

Nano Scale Nutrient – Saviour for Biological Waste Water Technology

[illegible]

By Mahesh Uppal

The issue of waste management in India is a much debated topic which needs no introduction. Large space is dedicated in the media every day to highlight the problems of urban waste. Particularly, pollution of water bodies due to sewage dumping has rendered all the rivers and lakes in urban areas unusable.

The problem is obvious to everyone who has lived in a city in India. While the debate on cleaning our rivers and lakes goes on, there are a very few people coming up with solutions. However, most of these solutions are either exorbitant or too tedious to implement. Thankfully, some interesting ideas have emerged that are not only cost effective, but also provide sustainable solutions for treating sewage water.

Water Hyacinth on Lake

Nano Scale Nutrient Nano Silica is one such technology developed by Indian innovators to feed diatoms. Diatoms are a type of single cell algae (phytoplankton), which live in all types of natural water bodies. Diatoms use sunlight to produce food through photosynthesis and they become food for other zooplanktons, which in turn are food for fishes. When this cycle is completed, the oxygen level in the water rises and the water body becomes healthy for all living beings. There have been other technologies innovated in the West to treat sewage water such as BioWish, which introduce a type of bacteria into water.

Nano Scale Nutrient for Sewage Water Treatment

“Unlike BioWish, Nano Scale Nutrient is like a regular farm fertilizer that causes the native diatom algae present in water to

grow. Nano Scale Nutrient Nano Silica is in a liquid form which is dissolved in fresh water before mixing with contaminated water. The oxygen from Diatoms causes the native bacteria to grow.”

Nano Scale Nutrient mainly treats domestic sewage and not industrial effluents. Industrial effluents contain chemicals that do not allow diatoms to grow and they also do not have nitrogen and phosphate nutrients that are required for diatoms to grow. Sewage is undigested food, so it contains all the nutrients needed.

The Process

On dosing N-S-N, the nano-nutrients in the Nano Scale Nutrient bottle spread rapidly into the water body on its own on the surface as well as at the plankton and benthic level. The coverage is very high as the constituents are at nano scale. To give an idea of advantages in nano scale we attach a diagrammatic representation. It shows that at nano scale just 1 cu cm of Nano Scale Nutrient would cover a surface area of 60 million sq cm of water area. This is the benefit of reducing nutrients to nano scale:

During photosynthesis, diatoms consumes Nitrates and Phosphorous, as also uses up CO₂ from the atmosphere. In the process, they release oxygen (pure oxygen in water) to almost saturation levels, which will help the water body regain its original levels of Dissolved Oxygen. The absorption of CO₂ will also mitigate the water acidification and pH levels would move towards more basic levels. The high levels of DO would set up a chain of benefits, primarily it promotes aerobic bacteria which would digest the excess nutrients in water and convert them into the base constituents. Such high levels of DO would also oxidise the heavy metals which would precipitate out of water, where other bacterial strains would consume them. N-S-N will also



trigger growth of Zooplanktons, which consume diatom algae. The zooplanktons are consumed by fish, thus ensuring that the diatom algae exits the water as fish biomass and does not decay in water like other cellulose algae. Diatoms have silica shells and the zooplankton and fish love to eat this live food as it helps them to build up their body constitution.

Dosage

Even a small volume of N-S-N dose can cover an exceptionally large surface area. Each litre of N-S-N treats about 10 million litres of affected water in a flowing river and about 2-4 Million Litres in sewage water. Such a large effect is possible because of the nano scale of our nutrients. For a 12000MLD load and a river length of 2000km (treatment section) for a flow speed of 3 km/h the amount of N-S-N required in a river would be just about 2400 Litres per day at 4 to 6 stations along the river starting with upstream of Hardwar. Such dose can also be adjusted up or down based on the analysis results downstream.



