

Isipingo River Rehabilitation

Why You're Just Now Hearing About Archaea

Archaea, one of the oldest life forms on Earth, makes up an estimated 35% or more of the planet's life.

Carl R. Woese, Ph.D. discovered Archaea in 1977 at the University of Illinois.

He made an enclosed vacuum hood, which created one of the most oxygen-free (anaerobic) environments in history.

In this oxygen-free zone, the Archaea grew and were discovered.

Other labs were not able to study Archaea until they were able to create the same oxygen-free atmosphere, which took some time.

When scientists began describing Archaea in detail, they found several unexpected things:

- Archaea looked like bacteria; small microbes without a nucleus.
- But Archaea controlled their genes like a plant, animal or human.

This went against hundreds of years of knowledge about living things. Few scientists climbed out on this slippery slope.

In recent years, however, this has changed. Research has shown that Archaea is the final step in waste breakdown. The key is its enzymes, which breakdown toxins and poisons that were previously thought untouchable.

ArchaeaSolutions, Inc. is honored to be the single company that can provide you concentrates of natural Archaea sources to resolve waste water problems.

And that's why you're just now hearing about Archaea.

Increasing the Amount of Oxygen

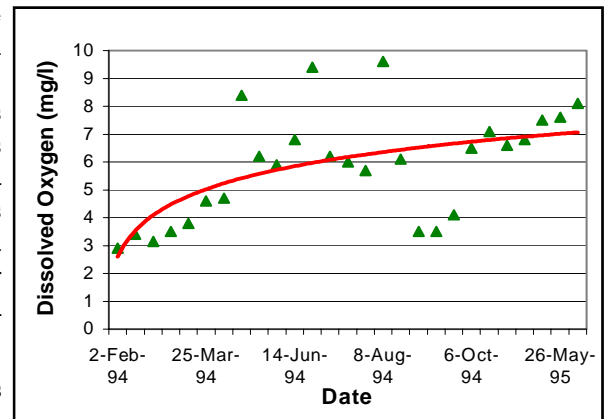
A river's health is measured by the amount of oxygen in its water, which scientists call dissolved oxygen (DO). The lower the amount of oxygen, the less healthy the river. Reduced oxygen levels are a direct result of industrial and chemical spills and pollutants, such as raw human and animal waste, entering a river. Efforts to restore the Isipingo River illustrate how an Archaea biosystem can return a polluted, dying river to life.

Once an ideal habitat for tropical trees and shrubs and a rich variety fish, crabs, shrimps, snails and birds, the Isipingo River flows quietly by industrial and residential areas before entering the Indian Ocean near Durbin, South Africa.

The amount of oxygen in the river had dropped to less than 3 mg/l, which is 50% less oxygen than is needed to keep fish and other wildlife alive. At this level, all forms of life in the river were dying. The water became cloudy and grayish-brown. Also, disease-causing (fecal) bacteria thrived. As a result, the beautiful Isipingo River became a miles long poisonous, ugly, smelly, disease ridden drainage ditch.

Reducing Disease Causing Organisms

At one time, the Isipingo River had been one of the country's major recreational areas. Because there are no sewer plants or septic tanks along the river, raw human and animal waste entered the water all the time. As a result, the amount of oxygen in the water dropped. When the low amount of oxygen combined with the waste, fecal bacteria were able to grow at alarming rates. Because fecal bacteria can cause people to get very sick and



DO increase following Archaea biosystem treatment.

An Archaea biosystem was introduced upstream from the industrial/residential area at a rate of eight gallons per day. The graph above shows that the amount of oxygen (DO level) increased 250% in four months.

The Isipingo River went from close to dying to having more than enough oxygen in its waters to support plant and animal life. Increasing the amount of oxygen also caused other positive changes, which are discussed below.

the river to smell very bad, the South African government decided not to allow swimming and boating along the Isipingo River.

Fecal bacteria counts reached levels of 10,000 per ml or 23,600,000 per cup, which is 2,000% higher than what is safe. Within four months of adding the Archaea biosystem to the river the count was well within safety limits (less than 50 per ml), and the river was reopened for boating and swimming.

Eliminating Sludge

Rivers not only need oxygen for plants and animals to live but also to give microbes (called aerobic bacteria) the energy they need to break down dead and decaying plants, fish, animals and other molecules into simple, stable end-products. These end-products then can be washed away, released into the atmosphere or used by the river to provide food for the living plants and animals.

Over the years, the Isipingo River built up a lot of mud and slime (sludge) beneath its surface. This sludge is a source of bad smelling substances such as ammonia and hydrogen sulfide (rotten egg odor). Also, many other bad substances collected in the sludge. These included phosphorous, lead, asbestos, zinc, cadmium and difficult to breakdown molecules such as herbicides, which are used to kill weeds and other unwanted plants. These substances helped lower the amount of oxygen in the river.

During the four-month period following the addition of the Archaea biosystem, the Archaea and other now healthy aerobic bacteria in the river got rid of approximately 50% of the settled sludge.

With less sludge, the bad compounds were released and became available for the Archaea and the now healthy aerobic bacteria to break down. These microbes then attached themselves to the root hairs of grasses on the river banks and transferred these bad substances out of the river.

ArchaeaSolutions, Inc. provided an effective tool for restoring the Isipingo River, which also was practical and affordable for the South African government .



Improving the Appearance

When there was enough oxygen in the Isipingo River to once again support life, the water's color began to change from brownish-gray to green and then finally back to blue.

The scum along the banks began to go away and then disappeared altogether. Also, grasses began to grow on the sand bars in the river.

The overall impact is best seen in the picture to the left – a clean blue water river leisurely flowing to the South African coast.

Handling Future Shocks

With population and industry growth along the Isipingo River, the dumping of more human and animal waste and other pollutants into the river is more likely to occur in the future. This dumping is referred to as "shocks."

The combination of enhanced Archaea activity and more robust aerobic bacteria will allow the river to more easily and fully handle these extra amounts of waste materials and pollutants.

The result: The Isipingo River is once again a healthy place for trade, business and recreation.

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