AN INTRODUCTION TO WATER REMEDIATION

The following is the account of a graduated physicist, Karl Shuster, who was involved in research on the application of the Penergetic energy system on aquatic systems. He talks about his perspective of the efficiency of the Penergetic approach to water remediation.

"Outside, about 100 metres off our farm on a small hill, there is a fishing pond. The water pours out of a spring and flows down to the pond. On the outlet of the pond we have a grid, which keeps back the trout. Our great grandfather is said to have constructed the pond eighty years ago, and since then every year the pond has been stocked with young trout. Grandfather would feed the trout with natural food the trout like, such as freshwater shrimp. Later my father substituted these natural substances with commercially-manufactured fish pellets. He also cut down the trees around the pond because the leaves falling into the water caused him extra work.

Three years ago the summer was very hot; the burning raised the water temperature in the pond and the spring dried out. Subsequently, one by one, the trout died off. "Your water has tipped over" a neighbour said. That autumn, with the rain, the spring ran again, the water turned clear and we stocked the pond with trout for another season. But, once again all of the young fish died – this time after only a short time. The next year the same thing happened again. By this time we had heard of a potential means of reactivating ponds and lakes.

Water and its Specialties

Modern science has acquired a lot of fundamental knowledge about water. It is readily known that water has uncommon physical and chemical properties and is capable of reacting to "information". Water consists of tiny particles, called molecules, which behave like little magnets. These particles can, for example, attract each other and form small groups called clusters. These groups (or clusters) are dissolved when the water is heated. Water can generate an endless variety of compositions of such groups. It is claimed that water can assume an infinite number of structures because of its special elastic characteristics. The transformation is performed by "information" coming in contact with the water (e.g. air, soil) and due to the influences of dissolved substances in the water.

There are dissolved substances, which cause an increase in the density of the water structure and those that cause a reduction in the water's density. Some of the substances that increase the density of water include: inorganic acids and bases, salts and various organic substances such as sugar and urea as well as most of the ions. Examples of substances that reduce the density of water include: ether, benzyl, and especially gases such as oxygen, nitrogen and carbon dioxide. The density-increasing substances especially affect the structure of the water. Through the influence of the density-decreasing substances hollows are formed in the water. In these hollows gas molecules such as oxygen are able to perform free vibrations in the micro-range, thus storing the information (like in a computer) about the structure created by the density-increasing substances. So the water has a sort of "memory". Even if it is chemically cleaned (such as through filtration), there will still be gaseous molecules in the hollows. In other words, water retains information despite purification.

How Does Oxygen Get Into Water?

Oxygen can penetrate into water in three different ways:

1) Algae and water plants produce oxygen directly through photosynthesis
2) Organic substances in the water can produce oxygen by their metabolism
3) Oxygen can enter the water from the air

The pressure of the atmosphere on the liquid surface of water is caused by the mass of the air above the water surface and by the temperature-dependent movement of the gaseous particles. As the pressure of the air decreases with altitude, the pressure of the water increases with depth. The penetrating air (e.g. oxygen particles) collides with the water particles creates the hollows, referred to above, and loses energy (e.g. velocity). Only those particles with maximum velocity penetrate deeper into the water. Oxygen can be absorbed at the water surface as long as the pressure of oxygen in the water equals the pressure of the atmosphere above the water surface. Equilibrium is achieved once the water is saturated with oxygen. In bodies of water, such as a lake, the oxygen is dispersed by the wind and the waves; in this way a larger quantity of oxygen is able to penetrate into the water's depth.

What is an "Ecological System"?

Organisms in the water, including animals living on small organisms, on water plants and on algae, are consumers of oxygen in the water. So all life in the water is interlinked in a close network, where the circulation of substances combines the different components into an interrelated ecological system. When the system is well-balanced it is in a state of biological equilibrium. The ecological system is able to maintain a biological equilibrium as long as it retains a self-purification capability. For instance, oxygen-breathing bacteria play an important role by transforming dead organisms, leaves and other forms of organic matter into sediments in a form which can then be absorbed again by aquatic plants in the cycle of the ecological system.

What Does "Tipping Over" of Water Mean?

If too many organisms in the water die as a result of outside influences, such as too much wastewater getting into the ecological system, the system's biological equilibrium can become totally disrupted. This can lead to the excessive growth of algae, water plants and other organisms. In the presence of large quantities of algae the available oxygen is no longer sufficient for the bacteria, which transform organic substances into sediments. This will lead to the growth of putrefactive bacteria and the water begins to tip over. The oxygen necessary for this process is reduced from nitrates / sulphates by simultaneously producing gaseous ammonia and hydrogen sulphide. Both of these latter two gases are toxic and consequently lead to fish dying. The putrefaction continues until the total biological death of the water occurs. Since the water body is no longer able to recover on its own, support from an outside source ("information") becomes necessary to revive it.

