

SOLUTIONS FOR POLLUTION

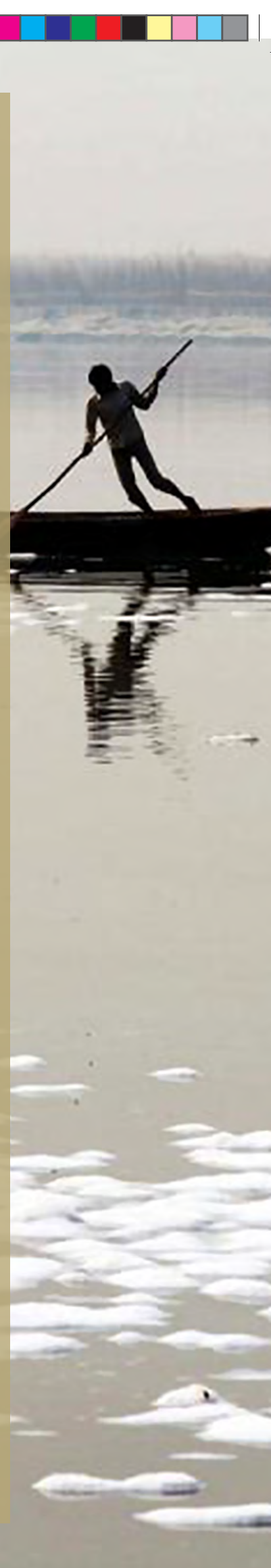
For Mother Ganga & Her Tributaries





CONTENTS

Introduction	3
A Boat that Cleans	6
Eco-Friendly Tannery Processes	8
Monitoring with Community Volunteers and Smart Phones	9
Plantations That Remove Heavy Metals, Chemicals & Sewage	10
Natural, In-Stream Treatment of Industrial & Sewage Effluents	11
In-Stream Blue Frog Technology To Clean Industrial and Agricultural Waste and Sewage	12
The Water Wheel For In-Stream Solid Waste Removal	13
The STP Bill Gates Drinks From	14
Sewage-Eating Bacteria to Help Clean Nalas	14
A Simple Technology To Turn Sewage into Energy & Fertilizer, Onsite, Without STPs	15
Mushrooms That Can Remove Fecal Coliform, Impede Malaria and More	16
Eco-Crematoriums that Save Trees	17
Cash from Trash	18
From Poly Bags to Petrol	19
Solar Panels atop Canals	20
Planting the Right Trees and the School-Based “My Tree Programme”	21
Micro-Irrigation	22
Agro-Ecology	23
Floating Billboards that Clean Rivers and Nalas	24
Power from Flowers	25
Idol Immersion Tanks	26
Bio-Sand Water Systems	27
Restoring Ancient Ways	28
Ganga Culture and Education	29
The National Ganga Rights Act	30





Dear Divine Souls,

The River Ganga is the Life-Line for 500 million and the Hope-Line for over one billion. For this reason, the world is joining forces to bring about Solutions for the Pollution that have plagued our National River for far too long.

In this document, we offer details on innovations ranging from the ultra-modern to low-tech, which, alone or together, can help to ensure the sustained revitalization of our National River. I personally find these innovations to be inspirations in their own right. By incorporating them into planning on local, regional, state and national levels, they can also enable Mother India to shine as a global innovator, for all the world to see and emulate.

We at Ganga Action Parivar and the Global Interfaith WASH Alliance are always here to help, as our patriotic mission. For additional details on these or other innovations, I can be e-mailed directly at swamiji@gangaaction.org.

