

Another View of Water, Sanitation and Health



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Traditional Methods of Sanitation

Indian traditions knew that soil is the best medium for waste management. Indian soil was sacred in the past and was used to clean utensils, also human body. It allowed speedy percolation of rainwater and also wastewater. The living soil then allowed healthy plant growth, using the nutrients from the rain and wastewater.

Putting any wastes (solid or liquid) into the water bodies was prohibited by the society. Flowers (nirmalya) of traditional worship were offered into flowing water streams or lakes, so as to purify water.

Air pollution was totally prevented because polluted air can enter human blood, through the breathing process. Unholy fuels (such as coal, petrol or diesel) were not used as fuel. In fact, selected fuels (such as selected firewood, cowdung patties, ghee, vegetable oil and herbs) were used to purify the air. This led to production of healthy rain that gave us clean nourishing water.

Current Methods of Sanitation

Chimneys are 'smart' devices that are used to scatter the pollution onto a large area. In fact, the first pollution abatement technology used by modern man is 'dilution'. Thus, came the adage: '*Dilution is a solution to pollution*'.

Then, came the second method of washing away sins using chemicals and copious amounts of drinking water. This not only dilutes the pollution and passes it on to others, but also increases the pollution because extra chemicals are used in the name of sanitation.

Recent study has suggested that pregnant mothers who drink or even shower in tap water, which is chlorinated, can double the risk of serious heart and brain abnormalities in their unborn babies.

The findings, reported in the journal **Environmental Health**, links by-products of water chlorination - chemicals known as trihalomethanes, or THMs - to increase the risk of holes in the heart, cleft palate and anencephalus, which results in the absence of a major portion of the brain, skull, and scalp. Babies born in areas where drinking water is heavily disinfected with chlorine are at double the risk of heart problems, cleft palate or major brain defects, according to the study carried out in Taiwan on nearly 400,000 infants.

The disturbing finding suggests that expectant mothers can expose themselves to the higher risk by drinking the water, swimming in chlorinated water, taking a bath or shower, or even by standing close to a boiling kettle.

Will you use phenyl or dettol to clean the sweet that is attracting the flies? How can you do that with a tile surface that can come in contact with human skin or can generate volatile toxins that will enter our lungs and get injected into our blood?

Ecology and ecological engineering are the evolving branches, and these are giving us new eco-friendly techniques that are much better than the old chemical approach. Ecosanitation that understands the root cause of sanitation problems is getting promoted. Let us teach them at the school level now.

Even use of soap is a chemical approach. It pollutes the water and this becomes a bigger sanitation problem for the downstream communities. Current methods that are used for sewage and water treatment, cannot remove all these sanitation chemicals, and the river gets full with these as it flows. Modern allopathic drugs also come into our drinking water against our wish; they can have serious impact on us, in a long run.

Reading Nature's Signals

Nature is well designed, as per the laws of ecology. When the sanitation crisis is fairly low, we get walking creatures, then they come running and flying at higher crisis. They may also bite us, if the crisis is very serious. At higher crisis, there is either odour or pathogen activity.

All these warning signals (pests-pathogens-odour) are actually serving a good purpose because they warn us. Human race would have perished long back without these mechanisms.

We 'try to' kill these sanitary inspectors of Nature, using chemical or biological weapons. But, they come back to perform their duty. Hospitals are using more and more toxic poisons to disinfect the operation theatres now. This is only producing drug-resistant bugs.

Eco-friendly Water Treatment

If we use chemicals (alum, copper sulphate, chlorine, etc.) to clean water, we are just suppressing the signals and spoiling the water quality. It becomes more acidic and corrosive. If metals are getting corroded, imagine the state of our digestive system.

If ecological filters are used to clean the sewage, we get resources

(plant biomass and oxygen production, no CO₂ production). Such a method evolved through 20 years of research of our group, at IIT Bombay's Dept of Chemical Engineering.

Similarly, we need to carry out eco-friendly composting wherein there is no production of greenhouse gases, heat and toxic leachate.

These methods have been further upgraded, to evolve the latest, compact, eco-friendly and user-friendly technology called **BIOSANITIZER Ecotechnology**.

BIOSANITIZER is a natural biocatalyst, 100 mg of which has the power to convert pollution into resources, equivalent to 1 acre of natural forest.

It is a non-recurring input, it is just kept in a well, borewell or a water storage tank and we get treated water. The inorganics that actually define the sanitation challenge also get corrected and the water becomes a resource for all its intended applications in homes, farms and industries.

BIOSANITIZER does not just produce clean water that we get after filtering out the impurities and dumping them at neighbours' doorsteps. It converts all the pollution into resources, using time-tested laws of Nature. We get 'healing water' like that of Ganga at her origin. Ganga Jal still has the power to wash our sins (nitrates) and still not get polluted. This elasticity is lost only after industrial pollution is able to spoil this ability, at Kanpur (heavy metals from the tanneries), for example. Ganga river recovers by the time it approaches Kolkata. Because of Ganga water effect, Kolkata sewage can breed fish hence it is not wasted like the sewage of other metros in India.

Silent Environmental Hazards

We are so programmed that we do not even know that a real sanitation crisis can occur when there are no signals. A recirculating cooling tower that has only the inorganic load, actually produces a mist of legionella, the flesh-eating bacteria. There is no signal such as odour. Mosquitoes do not breed because of aeration, but the last natural mechanism, that of deadly pathogens, do come into picture, punishing innocent people who may come in the wind-path that can carry toxic aerosol for several kilometres.

