MICRO LIFE IN WATER

Water is key requisite for life. This principle is also true for microorganisms. If there is water, the microorganisms are in their element, and every drop contains microbial life. Because the microorganisms are so small, the human eye does not perceive the water as blurred before there are 10 million germs per ml water. As opposed to humans and higher species of animals, the different bacteria species have almost unlimited amounts of metabolism capacities. Thus, there is no humid place on earth that is not naturally colonised by microorganisms. No matter if it is a boiling hot sulphur spring, salt mines with a high concentration of salt, glaciers, nutrient free spring water or contaminated wastewater, there is no environment too unfriendly for microorganisms. They have had time enough to adapt because bacteria have colonised our planet for 3,5 million years, much longer than we have been here.

In lakes, creeks and ponds the microorganisms are mainly responsible for breaking down organic material. Oxygen is used for these processes, and they function best in well ventilated surroundings, like rivers and gushing brooks. Under these circumstances, natural amounts of organic material, like dead plants and animals or excrements, do not cause any problems. After only a few kilometres the microorganisms have mineralised the organic material. These processes are simulated in wastewater treatment plants through mechanised airing systems. When humans interfere, and create imbalances through overburdening the water in industry and household drains, that is when the natural clearing systems are brought out of equilibrium.

In stagnant water, in lakes and ponds, the oxygen conditions are a bit more complicated. In our part of the world with changing seasons, it is normal that two water layers are formed with different density and oxygen content. During spring, the top water layer is warmed by the sun and thus becomes less dense and lighter. Through the contact with air and through photosynthetic active plants, these layers normally contain enough oxygen. The lower layers are colder and hence heavier and due to physical reasons it does not mix with the top layer. Sinking organic matter and organic pollution in the water is decomposed by the microorganisms in the bottom layer through an oxygen consumption. The free oxygen in the water is used, which can lead to an oxygen shortage in the cold zone. There is not enough light in the deep water layer to manage an oxygen production through photosynthesis and due to physical reasons it is not possible that the water mixes with the oxygen containing top layer. If the organic burden is high it can lead to anaerobe (oxygen free) conditions in the cold water layer during summer. The anaerobe microorganisms produce methane and hydrogen sulphide, forming stinking mud. During autumn, when the top layer is cooled down again and becomes the same density as the cold layer the zones dissolve and the water mixes and thus the bottom mud is re-oxidised. Most lakes in moderate climate zones go through this cycle every year.

If microorgansims are used to cleanse the water, it is like using the original and most natural method. The only difference, to natural processes in lakes and ponds, is that particularly well suited microorganisms are chosen and activated and added in a larger amount than would have naturally occurred. The chosen microorganisms are good at decomposing or absorbing certain substances and thus remove them from the water. These substances can have an environmental impact, like oxygen using organic compound or also plant nutrients like nitrogen and phosphate. The latter have a great impact on the explosive algae growth that can occur in many lakes. The amount of available nitrogen and phosphate often can prevent plant growth. As algae are plants, their growth is also hampered through the availability of these two nutrients. If it succeeds to hold one or both under a certain limit value the algae cannot multiply. This way bacteria can conquer algae.

For example, some bacteria have the ability to transfer the nitrogen, on salt forming the water, back to gas form through an oxidation or reduction reaction. As nitrogen in gas form is difficult to dissolve in water, it evaporates and is no longer available to the algae.
Normal water plants are usually not affected by these actions as they absorb nutrition from the bottom of the lake through the roots.

Carbon dioxide and bacteria biomass are the most important by-products by water cleansing with microorganisms. In a natural system these bacteria are useful as nutrition for fish, snails and crustaceans.

Biosa Danmark uses only naturally occurring, not modified, microorgansims that have been activated in organic growth media. The microorganisms in our products are totally harmless for humans, animals and plants.