In the Service of God and Humanity,

Swami Chidanand Saraswati
Founder, Ganga Action Parivar
Co-Chair, Global Interfaith WASH Alliance



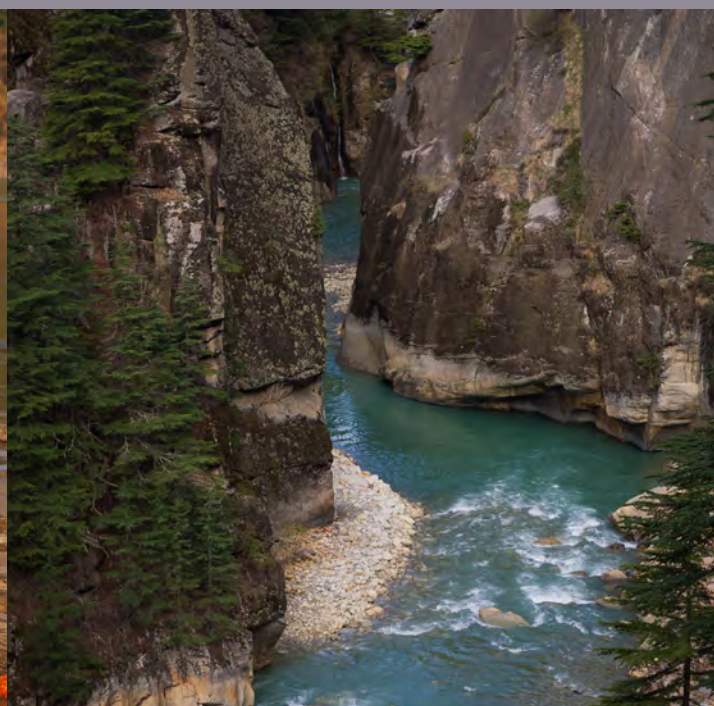
GANGA ACTION PARIVAR



Ganga Action Parivar is a global family of professionals, engineers, scientists, activists, spiritual leaders, environmental specialists and dedicated volunteers committed to protecting and preserving the River Ganga and Her tributaries in their free flowing, pristine and natural state.

The Six Ts Program: Of GAP's many initiatives, its Six Ts Program provides a foundation for a cleaner, greener, more sustainable environment. Through its comprehensive design, the people and ecology of the watershed are better enabled to survive and thrive. In so doing, the Six-Ts Program works to provide: eco-friendly

Toilets, the planting of Trees, the restoration of the habitats of endangered species such as Tigers, the provision of clean water Taps, the abatement of Trash and efforts to to clean India's sullied railway Tracks.

