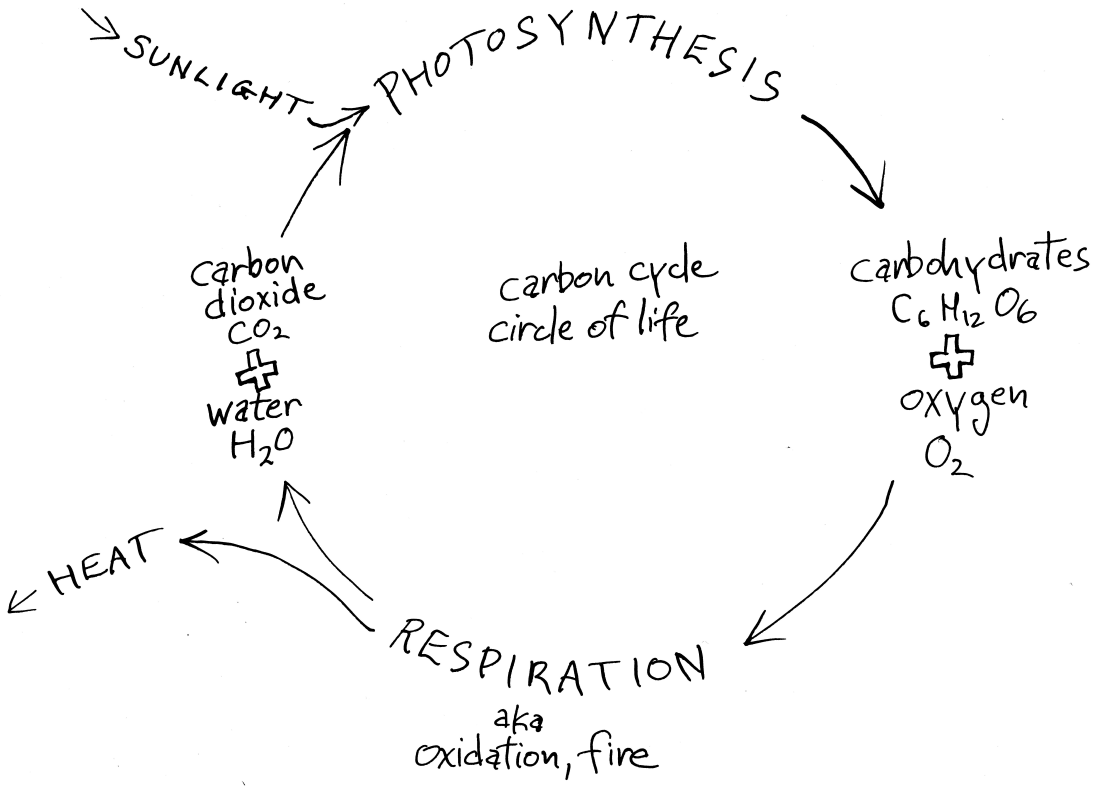
LIFE, powered by a tiny fraction of incoming sunlight, is the most powerful and creative planetary force. Our planet's atmosphere, its soils, its blue, white, and green colors viewed from space, even the composition of its crust and oceans, are the products of eons of life's complex chemical wizardry. This work of life powers carbon cycling, as well as the cycling of nitrogen, phosphorus, and many other elements. It modifies and slows the vastly greater power of water cycling at all scales. We are riding an enormous, incredibly complex, eddying flow of sunlight energy captured by interrelated communities of self-motivated living organisms whose metabolisms, behaviors, and relationships are increasingly influenced by our own.

Photosynthesis is a chemical transformation that happens quietly and gradually in the growth of a lichen, leaf, or diatom. It's happening almost everywhere on earth, in millions of different kinds of organisms. Unlike diesel engines or volcanic eruptions, photosynthesis occurs at ordinary temperatures and pressures, in microbes and parts of cells that are too small to see.

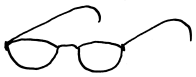
This complex circle of life, solar-powered through photosynthesis, does about 8 times more work globally than all our human-controlled power. It does almost 3 times the work of the geologic forces that move the continental plates and trigger earthquakes and volcanic eruptions.



