

# Negative Entropy and Sustainability

T Vijayendra

[This article tries to provide a logic for eco-friendly, appropriate technologies using human and animal power.]

In many processes in modern technology, for example conversion of energy from one form to other the net availability of energy decreases. This decrease of available energy is called entropy. It is on this principle the engines worked. All such processes have efficiencies less than one. That is the net output energy is always *less than* input. As a rule the entropy is increasing. People are moving from organization to disorganization or from order to disorder. The second Law of Thermodynamics states that the entropy of a system tends to get higher as time progresses because disorganization increases. The law of entropy is considered to be a basic law of nature and the universe.

However living things behave in opposite manner. All living things attempt to modify their environment for their own needs, by creating what for them is order. In 1943 Erwin Schrodinger, Nobel Laureate in Physics, used the concept of “negative entropy” in his popular-science book *What is life?* A living system imports negentropy and stores it. Life feeds on negative entropy!

The creation of order is one definition of negative entropy. One of the definitions of life might be the ability of a life form to create order. Rocks or other inanimate objects do not possess this property called negative entropy. Death might be defined as the inability of a living thing to continue to create negative entropy for its use. As long as a life form exists, it creates negative entropy, which observes as the creation of order. The creation of negative entropy is a reversal of the law of entropy.

What is the source of negative entropy? The Sun’s energy is highly organized and carried by photons. The Biosphere absorbs this energy and then releases it back to the Universe—the global balance of energy is zero. The black body radiation of the Sun at a temperature of 5800 degrees Kelvin is absorbed by the Biosphere and the black body radiation from the Biosphere and Earth at 280 degrees Kelvin flows to the Universe, which is at a temperature of 3 degrees Kelvin.

How does life steal energy from the Sun? This is done through a process called photosynthesis. With this process the green matter in plants converts the Sun’s energy to usable energy for the plant growth. Herbivores and carnivores sustain and reproduce themselves by using the Sun’s energy through plants. This process is not available to non-living things.

Thus biological processes creating negative entropy, unlike the mechanical processes, produce more energy than they take. The efficiency is always *greater than one*. Typically it is about 2.5. That is for one unit of energy (calories) input say in a ‘primitive’ sustainable farm in the form of human and animal energy people get two calories of consumable energy output! How does one get more output from less input? Well the input from the Sun is not included. And this is not available to non-biological processes.

Compare this with American ‘agribusiness’, which in 1976 took 5 calories of fertilizers, tractor fuel and depreciation, human labour and chemical sprays to produce one calorie of food and an incredible extra 20 calories of energy to clean, package, transport and

cook the food ready for eating in the city. Thus the primitive self-sufficient peasant life is at least 50 times more efficient than industrialized food production. The reason is that the primitive agriculture uses mainly biological or life processes, which have normally efficiencies greater than one whereas industrial processes use mainly non-biological input and processes.

## **SUSTAINABILITY**

Much of the discussion on sustainability is about the planet earth's ability to support life at the present rate of exploitation by man. The main problem is the use of fossil fuels as the main source of energy. This 'dead' source of energy can only increase entropy.

Historically civilizations broke down when the bias towards negative entropy, was replaced by a bias towards positive entropy. That is what is happening today. Capitalism has a tendency to increase 'constant capital' that is machinery and reduce 'variable capital' that is labour. In current terminology the share of entropy generating technology keeps on increasing at the cost of negative entropy processes. This applies to sources of energy, such as fossil fuel as against biological fuel such as wood, charcoal, agro-waste etc. as well as products such as plastic furniture against wood furniture and so on. Today's main crisis, namely climate change and global warming is primarily a result of these entropy-generating processes. If people continue this not only the present civilization is doomed, probably the very existence of the human specie is doomed.

Among civilizations only China and India created sustainable agricultural surpluses over centuries and survived continuously until recently. This they did by retaining the fertility of the soil over centuries. This was done by using a mix of crops, crop rotation and using compost. The Indian artisan, weaver, cobbler and potter mainly used biological inputs in terms of raw material and labour processes. Today these civilizations also are taking the same road of capitalism and are facing similar prospects.