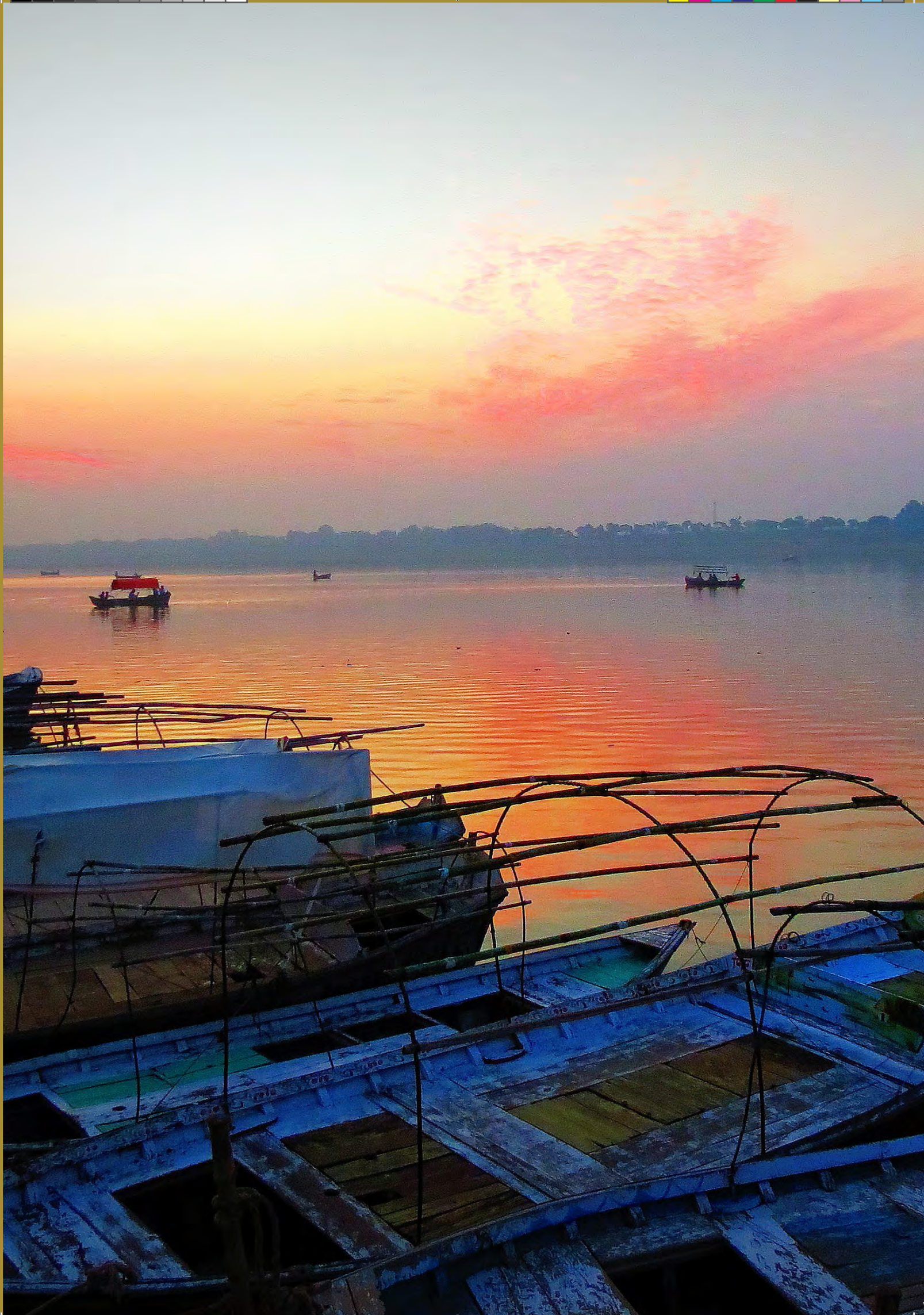


THE GLOBAL INTERFAITH WASH ALLIANCE

The Global Interfaith WASH Alliance represents a historic partnership of the world's faiths alongside civil society, private and governmental sectors in order to provide improved Water, Sanitation and Hygiene in the places that need it the most.

GIWA was launched at UNICEF Headquarters with the understanding that the world's faiths can play a pivotal role in enabling the survival and improved health of children and adults in the developing world. It does so through the development of networks and partnerships that enable faith leaders to motivate and educate their congregations towards healthier lives. Working alongside faith leaders and other partners, GIWA also serves to provide improved sanitation and health through the provision of eco-friendly toilets and safe water systems. **For more information, visit www.washalliance.org.**