Any kind of physical or chemical change involves **work**.
Power is work per unit of time. James Watt found that a brewery horse could lift 180 pounds, 180 feet (=32,400 foot-pounds) in one minute. This became a horsepower—about 746 watts. **How much work are you capturing from sunlight and rain on your farm or ranch?**



Frames



Many of us have been taught about photosynthesis in school. But the basic facts—that the dry material of a tree or plant comes mainly from the air, for example, not the soil—are often forgotten because they don't fit the frames or contexts by which we recognize and organize our beliefs, judgments, and decisions.

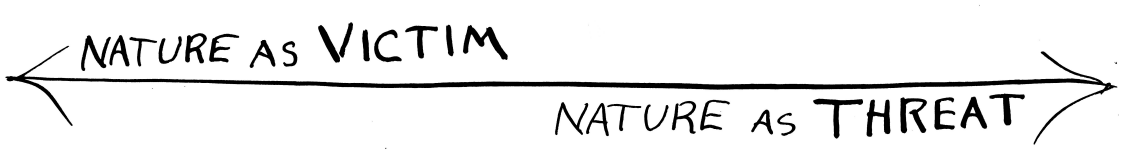
1. Nature is a *THREAT*

One of the oldest, this is the belief, paradigm, or orientation of using technology and organizing our society to protect ourselves from famines, diseases, pests, and dis-

asters. Many of us owe our lives to this protection, from the most primitive hut and plow to modern equipment, chemicals, and pharmaceuticals. We continue to seek technical solutions to every problem and threat.

2. Nature is a *VICTIM*

The environmental movement arose as many people realized that our technology had damaged or destroyed aspects of nature that we valued: pollution, deforestation, extinctions of species, and on and on. Our technology may even spell the end of nature (wild things), and many have personal experience of these losses. We seek to limit ourselves and our technology, and find a more sustainable way to live.



Though these orientations are opposed, they share many characteristics. They both:

- problem-solve, manage *against* what we don't want
- rely on expert decision-making and leadership
- label species as good or bad: cows or wolves, native or non-native

- label practices or tools as good or bad: concentrated animal feeding operations, conservation easements
- regard nature as resources or things (to either exploit or save)
- regard humans as somehow separate from nature

Both "nature as threat" and "nature as victim" are based on evidence and personal experience. Wherever you stand along this spectrum, there is loyalty to some beliefs and behaviors. There are enormous vested interests and sunk costs—John Deere, Monsanto, Pfizer on the one hand, environmental organizations and movements on the other, and even long-running governmental and civil efforts at somehow balancing the two. These various vested interests now fund most science and research. All this is where the money and jobs are.

In this strongly polarized field, everything is judged and recognized according to the spectrum, and can easily become a wedge or dividing issue. How do you feel about atmospheric carbon dioxide? livestock? nitrogen fertilizer? If you're like most people, your feelings about these matters reflect your identity and loyalty to one or more positions on the polarizing spectrum, which is the **context for your judgment and decision making.** This context, in which protecting economic sectors and protecting the environment are locked in an expensive and

perpetual conflict, results in a zero-sum or finite game in which our choices and opportunities for improving our lives are limited or merely predatory.

But a different context is possible and available:

3. Life is the most powerful planetary force

Humans are part of nature. This is not a compromise or combination of "nature as threat" and "nature as victim," but something different, in a different direction. Nature is not just things or resources, but processes that do an enormous amount of work. We influence that work and depend on it.

Through human history, we have unintentionally and inadvertently worked against the circle of life, resulting in land degradation, desertification, failing watersheds, and failing civilizations.

	To manage parts:	**To manage wholes:**
energy	energy means sources of industrial, transport, and home energy	energy includes the power of photosynthesis, which has huge leverage over the vastly greater power of the water cycle
water	focus on control of water in ditches, pipes, wells, and behind dams	soil moisture, soil cover, soil structure, and atmospheric water vapor are all related, even locally: how we manage the soil surface
climate	focus on atmospheric carbon dioxide and methane	focus on soil sponge because it influences the water cycle: plants manage water, and in managing water they manage heat

If we can learn to manage complex living communities of self-motivated organisms, to ally ourselves with that work, we have a huge opportunity to slow down the water cycle (the main factor in climate and in sea-level rise), improve human health and nutrition, boost farm profits and quality of life, and save taxpayers and governments some of the enormous sums they are laying out for infrastructure repair, disaster relief, and water purification.

