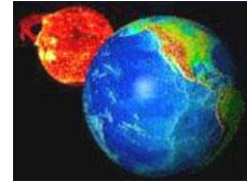


Diabologic: Oekologie

by Frank Dolinar

The first documented use of the word 'oekologie', in 1886, is attributed to the German biologist Ernst Haeckel. It is derived from the Greek roots 'oikos' (household) and 'logos' (study of). This study of the household, or of nature, is today identified by the word "ecology", often used as a synonym for the natural environment.



Ecology is a complex concept, understood by few, difficult to explain, fraught with subtle nuance, and often counter-intuitive. A simplistic (and therefore inadequate) description of ecology is "the web of life". A better description comes from a fundamental principle of ecology, which states that each organism has a continuous, ongoing relationship with every other element that makes up its environment.

Any situation where there is an interaction between organisms and their environment is defined as an ecosystem. In addition, I think of an ecosystem as a natural environment for which a boundary can be defined that separates the indicated ecosystem from any other ecosystem with clearly identifiable differences. For example, the Everglades, the Gobi Desert, and the Galapagos Islands are each identifiable ecosystems. Ecosystems are not closed systems. The boundary is porous and over time the characteristics of the ecosystem not only can change, it almost certainly will change, possibly transforming the existing ecosystem into another.

Consider what happens when a beaver builds a dam across a stream. The area behind the dam fills with water creating a pond or small lake. While the beaver family lives there and the stream continues to flow, silt builds up behind the dam and eventually fills in much of the stream bed. The beaver family's actions may even cause the stream to find a new path that no longer flows in behind the dam, at which point the beaver family will, of necessity, move elsewhere. Then, as the nutrient rich land of the erstwhile pond dries out, grasses begin to grow, followed by flowering plants, shrubs, and often trees. The stream has been displaced by the new growth.

I noted that ecologies are sometimes counter-intuitive. You can't modify an ecology by trying to force a sudden change. It's possible to destroy an ecology in this fashion, but that's not modifying it. That's not to say ecologies can't be changed. When pressure to change is exerted on an ecology, it will change, but in *its* own direction of least resistance and it will do so in an effort to restore balance. What this means for the subsequent state of the ecology is probably not predictable before the fact.

To change an ecology in a way that you intend, it must first be understood as thoroughly as possible to determine – insofar as possible – how to exert an appropriate effort, subtly and continuously over time, to nudge the ecology in the intended direction. These nudges may take the form of dozens, hundreds, or even thousands of tiny adjustments so that the relevant components of the ecology are all moving in the same direction. (Probably the best sense of this process I've ever seen in print is Frank Herbert's science fiction epic "Dune".)

Humans are now witnessing an ecological change called Global Warming. It has, for years, been a debated, controversial issue in politics and science. In 2007, the overwhelming scientific consensus is that Global Warming is real and is, unfortunately, accelerating. [Note: My opinion agrees with this consensus. I admit, however, that – at the time of this writing – I am not entirely sure whether it is principally human endeavor that has precipitated this situation or whether humans have merely provided a tipping point for a larger natural phenomena. Regardless, I do believe that humans can and should do everything possible to help correct the problem. This effort would take substantial political and economic will.]

Much of the human contribution to the problem of global warming, a dependency on fossil fuel, is tied to an ancient invention called *fire*. We use, and deplete, fossil fuels as if there are no other energy sources available, even in the face of the evidence to the contrary. Passive solar, photovoltaic, wind, biomass, and tides are alternatives. To date, none of these alternatives is economically competitive with fossil fuels.

This has all the earmarks of a self-fulfilling prophecy, but I think it's about to change. There are three reasons for this:

- Last summer the U.S. Department of Energy announced results of research that had achieved a 40% conversion of solar energy to electricity using a new concentrator photovoltaic solar cell – the previous best was around 8%.
- Early last year, the University of Toronto announced creation of photovoltaic cells that convert infrared radiation to electricity. Infrared energy reaching the Earth is about 5 times the energy from visible light.
- Researchers in California are using modern materials coming out of the nanotech labs to build solar powered Stirling engines to generate electricity. (A Stirling engine is a very efficient closed-cycle piston heat engine. The term "closed-cycle" means that the working gas is permanently contained within the cylinder.)

All of these developments, taken together, are changing the economic equation.

How much energy are we talking about? Calculations from physics indicate that every minute of every day, enough of the Sun's energy reaches the Earth's surface to meet the world's energy demands for an entire year. We just have to learn to use it.

If we could stop, or reduce, burning fossil fuels and stop discharging carbon dioxide and particulate residue into the atmosphere, then humans stop exacerbating the problem.

Unfortunately, such a change on our part won't stop the process of Global Warming. Why? As difficult as it is to get an ecology to change, it's just as difficult to get it to stop. Once it's moving, it will take as much effort to get it to stop as it did to get it to start moving. The stopping point may not resemble the starting point. Finally, it may not be possible to return the changed ecology to that starting point.

This is true regardless of the form of the "ecology" undergoing the change. It could be economic, political, social, personal, or almost any other system.

Which reminds us: "Be careful what you ask for. You might actually get it."

Genies, once released, are notoriously difficult to get back in the bottle. And the lid of Pandora's box, once opened, cannot be secured again.