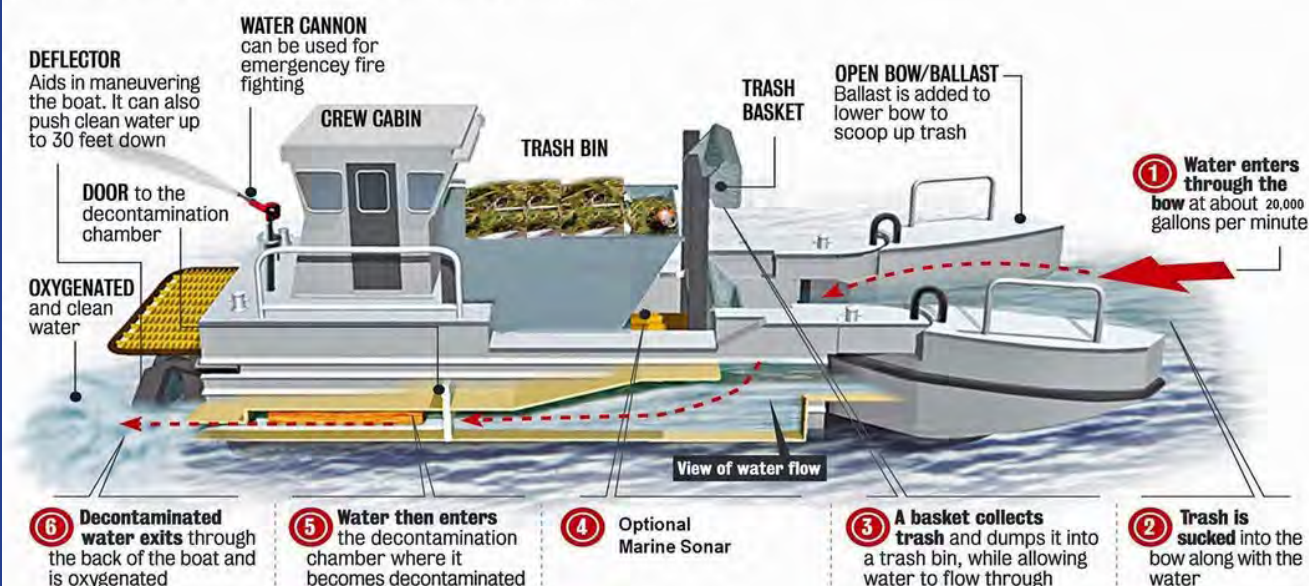


THE BOAT THAT CLEANS

Removing Trash While Purifying and Oxydizing Water

CLEANING THE WATER

How the 'Scavenger's' onboard water treatment system works:



The Scavenger 2000 is one of the most effective pollution control and water maintenance vessel available in the world today. The vessels improve water quality by reducing and eliminating bacteria and viruses, raising D.O. (Dissolved Oxygen) levels, controlling algae growth, improving water clarity and eliminating odors. A multi-purpose vessel, the Scavenger 2000 not only decontaminates and re-oxygenates water, its unique design also allows it to collect floating waste and debris, creating a safer and more attractive public waterway.

The key to the Scavenger 2000 vessels is an advanced Patented Oxy-Plus water decontamination system that treats and revitalizes water by directly aerating it with a combination of ozone and oxygen. When oxygen is injected into polluted water, the enrichment contributes directly to reducing contaminants suspended in the water. With the addition of ozone to the aeration process, a very powerful yet environmentally safe disinfection occurs in the body of water being treated by the Scavenger 2000.

Ozone has been applied with great success in municipal sewer treatment facilities worldwide because of its ability to disinfect

water without leaving harmful by-products left by chlorine. In fact, ozone has been found to be more than 100 times more powerful than chlorine in destroying E. coli bacteria.

As water enters through the bow of the vessel, the Oxy-Plus system generates ozone and oxygen and injects it into the water. The ozone's life expectancy varies between a few seconds to a few minutes. The ozone then converts into oxygen. This process supports Chemical Oxygen Demand (COD), breaks down substances so they become digestible to bacteria, and supports the aerobic oxidation of toxic nitrogen compounds. By altering the surface charge, ozone enables suspended particles to coagulate, therefore improving water clarity. In addition ozone effectively oxidizes some pesticides and some algae, eliminates odor and polluting chemicals. Lastly, it improves the dissolved oxygen (D.O.) content of the water, which has a rejuvenating effect.



River Water Before and After Treatment

The River-Cleaning Boat simultaneously picks up floatable trash, kills bacteria such as fecal coliform and injects life-supporting oxygen and cleansing ozone into the water.



Before Cleaning (Source: City of Miami Public Works Dept., USA)



After Cleaning

ECO-FRIENDLY TANNERY PROCESSES

Beautiful, Environmentally-Friendly Leather Without Retrofitting Factories



The most effective solution for the pollution is to eliminate it at its source. Fortunately, new leather tanning methods do exist, which can replace the use of deadly chemicals with more environmentally-friendly materials. While all effluents should be treated and recycled instead of being poured into our drinking water, these alternatives do provide more environmentally-sustainable solutions that can protect the River Ganga.

According to Portland State University (USA), India's "Central Leather Research Institute has established a way to modify the tanning process in order to make it more eco-friendly and cost-efficient with no observable loss of leather quality. Researchers found that simply reversing the order of the tanning and post-tanning steps, while simultaneously promoting non-chemical-based pre-tanning methods, reduced the amount of chemicals released by 82% and made an energy saving of nearly 40%. These findings were published in the Journal of Chemical Technology and Biotechnology. According to the head of this study, Raghava Rao, "The significance is tremendous in the context of environmental challenges being faced by the leather industry."