But this opportunity still doesn't often fit with the vested interests, leadership, or expertise of either the

agricultural research and input sectors, or environmental organizations. It does not align well with the left/right polarized spectrum we're usually so sensitive to, and thus it remains hidden from many.

How do we orient ourselves around this opportunity, this frame or context?

Soil is the center or hub of the circle of life

Soil is often regarded as the dance floor or stage upon which the real activity occurs: plants, animals, vehicles, buildings, and so on. But in fact there are enormous flows of matter and energy through soil that we seldom notice: water, carbon and sugars moving into soils, and water, carbon dioxide, and other transparent gases moving out.

The flows of carbon compounds, energy, and water in and out of the soil surface include the formation and also the degradation of the soil aggregate—the complex of sand, silt, and clay held together by the snots, cements, glues, and fibers produced by the soil foodweb, and fed by plant photosynthesis. This results in a fantastic micro-architecture that holds water, air, and provides a variety of niches, food, and habitats for important soil organisms such as bacteria, fungi, mites, nematodes, insects, and worms, most of them beneficial to agriculture. This micro-architecture, the soil aggregate, is also the fundamental infrastructure of our civilization,

as without it the soil dissolves in water and wind, floods will take out the rest of our infrastructure, and droughts will finish off our economy.

Technology can't build the soil aggregate, but technology such as tillage or chemical applications can destroy it faster than the soil foodweb can rebuild it. This is a complex situation. In complex situations we learn through feedback, by outcomes in physical reality.

Practices—such as no-till, cover crops, rotational grazing—are tough to define with any accuracy. Everyone's situation is different, and everyone does things at least a little bit differently, with different timing. A few NRCS people in North Dakota came up with some principles that can be implemented in a variety of creative ways depending on your situation, your resources, and your resource concerns:

Soil health principles

keep soil covered

living roots for as long as possible

diversity of plants

minimize tillage

integrate livestock

"Integrate livestock" is sometimes left off, but nature does not try to grow food without animals. And this

To manage parts:	To manage wholes:
A few accredited experts and specialists have the power and resources to ask, frame, interpret, forecast, regulate, and collect data.	Ask, how does the whole system function? What works for all, in the long run?
Ask, what are the mechanisms of the parts?	Engage more people in asking and answering whole-system questions, based on observations, real data, variability over space and time, and creativity.
Manage **against** problems (or symptoms).	Manage **for** what we need and want. Ask, what are the enabling conditions for these?

means more than just having livestock in the system, but using livestock at the right time and place for the livestock, the plants, the soils, and the people and animals that share the habitat. A good and flexible planning procedure will accommodate all of this.

The soil health principles are **enabling conditions** for the formation of soil aggregates, using solar energy. Observation and listening—to the land, people, animals—is an enabling condition for learning. Being in the right position is an enabling condition for low-stress livestock handling, for letting your animals do what you need them to do.

common questions	**better questions**
Am I doing the right thing?	What results am I getting?
Is this species or practice good or bad?	How does it function in the larger system? What work does it do?
How do I kill this weed?	What conditions could I create so that this weed is no longer a problem?
What best management practices are commonly associated with accomplishing *X*, and which appeal to me?	What conditions will enable *X* to occur?
What's my soil type? Is it good or bad?	How long does it take an inch of water to infiltrate? How might I improve that so my soil can accept and store more water?

Some good questions

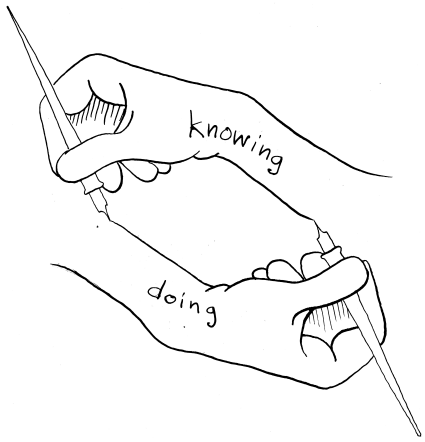
> Do civilizations fall when the soil fails to produce, or does a soil fail only when the people living on it no longer know how to manage their civilization?
>
> Charles E. Kellogg, USDA soil survey chief in 1930s

People want to manage wholes. The levers or buttons to push aren't obvious, and neither are the good questions. It takes some time and effort. Where fear, habits, and urgency rule, we default to managing parts.