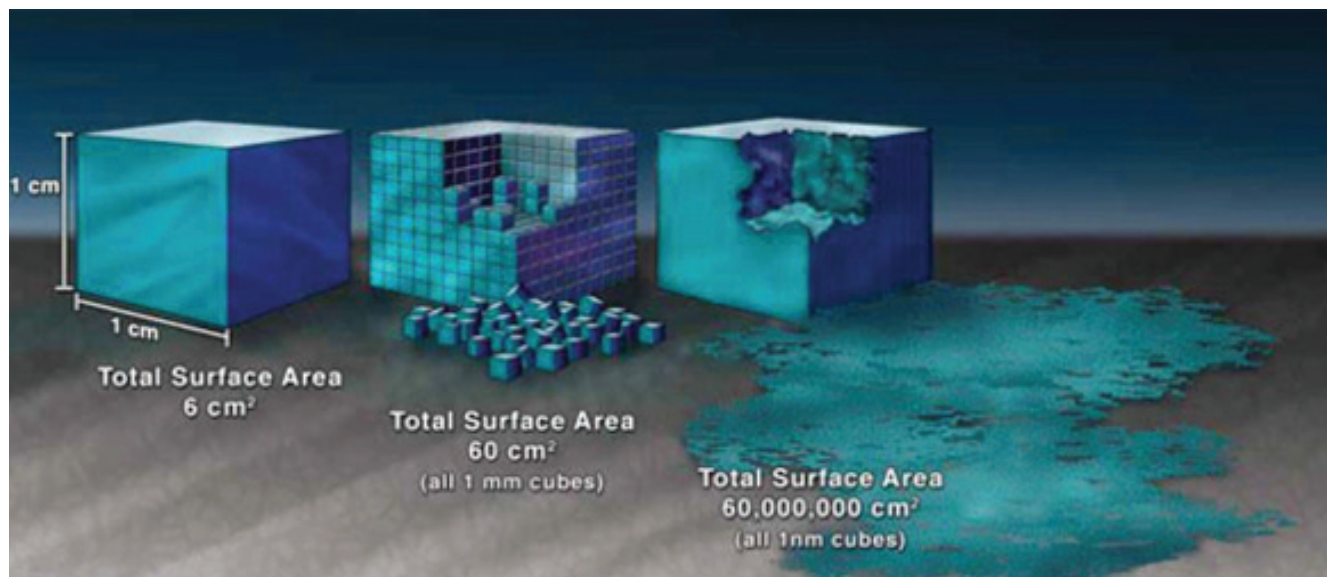
Safety

Nano Scale Nutrient is absolutely safe and a toxicology report from the Indian Institute of Toxicological Research (IITR), Lucknow is enclosed. The product is absolutely non toxic and has no negative effect on aquatic life or water quality. It can be dosed in any water body without hesitation.

The first application of Nano Scale Nutrient on sewage water happened in 2006, when it was used for treating Madivala Lake, a large lake in Bangalore. Being in the heart of a major residential area, Madivala Lake receives domestic sewage, which significantly reduced the oxygen content thereby affecting the aquatic life. In 2006, Madivala Lake encountered a drastic situation, which led to mass fish death.

To solve this problem, local fishermen added Nano Scale Nutrient in the lake to solve the problem of fish death in the sewage laden lakes. The powder was used once in 15-20 days or whenever they experienced lower fish harvest. Typically, 1 litre of Nano Scale Nutrient mix is needed for 2 million litres of sewage or 1 litre for 1 hectare sized water body. Apart from preventing algal growth, Nano Scale Nutrient inhibits growth of water hyacinth as well.

Beyond large water bodies, Nano Scale Nutrient can also be used for treating sewage water from a residential apartment complex as well. Typically, sewage from a complex of 50 houses would be about 25,000 litres per day (100 litres per person). If there is space for open water storage, the sewage can directed to a katcha pond



with plastic sheet lining, and without any special construction. The pond/tank can be covered with transparent acrylic sheets for aesthetics and safety. The treated water can be used for gardening, car washing, toilet flushing and other purposes.

'Nano Scale Nutrient' contains special and trace nutrients that are deficient in normal waters. Upon application diatom algae will start blooming within 3 hours that will trigger a large population of zooplankton. 'Nano Scale Nutrient' produces both live food as well as oxygen (by photosynthesis) in the pond. 'Nano Scale Nutrient' can be used for

- (a) Creating live food
- (b) Solving problems in the pond.

Other benefits of using 'Nano Scale Nutrient'.