Another popular method is called **Wet White Tanning**, in which leathers are produced by combinations of synthetic tannins, vegetable tannins, glutaraldehydes and minerals, such as aluminium and zirconium.

Other, newer tannery technologies, such as the **European Union-Funded Tileather or Sanotan**, which uses titanium instead of chromium, have been developed to save water and reduce the impact of tanneries on the environment. The process is bio-degradable.

Perhaps one of the most promising technologies is **X-Tan from Lanxess**, which is a next-generation form of Wet White tanning with the manufacturer's claim that "**at no stage during the tanning process are any substances formed that could be harmful to health or the environment. The leather, shavings and wastewater contain no reactive tanning materials and no adsorbable organic halogen compounds (AOX) or aldehydes. And because no pickling is required, the salt load of the wastewater is much lower. Thus X-Tan makes an important contribution to protecting water as a natural resource.**"

MONITORING WITH COMMUNITY VOLUNTEERS & SMART-PHONES



Smartphone technologies can now give every-day people the ability to perform the same tasks that only highly-educated researchers could have carried out up until recently.

New, innovative smartphone-based kits can enable anyone, with only a minimum of training, to sample water and send the data regarding the sample to a central mapping system and database, using only a phone with a small attachment. The maps and data can be then immediately seen and used by anyone-- including researchers, students, NGOs and policy-makers-- via the internet.



Community-Based Action Through Ganga Parivar Sevak Volunteers

With little training, volunteers or para-professionals can be recruited from local communities to serve as investigators of their own sections of the Ganga, providing regular water quality checks and reporting highly-polluting activities. They can also be trained to serve as leaders in crucial endeavours, such as clean-up programmes, tree plantations, and more.

- In rural areas, Ganga Parivar Sevaks can be recruited to care for one 1-kilometre long stretch of the Ganga River each, so that they may

eventually cover the entire 2,525 km stretch of our National River.

- Each GPS Worker can be trained to take regular water quality measurements and photos, which they can upload to the internet via smartphones.
- All water-quality tests can be displayed on an attractive real-time map that can be accessible for researchers, policy makers and caring members of the general public.
- By placing materials and data online, people from across the world can become involved in the revitalization of Mother Ganga, and improvements can be readily monitored by government authorities, who will all see change happening in real time.
- Such actions can also facilitate "adoption" of stretches of the Ganga by CSR programmes and individuals, who will be motivated by seeing the dynamic rejuvenation of the River Ganga as it happens.
- Women can be recruited to lead the way as GPS Workers. Just as Ashas are trained to serve as community health workers, GPS Workers can become the Ashas of Mother Ganga.

PLANTATIONS THAT REMOVE HEAVY METALS, CHEMICALS AND SEWAGE SCIENTIFICALLY



Nalas and Nadis can be beautified and cleaned at the same time through the use of secalized plants, such as grasses and lotuses, planted and maintained by expert bio-remediation firms, such as Ayala.

While adding to natural beauty, the plants eliminate pollutants including: sewage, hydrocarbons, organic and mineral oils, salinated water, boron, pathogens, hormones, heavy metals, rivers and lakes, grey water, land fill leachate, agricultural sewage and more.

Removing Sewage and Chemicals While Beautifying Mother Ganga Affordably. NBS Systems:

- Are low-cost, easy and fast to install
- Are able to cope with a large variety of pollutants simultaneously.
- Render water to a clear and healthy quality that can support wildlife in reservoirs, rivers, or on land.
- Maintenance costs are negligible
- Can withstand sharp fluctuations in the quality of influent water
- Can function as a very powerful air clarifier, especially in uran areas.
- Provides extremely high quality water right from the start of the process, complying with the most stringent standards
- Naturally improve over the years
- Are adapted to the site's conditions, and enhance and beautify the landscape.
- Can be included as solutions that promote groundwater recharge, flood prevention and restoration of local flora and fauna.



Drinkable water from a waterway that had been heavily polluted. Beautiful plants were the only treatment needed.