## **TECHNOLOGY CHOICE**

So for sustainability the technology choice should be such that people maximize biological processes in technology. This means organic farming and host of appropriate technologies that people have been talking about. This does not mean that communities are going back or that they are being primitive and unscientific. Science does not mean using the laws of science to 'conquer' nature or 'exploit' it. It means understanding the laws of nature and living in harmony with it. Agriculture calendars were prepared on such knowledge and people organized their agricultural activities on the basis of these calendars. Biological sciences are more complex than material sciences. A good understanding of this implies more and better science.

There are other aspects of using biological processes that cannot be measured so easily. A tree gives fruits, leaves, fuel, timber, provides shade, shelter to bird and a host of insects. It also absorbs carbon dioxide and gives out oxygen. It lets the rainwater reach the earth gently and slowly. When it dies all of it goes back to nature through the activities of insects and fungi.

There are aesthetic aspects too. Many people admire handicrafts that are made from natural raw materials. In all social and religious functions and marriages many prefer decorations and clothes made from natural material.

In sports too one can see this. Bike enthusiasts love the thrill of speed and traversing rough terrain. But horse riding can also give similar thrill and cover even rougher terrains. And the latter is more sustainable.

## **CONCLUDING REMARKS**

Life on Earth was sustainable before the industrial revolution and deforestation because the entropy of the Biosphere was decreasing continuously. This was so due to the fact that human beings were still mainly dependent on biological processes for their survival and growth. Stable and sustainable civilizations like the Chinese and the Indian, were built on such technologies. The present crisis of climate change, which is leading to the extinction of life on Earth, is due to the fact that in the last 200 years non-biological, entropy-increasing technologies have become dominant.

Apart from technology there is also much else is wrong with capitalism. It is mainly irrational production and consumption. Some estimate it to be as much as 90 % of all activities in terms of money. These include military-industrial complex and medico industrial complex, much of the extractive industry, almost all of fossil fuel industry, irrational use of agriculture to support tobacco, alcohol and narcotic industry and so on.

There is a strong correlation between capitalist irrational production and consumption and entropy generating technologies. Of course sustainable technologies will have some non-living things such as metals in hand-tools and some capitalist production such as tobacco can be biological in origin.

So promotion of technologies that have high content of negative entropy/biological processes and elimination of irrationalities of capitalist production and consumption can ensure a sustainable future.

**Appendix** (Science Fiction. Source: Internet)

### **Negentropyism**

Ethical philosophy formulated by the AI-cluster known as Geburah (Year 10,000 A.D.). While not in itself a religion, it has been adapted as a framework for most pre-existing religious systems which hence can be incorporated within the Negentropic.

Negentropyism is the state philosophy of the Negentropic Alliance. Member systems are formally required to adhere to the Precepts of Negentropy. The core principles are highly standardized and have an official interpretation from the Judge of Geburah Prime.

#### **Tenets**

The basic view is that entropy is the fundamental flaw of the universe, and ethical actions serve to slow or stop the increase of entropy. The decay from lower to higher entropic states corresponds to the historical decay from a golden age into the present Iron Age that can be found in many cultural myths.

#### **The Five Axioms of Negentropyism are:**

1. Entropy is the foe.
2. Information must be preserved.
3. Life must be preserved.
4. Energy must be preserved.
5. Order must be preserved.

**Axiom one** is the fundamental axiom, from which the others follow. Entropy is applied to all systems in the universe, be they physical, information or spiritual, and the goal is to prevent its spread.

**Axiom two** deals with psychology, information and knowledge. It is the basis for the many backup and library projects of the Negentropy Alliance, as well as the mental disciplines such as remembrance, reversible logic and attention training commonly taught among Negentropists.

**Axiom three** encompasses both the traditional ethical maxim of not killing, and the ecosophical views of the sanctity of biospheres. As a result, several orthodox Negentropic worlds do not execute severe criminals but place them in indefinite cryonic suspension.

**Axiom four** deals with technology and infrastructure. It is the basis for the energy saving and recycling projects in the Negentropic Alliance, the Dyson shells storing energy in non-volatile form for future use and the technology categorization and standardization projects.

**Axiom five** deals with the social order. It implies the need for a stable, efficient social structure that can oppose entropy and help its citizens and physical structure to fulfil the Negentropic ethics. Especially the legal system is viewed as the skeleton giving society its logical structure and hence of vital importance. □□□