1. **Improves** survival.
2. **Helps** breakdown of organic over loads.
3. **Prevents** organic pollution and generation of toxic gases.
4. **Prevents** muddy and moldy smell in prawns.
5. **Improves** color, freshness, strength, and weight gain.
6. **Boosts** immunity and reduces incidence of diseases.
7. **Reduces** requirement of water exchange

Most of the zooplanktons are less than 2 mm in size. This live food is preferable for culture of prawns and fishes for 30 to



Lake after using Nano Scale Nutrient

40 days till such time that the animals are about 10 gms in size. Later on the pellet feeds can be consumed without wastage and pollution to the pond. The costs of culture under this method can come down substantially by anywhere from 25% to 50%.

For treating sewage, polluted and effluent waters by growing diatoms and reducing COD and BOD and COLOUR.

If '**Nano Scale Nutrient**' is applied to effluent waters containing sewage and industrial wastewater (provided there are no toxic chemicals and metals), diatom algae can be made to grow and absorb carbon load and release oxygen. If we have the nutrient analysis of the wastewater we can tailor make the product to suit individual requirements. The release of oxygen and absorption of the nutrient load will reduce the **BOD, COD, COLOUR** and **ODOUR**. In some cases the growing algae could remove the color in the water. This can be proved only by trials.

For reclaiming and bringing life to lakes, rivers, and water bodies that are polluted by sewage and other pollutants and those in a state of eutrophication.

Most of the lakes and rivers of the world are severely polluted by sewage and industrial effluents. Due to this there is very little aquatic life and most are in various stages of eutrophication. The heavy load on nutrients like nitrogen and phosphate and the lack of essential trace nutrients for diatom algal growth are the main reasons for such a state of affairs.

If '**NANO SCALE NUTRIENT**' is added to the system the diatom algae starts growing changes anaerobic conditions to aerobic conditions. Stops generation of bad ODOUR in the form of H₂S, very soon the water conditions improve. More oxygen and live food returns to the water and very soon the water body is restored to its normalcy. Dosage may be reduced or increased depending on actual conditions. After recovery of the water body even a tenth of the above dosage could be enough.

For preventing wild growth of waterweeds, water hyacinth, green algae and blue green algae and other waste plants in lakes, rivers, ponds and other water bodies.

The addition of '**NANO SCALE NUTRIENT**' always removes excess nutrient loads of Nitrogen and Phosphate from the water body by growing diatoms and converting to live food. In the absence of the nutrient load, other exogenous weeds and plants

cannot grow. Further in lakes where the wild plants have already grown, if '**Nano Scale Nutrient**' is dosed into it, the rapid growth of diatoms consumes the nutrient chain required for the weeds to grow. Slowly they turn into yellow color and die. Within a few months they disappear from the pond. It is important that systematic dosing of the body of water with '**Nano Scale Nutrient**' should be carried out.

Avoiding Mass Fish Kill]

Oxygen depletion in water bodies is the major reason for mass fish kill. Sometimes toxins released by algal species like blue green algae and dinoflagellates are also responsible for mass fish mortalities. Using '**Nano Scale Nutrient**' can prevent this. Addition of '**NANO SCALE NUTRIENT**' produces blooms of diatom algae that help crash out green, blue green and toxic algal species from the water body. The blooming diatoms produce very large quantities of oxygen by photosynthesis and is soon converted into zooplankton that is live food for fishes. The water body becomes clean and healthy.

Removing and Crashing out of Blue Green Algae

Blue green algae proliferate in water bodies that have a source of pollution or excess nutrients washed down from agricultural lands. Some species like anabaena produce neuro toxins. In lakes which supply drinking water to towns and cities the growth of Blue green algae is a big nuisance. By using '**Nano Scale Nutrient**' the Blue green algae will crash out of the system and float in the water in the form of fibers or like a green paint. This has to be physically removed. The potability of the water is not affected and the fishes are not harmed. The water is purified and it is safe for normal use.

Nano Scale Nutrient is a liquid mixture which is diluted in water dosed into the pond once a week. It is effective within hours of dosing. Nano Scale Nutrient contains nano-scale micronutrients required for multiplication of the ubiquitous and beneficial diatoms in any water body. Nano Scale Nutrient contains Si, Fe, Mn, Ca, Mg, Zn, Cu, B, S, Mo, P, K and Co.

Nano Scale Nutrient causes a controlled and sustainable growth of beneficial diatoms. Diatoms are unicellular microscopic aquatic plants that absorb carbon dioxide and release oxygen during photosynthesis. Higher oxygen levels in water enable aerobic bacteria to grow and breakdown the organics in the water.