Use of BIOSANITIZER is a good way to tackle such silent sanitation challenges. Since, the salt load is also tackled, there is no need to discharge the concentrated salty water (from RO units) and produce sanitation crisis for the downstream communities. We also get better cooling effect in the cooling tower. After all, the BIOSANITIZER also produces the cooling effect like a natural forest.

Boiler feed water is processed through ion exchange or demineralization plant. This produces salty effluent that can create severe sanitation crisis for the downstream communities. Ion exchange also introduces extra chemical load, making it worse than before.

Use of BIOSANITIZER to treat water, also takes care of scaling,

corrosion and algal growth problems, all these are just the signals, not the root cause. Root cause is again, nitrates that make other inorganics shout loudly.

If we teach ecology to schoolchildren, then they will make better decisions when they grow up. They will not use alum (introduces heavy metal pollution) to clean muddy water.

Sanitation problems also affects human mind. Recent research has shown that if children are exposed to heavy metals (silent sanitation challenge), more of them tend to commit crimes, when they become adults. (For more information visit : <http://www.biolab.co.uk/docs/nkpaper.pdf>).

Heavy metals are harmless when they are insoluble in rock particles, at neutral pH, they become soluble at acidic or alkaline pH. Hence, use of acids or alkalis for 'cleaning' is very hazardous.

Our forefathers used Ganga Jal, cow urine, cow dung and healthy soil for achieving sanitation. These got spoiled after we learnt how to burn the fossil fuels that produce harmful NO_x, that spoil our rain, water, soil, food and mind.

Even the so-called 'clean' fuels such as LPG, CNG, methane, and hydrogen, are very hazardous because they increase the NO_x levels.

What is the safe level? Not what the scientists from the cold region may say. Ask Mother Nature. Catch the rainwater and wait for 10 days to see whether dengue or malaria mosquitoes breed. If they breed, air quality (and the fuel) is bad. Mosquitoes do not breed in cold weather and that does not mean the air quality is good there. It is silently hazardous, as we can see from the crime rate there.

Farmers have been very creative in developing eco-logical techniques, though the agricultural universities have been promoting the toxic chemical route for sanitation and pest control. After all, farmers are close to Nature, and have seen the toxic methods failing and putting increasing burdens on their pockets. They have found that 'panchgavya' that consists of 5 products of desi (holy) cow produces good results when used in home, cowshed and farms.

Both plants and animals get pest infestation when they get higher supply of inorganic nutrients, than what they actually need. Pests and pathogens actually are mechanisms to suck that extra nutrition out and take it to plants that need them.

Evolution on this earth is from higher pollution to lower one, nitrates act as regulator of pollution load. Hence, man has least demand for nitrates. Low nitrates are needed for creative mind. So people, who aspire to be creative and get prosperity through a creative mind, should take care of both visible and silent sanitation challenges around them. **IP1**

References

Bhawalkar, U.S. (1997) Vermiculture Bioconversion of Organic Residues, PhD thesis, Chemical Engineering Department, IIT Bombay, Mumbai.

Bhawalkar U. S. and Sarita U. Bhawalkar (2008) Invisible, compact and high-rate phytoremediation of water and wastewater using BIOSANITIZER Ecotechnology, 11th International Conference on Wetland Systems Technology in Water Pollution Control, held during Nov 1-7, 2008, Indore (India).

CSE (2008) Recycle and Reuse of Wastewater: Decentralized Sewage Treatment Options, published by The Center for Science and Environment, New Delhi

WHO (2006) Guidelines for the Safe Use of Wastewater, Excreta And Greywater

UNEP (2008) Every Drop Counts; Environmentally Sound Technologies for Urban and Domestic Water Use Efficiency

Net Resources

www.wastetohealth.com: Website of Dr Uday Bhawalkar, has exhaustive literature on BIOSANITIZER Ecotechnology.

www.who.int/water_sanitation_health/wastewater/gsuww/en/: WHO Website, gives details of 2006 publication: Guidelines for the safe use of wastewater, excreta and greywater

www.unep.or.jp/ietc/publications/water_sanitation_everydropcounts/index.asp UNEP Sourcebook (2008): Every Drop Counts; Environmentally Sound Technologies for Urban and Domestic Water Use Efficiency

<http://www.cpcb.nic.in/oldwebsite/News%20Letters/Latest/sewagepollution.doc>: CPCB website that discusses natural low cost methods of wastewater treatment

http://data.cseindia.org/books_search_results_details1.asp?ref=43389: CPCB Booklet written by Dr Uday Bhawalkar

http://ddws.nic.in/infosacosan/AdminPanel_Downloadfeedback.aspx?f=2098872236.doc&path=Paper: Paper presented at the Third South Asian Conference on Sanitation (SACOSAN III), Vigyan Bhawan, New Delhi on 16-21, November, 2008

wesnetindia.org/fileadmin/attachments/newsletters/august08/B-W_Eco-logical_Water_Filter.ppt: Power-Point Presentation on BIOSANITIZER Ecotechnology

<http://video.google.com/videoplay?docid=5995777895451134666&q=biosanitizer&total=2&start=0&num=10&so=0&type=search&plindex=1>: Short video on BIOSANITIZER

<http://www.biolab.co.uk/docs/nkpaper.pdf>: Heavy metals and Crime

[http://www.google.co.in/search?hl=en&q=panchgavya+m+s+swaminathan&meta=Good information about 'panchgavya' with five cow products, that farmers are using for ecosanitation.](http://www.google.co.in/search?hl=en&q=panchgavya+m+s+swaminathan&meta=Good+information+about+'panchgavya'+with+five+cow+products,+that+farmers+are+using+for+ecosanitation.)

http://www.who.int/water_sanitation_health/dwq/nutdemineralized.pdf: 2004 WHO study on hazards of soft, dematerialized or RO water