

THE HIGH KNOB HERALD

EARTH DAY EDITION



The Clinch Coalition
Newsletter

APRIL 2022, ISSUE 16

THIS ARTICLE IS PART OF OUR SERIES ABOUT HIGH KNOB, ONE OF THE MOST DIVERSE BIOSPHERES IN THE COUNTRY.

High Knob As A Self-Organizing System

By Wayne Browning

At its heart, without any human interference, the High Knob Massif is a self-organizing system like the natural world of planet Earth. Like all complex things. Like the human body.

During this Earth Day month, its 52nd Anniversary, the best investment that can be made into the planet is understanding this concept and spreading its message. Answers needed to deal with climate change and environmental degradation, as well as other social-economic problems, are found within an understanding of natural self-organization. In other words, nature is telling humans what needs to be done, showing this species the pathway forward by the model of self-organization.

It is first important to know that all things are part of nested systems. The human body is a perfect example, with cells being inside tissues, which are nested inside organs, which collectively form organ systems, which together form the organism (a human being). Higher levels of ordered systems then arise as organisms comprise populations, populations form communities, and different communities make up ecosystems. In the big picture, this continues up to the Universe (then, perhaps, the Universe is itself nested within other dimensions beyond current understanding).

Existence of this nested, composite, structure means that growth has limits. No nested system, as a component of the larger whole, can persistently use energy and materials beyond replenishment rates without acting to



degrade the total system. This can not occur without causing the larger system to become entropic, where it shifts from complexity toward simplicity and from a concentration of energy and materials toward a state of diffusion of energy and materials.

From this perspective, every environmental and social-economic problem facing humans today is an entropic problem. Human forcing applied to the climate system exemplifies this where concentrated stores of carbon have been extracted, simplified and combusted (diffused) outward into the atmosphere.

Because of the complex, nested nature of the climate (Earth) system, with many feedback loops, this action is bigger and also ultimately different from the summation of its component parts. From a biosphere perspective, human activities are currently changing and diffusing (releasing) materials and energy at rates beyond replenishment rates to result in degradation and simplification of terrestrial and aquatic ecosystems. This is happening without any consideration of climate change.

So, just what is self-organization?

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Earth Day Activities

What's New on High Knob?

April 22nd: Earth Day Event with the City of Norton @10am. Join the Norton Green Thumb Garden Club to build a pollinator garden! Contact Rebecca Iozzi at rmiozzi@nortonva.org.

April 23rd: Great American Clean Up with the City of Norton from 9am-1pm. A pizza lunch for volunteers will be served at 12 p.m. For more information, contact Rebecca Iozzi at rmiozzi@nortonva.org.



Plant of the Month

All Native Greenery!!!

One of the best ways to celebrate Earth Day is to plant a green life in the soil. All greenery helps the environment by absorbing carbon dioxide and releasing oxygen into the air. While plants and trees give back to the earth, they also may be used to commemorate and celebrate milestones, honor a loved one, mark a memory or just simply because.

This Earth Day—and each Earth Day thereafter—let's all make a plan to plant a life to represent something special. Plants and flowers hold meaning and symbolism, and every month there's a way to honor the Earth with a unique flower, plant, or tree. On Earth Day, celebrate family and friends by planting seeds that represent each individual, or choose flowers and plants that are symbolically linked to special memories.

You can also join us on April 22nd with the Norton Green Thumb Garden Club to really make your mark on the natural area as we plant flowers!

Contact Rebecca Iozzi at rmiozzi@nortonva.org.



Come to the Pine Mountain Naturalist Rally!

May 7, 2022 @9am

Lady Slippers galore by May 7th, a wonderful time to enjoy the Natural Beauty of Pine Mountain! Join the Master Naturalists for a day of sharing Birds, Butterflies, Wildflowers, Mushrooms, Geology, and more!

Brought to you by Virginia Master Naturalist High Knob Chapter.

If you would like to become a member or make a donation, please visit www.clinchcoalition.org.



Western science was slow to discover the reality of complex systems, of which self-organization is a central principle, in contrast to eastern philosophy and indigenous tribes where it was discussed hundreds of years (if not longer) prior to the birth of Christ. It was really not until post-World War II, during what were called the Macy Conferences, that scientists from different disciplines gathered in New York City and started realizing they were all observing the same basic principles. This was the official birth of Complex Systems Theory, of which self-organization, as noted, is a central tenet.

Self-organization, as perhaps best described by terrestrial ecologist Tom Wessels, is a process by which a system increasing in size not only becomes bigger but also more complex. This increase in complexity is due to components nested within the system becoming more and more specialized and tightly integrated over time, such that each component part doing what it needs to do in order to sustain itself creates conditions that support the larger whole. As a result, a self-organizing system becomes more and more complex, more energy efficient, more resilient, and more stable over time within a state that is further and further removed from equilibrium (a key point to be stressed shortly).