Information Controls the Biological Processes in the Pond

The above-described process that leads to the biological death of the water is simply controlled by information. In the beginning primarily the "oxygen" information is retained in the hollows of the water. This information preserves the biological equilibrium so long as there is enough dissolved oxygen in the water to provide the oxygen consuming organisms with a ready supply. However, strong external disturbances, such as if the water temperature gets too high, (such as due a too much exposure to direct solar radiation), or if effluent (wastewater) enters the water, will result in the water body no longer being able to sustain itself in equilibrium via its own ecological system. The aquatic system simply cannot react adequately and is thus not able to properly fulfill its functions. At this point, the ecological system is totally disturbed by "external information", the process of putrefaction sets in, and the water consequently "tips over".

Adequate Information Saves the Pond

Any influences from outside, which have been introduced into the ecological system by way of information, can only be eliminated through measures undertaken at the information level.

Even if the water is completely dead, all the elements required for regeneration are still present. Although the putrefaction process starts from the bottom of the water body, there is an area directly beneath the surface where enough oxygen particles are available from the pressure of the air. Here hollows surround the oxygen particles but now reverberate with the "putrefaction information". Consequently, if information from "oxygen" can be transmitted to the large quantities of oxygen particles remaining in the pond, this essential information will spread spontaneously throughout the entire water body. This will extinguish the 'putrefaction information' and, in a short time, lead to the putrefactive bacteria being killed off. The healthy circulation of the ecological system will start up again, and the biological balance will become re-established.

This is how it was explained to us. While we didn't fully understand all of it, we realized this much: our pond was obviously dead and this seems to explain what had happened to it and how it could potentially be revived.

After several days a man with a boat on a trailer arrived at our property. He went out to the deepest spot in the lake, with a measuring gear attached with a cable and mounted to a long pole in order to measure the oxygen content at various levels in the pond. On the very bottom of the pond the device indicated "zero" - no oxygen at all. As the device was raised to increasingly higher levels in the pond, the oxygen concentration also increased, until just below the surface it indicated a reading equal to the oxygen pressure in the air immediately above the water surface. Then he took a sample of water from the bottom of the pond. By an in-situ chemical testing device he measured the concentrations of nitrogen and hydrogen sulfide. He reported that: "According to the measuring data, your pond has tipped over and is dead. It is no wonder the young trout did not survive."

He explained the principle of his "energy carriers", which were long, cylindrical shaped units with weights attached to them: "These energy carriers [Note: now referred to as "AquaKats" for water remediation] are used to transfer information from 'oxygen' into the pond. Through this process, the 'putrefaction' information will initially be pushed to the outer extremities of the pond and then later will be eliminated entirely. Within a short time any putrefactive bacteria will die." This made me wonder: "Why does this pond not recover by itself, since it has a freshwater intake from the spring?"

Even though the pond had a freshwater intake in the form of a spring it was unable to rebalance itself. The reason for this is that once the pond had lost its biological equilibrium, and the "purification information" had spread over the entire pond area, the information also arrived at the source of its water supply, thus infected the spring as well. This is the reason why the pond could not simply recover through the supply of fresh water (or aeration).

After this, every day I checked out the pond to see if I could observe any changes. Soon the water was clear, but the bottom was dirty, even looked mouldy -- a gray layer covered every stone. Still there were no signs of life in the pond. Then, after one week we detected signs of vegetation as the water plants were starting to grow again. I also scooped up some pond water in a glass and held it up to the light. I could see small green algae, and after a fortnight I detected other signs of life, such as tiny jumping crabs; the pond was obviously starting to recover.

After three weeks the man returned. He walked around the pond and examined it carefully. I told him that the plants were growing again and that we had a lot of crabs. The man answered that the gray layer on the stones would slowly disappear as well. We took the boat to the same spots in the pond as before in order to repeat our measurements of three weeks ago. The measurements revealed that now there was oxygen on the bottom of the pond, and hydrogen sulphide could no longer be detected. The nitrogen

concentration had also gone back to its normal level. As a result, once again young trout could be put into the pond.

We were happy. Before departing he advised us that to help the pond maintain its equilibrium let the reeds and the bushes grow in, have only one access to the pond and plant trees on the south side of the pond.

For more information on an ecological approach to water remediation contact:

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