Higher DO level also results in tangible changes like cleaner water, reduction in BOD, lower coliform levels, elimination of foul odor, reduction in mosquito colonies in water and healthier aquatic life. To some extent even metals get oxidized and precipitate out of water resulting in lower COD levels. Nano Scale Nutrient is therefore a substitute for bacteria and other algae control products.

1 ml of Nano Scale Nutrient is applied to 1000 gallons of water once a week. Shake the bottle well before dosing. Dose early at sunrise when diatoms are most active. Dose the appropriate dose directly into the filter or skimmer or any area of high flow. The cap holds 5ml. UV needs to be turned off. If the pond has more than its fair share of algae, you can start with double or triple the dose. Since Nano Scale Nutrient is not an algaecide, results can take anywhere from 1 to 8 weeks. So please be patient. Once Nano Scale Nutrient gets a hold, it will maintain excellent water parameters and your maintenance time will reduce by as much as 60%. If your water temperature is below 50 deg F and the pond is algae free, then you can dose half the recommended dose once every other week to maintain a diatom population in water. This will prevent algae from taking hold in the spring. Once the water temperature rises above 50 deg F, you can revert to normal dosing.

Nano Scale Nutrient has been tested to be non-toxic as per APHA (2012) and OECD (1992) Nano Scale Nutrient has no impact

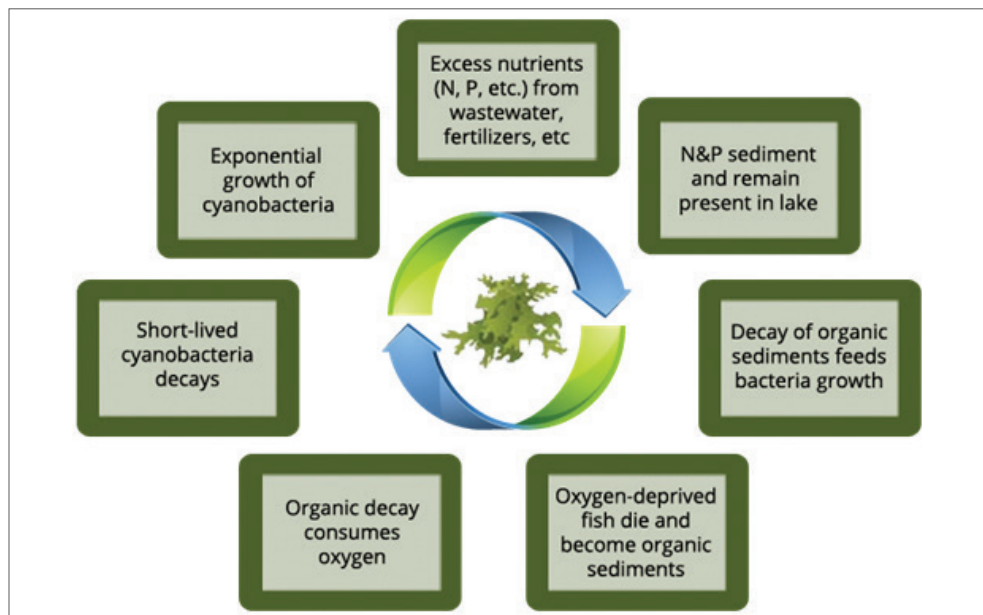
on humans and is even safe if small amounts are consumed accidentally. Overdosing will cause excess diatoms and water will turn brown. Nano Scale Nutrient has no side effects when dosed in water. Beneficial bacteria, zooplankton and fish grow in a healthy manner in ponds and lakes dosed with Nano Scale Nutrient.

A New Way To Clean Up The Rivers, Lakes

How would you like the idea of cleaning a dirty lake or a river for a nominal price and in an eco-friendly way?

Nano Scale Nutrient has devised a way to treat sewage and effluents through a patented product, called Nano Scale Nutrient, which not only cleans a polluted water body without affecting its ecology, but also adds nutrients to it, increasing the food content for fish.