NATURAL, IN-STREAM TREATMENT *of Industrial and Sewage Effluents*



An in-river application in Brazil, which can also be seen in the above aerial photo

The failure of waste water treatment through STPs is partly responsible for the high pollution levels in the rivers of India. Encouraging news is that most the handicaps associated with STPs can be overcome in one go by instream treatment-

an innovative and sustainable technology.

In-stream treatment/cleaning of rivers and nalas offers a very cost effective and transparent way of treating the entire sewage load continuously while it is moving within the stream. The unique feature of instream treatment lies in the fact that the treatment is dynamic unlike conventional STPs and more importantly, takes care of non-point source sewage as well.

In-stream treatment adopts a technology called 'Flotation', which uses Tanfloc, an extract from the bark of the Acacia, an organic (ayurvedic) cationic

polymer that act, as a fast-acting coagulant as well as a flocculants in water and wastewater treatment. Tanfloc is well known to be particularly effective in treating effluent from metallurgical, tannery, municipal, food, oil and chemicals, industries, which matches very well with the challenge offered by Ganda nalas, which have become infamous landmarks in the majority of Indian cities.

The applications include:

- River cleaning
- Nala remediation
- Domestic Sewage treatment
- Treatment of industrial effluent
- Treatment of community and municipal waste

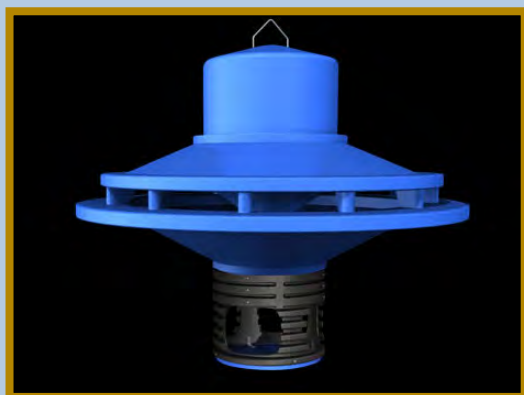
For Complete Details on How To Use this
Cost-Effective In-Stream Technology
to Clean Sewage
and other Waste from
Nalas and Rivers Without STPs,

Contact: Swamiji@GangaAction.org



IN-STREAM BLUE FROG TECHNOLOGY

To Clean Industrial and Agricultural Waste and Sewage



Blue Frog Technology by Absolute Aeration can clean canals and other water sources of sludge, pollutants and more without chemicals, without the need to divert water to expensive treatment plants and without the need for dredging. In so doing it helps ensure:

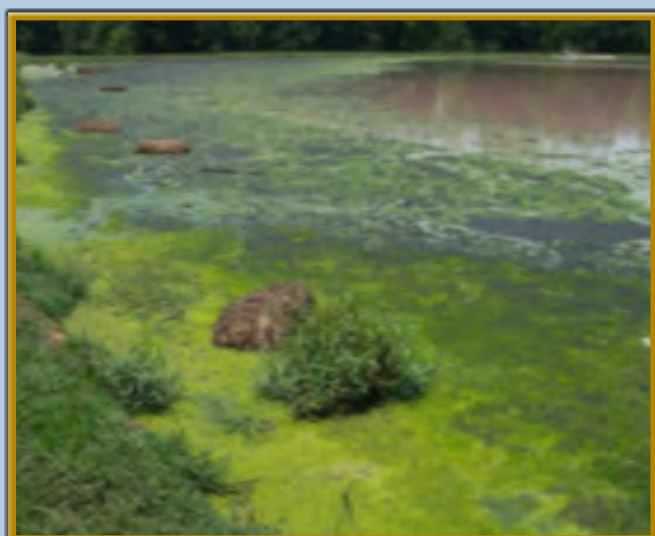
- Sludge digestion in situ
- Reduced energy costs
- Minimal operating and maintenance
- Rapid oxydation of soluble BOD
- The sinking of insoluble BOD 4x faster
- Less odor
- Less ammonia
- Lower pathogen content
- Less hydrogen sulfide
- Higher quality irrigation water
- Higher quality irrigation water
- Increased nutrient uptake
- Reduced odor complaints
- Reduced field run off
- Struvite recovery
- Increased separation efficiencies