Photography by Wayne Browning

Energy is the finite, limiting, ingredient in nature that drives self-organization over time by selection of adaptations and life history strategies favoring processes and species which are most energy efficient at the expense of those which are energy inefficient. Essentially, this drives co-evolution of species and it is this process that functions to create interrelated, mutually beneficial relationships that collectively work together across space and time to generate a self-organizing, higher ordered system.

The paradox, the pure miracle, of self-organization is perhaps best exemplified by chemical systems that interact in ways that produce life. Each living entity, a tree, a salamander, a human, is an enormous array of chemical reactions that somehow become ordered over time to form a living being. All beings are composed of similar particles and elements, merely arranged in different proportions and different configurations that by themselves, without interrelated self-organization, are non-living. It is this key function, the emergence of a global (large-scale) pattern from localized interactions and feedbacks, that makes self-organization extraordinary and mysterious (there is so much yet to learn).

Due to the intrinsic, non-linear nature of self-organization it can not be predicted from its individual components. The linear reductionist approach of science, essentially the analytical left-brain way of breaking everything down to component parts, materials, reactions, can not explain the results. In this way, self-organization is not only more than the summation of its parts, it is different from them and in direct opposition to what the left-brain, without understanding the big picture, would or could predict.

Amazingly, resiliency and stability in nature is increased by self-organization as it acts to decentralize critical --



Photography by Bill Harris



functional roles through species specialization, co-evolution, and niche separation. In highly stable, resilient environments, there are not just a few green plants and pollinators, there are hundreds to thousands that support a repetition of function and spread energy out across space and time amid increasing diversity. The result, if an individual species goes extinct the system continues to function.

Self-organization dictates that all life depends upon gradients and a constant flux of mass, energy, momentum and material flow driven by these gradients. This makes states of equilibrium limiting. In a natural system when equality is achieved, when complexity is simplified to its most basic parts, there is only one result. Death! This is certainly true of climate, with gradients that drive change being essential to a healthy planet. An Earth with no gradients to drive changes in weather and climate would be destroyed. The day when humans can create an equilibrium (equity) climate is the day that Earth will die. This is why self-organization in nature encourages diversity and differences that constantly enhance specialization and decentralization of functional roles to push entities away from equilibrium and death toward the miraculous flow of life exemplified by mutually beneficial relationships and individual differences. A flow maintained by gradients that drive energy import and entropy export. Incredibly, self-organizing systems arrange themselves in order to enhance this dynamic flow.

The social-economic structure of today is moving in a polar opposite direction to self-organization, with an insane push to concentrate energy, materials, and power into fewer and fewer entities. Only a handful of banks control the bulk of capital, only a handful of companies control critical food and drug supplies, and increasingly large corporations control consumer goods and services. This results in less stability and resiliency given any disturbance to the system. This results in a great reduction in total energy efficiency. This results in increasing environmental degradation as total human consumption increases. Increasing human consumption is directly proportional to forcing on the climate (Earth) system given that the amount of greenhouse gases emitted is determined by the amount of goods and services consumed. In this way, increasing technology is related to increasing global consumption.

Returning to High Knob, it is such a great and wondrous place because the mountain possesses an enhanced number of gradients that support continuous fluxes of mass, energy, momentum, and materials, creating a setting not only favorable for diversity but a maximization of species density that approaches latitudinal limits within a self-organizing framework.

Gradients generate and drive waves. All things in the natural world can be described in waveform. The more gradients present the more complex the waveform can potentially become. The High Knob Massif area, by virtue of its extraordinary subterranean, terrestrial, and aquatic diversity, generates a total waveform that is uncharacteristically complex and ideal for self-organization. It is the natural laboratory within which these processes can freely operate.

Human disturbances within the massif area have historically worked to simplify its complexity, to decrease energy efficiency, to weaken gradients, and to push the system toward states of preferred human equilibrium (for example, simplifying mixed-mesophytic hardwoods into oak forests). Most human disturbances have historically functioned to dampen (limit) its waveform. In plain language, disturbances by past human actions, many massive, have attempted to destroy it. That this complex landform has continuously been able to begin recovery is testimony to the resilience and stability of its natural self-organization. A present and ongoing problem being that recovery is being interrupted by new disturbances and proposed management practices that continue to be energetically inefficient and degrading to both present biodiversity as well as to its future complexity.





Moving forward a new vision must be adopted for human society, High Knob, and planet Earth (these are all one and the same). A vision based on natural self-organization that reduces human consumption, increases energy efficiency, resiliency, and stability by following proven principles within nature that continually work to maintain flows of energy and materials through ever increasing networks of locally complex, mutually beneficial relationships. The way to achieve this is through a bottom up process at local levels where beneficial relationships are encouraged and protected, both in natural environments and within human society, that collectively work to make conditions more resilient and stable for the whole by actions of individual components doing what they need to do in order to sustain themselves.

Whether these components be trees in a forest or individuals within a human community, they must be linked and opened to the sharing of resources and knowledge with each other in ways that allow this approach to spread across space and time. The rest will take care of itself.



Let self-organization begin!