Good questions help us escape the polarizing, left/right spectrum. Good questions orient us around wholes, around what we don't know, and perhaps need to know.

Monitoring animals, plants, and soil is an excellent

way to focus on basic questions for working with the circle of life. It connects us to physical reality rather than to stories we tell ourselves. We can test our beliefs, which takes courage.



Questions about soil cover, diversity, production per unit of input, food and forage analysis, soil samples and analyses can all be answered with repeatable measurements and observations so we can track progress. If these measurements and observations are open (as they are on the free web app `atlasbiowork.com`) they can also be an instance of leadership.

Soil Carbon Coalition was formed to help people:

1. ask good questions (about soil health and watershed function, about systems, about managing wholes), and

2. to engage more people in asking and answering these questions.

Contact us at `info@soilcarboncoalition.org` or `managingwholes.com@gmail.com` if this is something you'd like to do.

Links and further reading

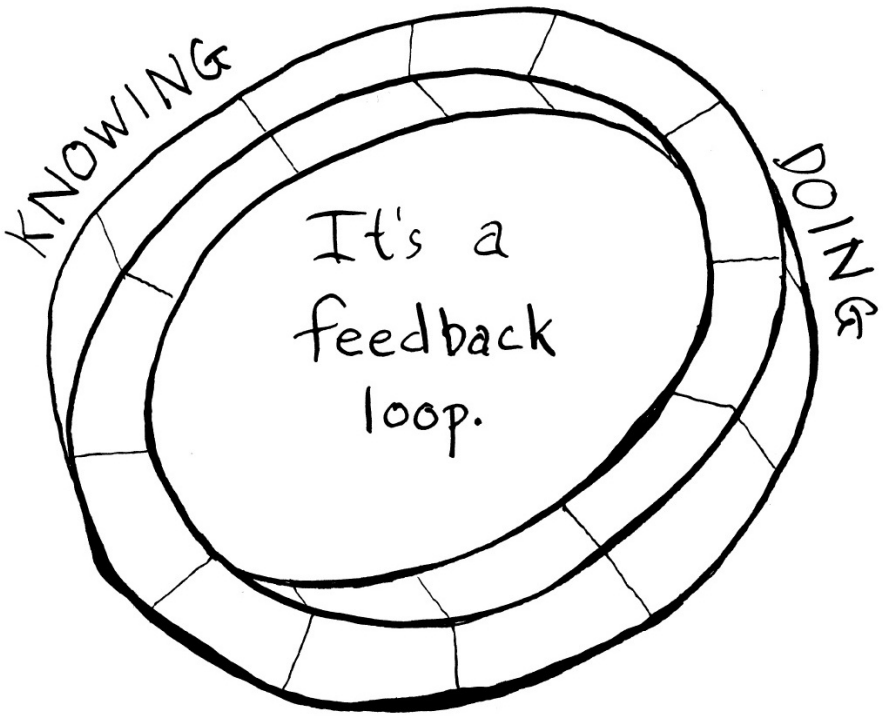
`soilcarboncoalition.org` includes many hands-on learning resources for schools, communities, adults about soil health, watershed function

`managingwholes.com`: a library of articles about holistic management, low-stress livestock handling from Bud Williams, and consensus building from Bob Chadwick

`atlasbiowork.com` A free and open web app for data entry of repeatable observations around soil health principles such as soil cover and diversity, water infiltration, soil, food, and forage analyses, and production per unit of input. See `soilcarboncoalition.org/atlasbiowork` for more information and intro.

`soilcarboncoalition.org/downloads` Free downloads in printable pdf form, including this and other booklets. `big-force.pdf` is a short booklet that includes an example of working out livestock production (stock days per acre, or pounds gain per acre) per inch of rainfall. If you can increase this over time, and that is an excellent indicator of soil function and health. These kinds of production-per-unit-of-input figures can also be recorded using the open web app `atlasbiowork.com`.

The circle of life is the most powerful geologic force. How we recognize it influences our beliefs and actions, which in turn influence the circle of life.



Soilcarboncoalition.org