Within 15 minutes of dissolving Nano Scale Nutrient in the water, diatom algae are released. These growing algae absorb nutrients and carbon dioxide from the water and produce oxygen by photosynthesis. The oxygen released helps aerobic bacteria break down the organics and convert the pollutants to base constituents, all this minus the stink that anaerobic decomposition generates. The diatoms are eaten by zooplanktons that are, in turn, consumed by fish. The ecosystem of the water body is maintained and observed by the presence of healthy fish, which are fit for human consumption.



Eutrophication is the enrichment of an ecosystem with chemical nutrients, typically compounds containing nitrogen, phosphorus, or both. Eutrophication can be a natural process in lakes, occurring as they age through geological time.

“With the use of Nano Scale Nutrient, all polluted lakes and rivers can be restored without harming the water life,” Besides cleaning water bodies, the product also has several other uses. Nano Scale Nutrient can be used for growing phytoplankton in oceans to absorb carbon dioxide and reduce greenhouse effect, thereby aiding in solving the global warming problem. It can also be used for preventing growth of toxic algae species called red tides in the oceans. It can be used for generating plankton and live food in aquaculture ponds which can boost the growth of prawns and fish.

Nano Scale Nutrient is a silica based micronutrient mix packed in 1 litre bottles.

Nano Silica and 10 micro nutrients – Iron, Zinc, Manganese, Boron, Molybdenum, etc.

- It can be used in any natural water body like – Aquariums, Aquaculture Ponds, Lakes, Rivers, Estuaries, Coastal Waters and for Sewage in Sewage / Wastewater treatment plants.
- It causes the diatoms present in the water to grow rapidly.
- Generally water bodies contain more of nutrients, N and P, and less of micro nutrients, since metals are not stable in water. So by providing the missing micro nutrients, diatom growth is enhanced.
- Diatoms have a silica body, unlike other algae such as Green Algae and Blue Green Algae which have cellulose bodies.
- Diatoms are consumed by zooplankton and these by fishes, unlike Blue Green Algae which are not good food for zooplankton and fish. Lesser quantity of Diatoms die and decompose in the water compared to Blue Green Algae. Decomposition results in release of CO₂ by bacteria.
- Dead Diatoms sink and do not float, so they do not form a layer on top of the water, unlike other algae that form a layer on top of the water and thus cutoff light and reduce photosynthesis.
- The Silica shells of the Diatoms too do not decompose; millions of tons of fossilized Diatomaceous Earth from various points of time is available all over Earth and is used in many products like toothpaste, water filters, pet food, as a pesticide in granaries, cosmetics like Multani Mitti, Dynamite, etc.
- “Because of their abundance in marine plankton, especially in nutrient-rich areas of the world’s oceans, diatoms probably account for as much as 20% of global photosynthetic fixation of carbon (~ 20 Pg carbon fixed per year: Mann 1999), which is more than all the world’s tropical rainforests.”
- Sewage Treatment – removed nutrients, N and P, and provides Oxygen.
- Lake, River, estuary and coastal water remediation – removes nutrients – N and P, increases dissolved oxygen level, reduces harmful bacteria, reduces mosquitoes in polluted lakes, reduces harmful algal blooms, red tides, mass fish kills, dead zones in coastal waters,
- Increases fish catch in lakes,
- Helps keep aquaculture ponds clean and well oxygenated, prevents harmful algal blooms, reduces ammonia accumulation, provides natural live feed to fish.
- Diatom Algae are a source of biofuel.
- Production of Omega-3 dietary health supplements

People make a big deal about planting trees, growing Diatoms in lakes and oceans is more beneficial and easier too, if Nano Scale Nutrient is used!

- 1 litre of Nano Scale Nutrient causes growth of at least 200 kgs of Diatoms.
- 1 litre of Nano Scale Nutrient results in release of at least 200 kgs of Oxygen.
- 1 litre of Nano Scale Nutrient results in consumption of at least 275 kgs of Carbon dioxide.
- 1 litre of Nano Scale Nutrient results in consumption of at least 80 kgs of Nitrogen.
- 1 litre of Nano Scale Nutrient results in consumption of at least 10 kgs of Phosphate.

Hydrogen Sulfide is emitted by anaerobic bacteria in sewage treatment plants, septic tanks, polluted lakes, etc. Nano Scale Nutrient and Diatoms create aerobic conditions and this stops the emission of Hydrogen Sulfide.