Sludge in lagoon, before



After



12 Industrial pollution, before



After

THE WATER WHEEL

For In-Stream Solid Waste Removal

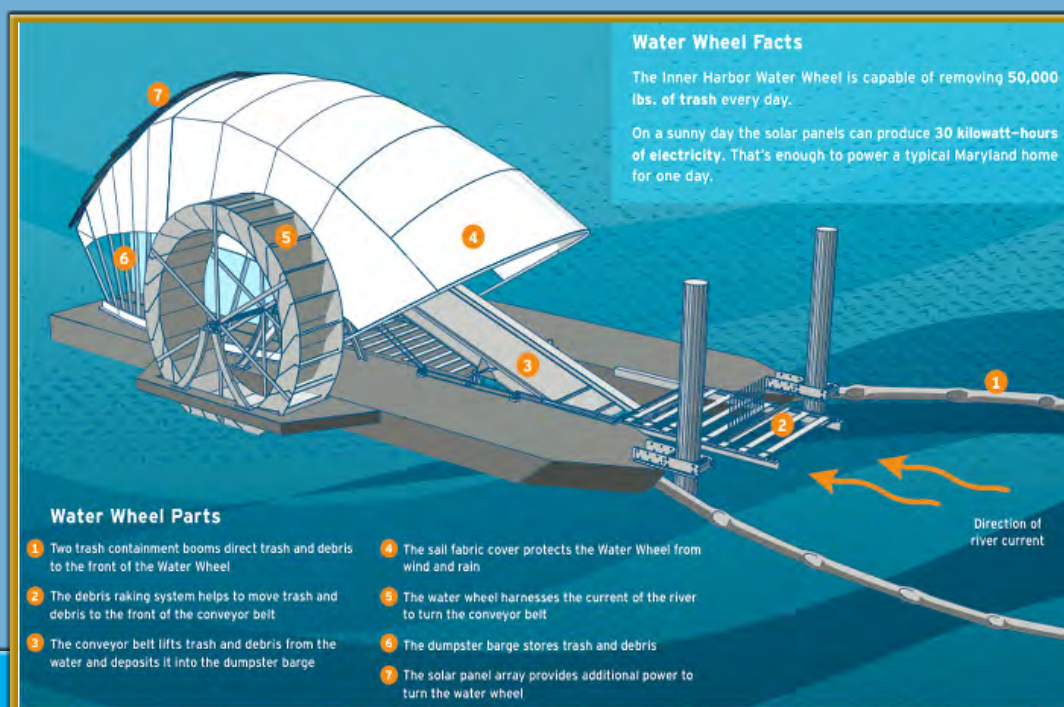


Powered by 30 solar panels and the water current, the Water Wheel Trash Inceptor has a record of removing up to 19 tons of trash a day, while also generating electricity through its solar panels.

How it works: two orange booms help funnel debris towards the Water Wheel, where spring-loaded leaf rakes intercept the trash and push it onto a moving conveyer belt which empties out into a 16 yard dumpster, located on top of a floating dock. Once the dumpster is full, the dock is detached, hooked up to a boat, and then taken to a waste-to-energy plant, where the trash is incinerated and turned into

electrical energy. The solar-powered pumps move 20,000 gallons of water an hour onto the rotating waterwheel that turns the conveyer belt.

In addition to cleaning up waterways, the Water Wheel also provides other benefits. The constant rotation of the waterwheel puts much needed oxygen back into the water, helping to attract schools of fish and improve habitat conditions and water quality. The trash collector also removes organic waste, which if left to decompose, causes oxygen depletion and releases ammonia.



THE STP BILL GATES DRINKS FROM

Turns Sewage into Power, Drinkable Water and Fertilizer



The Janicki Omniprocessor produces electrical energy, drinkable water and fertilizer from raw sewage, and it runs on its own power.

Manufactured by Janicki Bioenergy, the proof of concept model was funded by the Bill and Melinda Gates Foundation. The S100 model, which costs about \$1.5 million, can produce 10,800 liters of drinking water per day and 100 kW of electricity. The larger S200 model can handle the waste from 100,000 people, producing 86,000 litres of drinking water day and 250 kW of electricity.



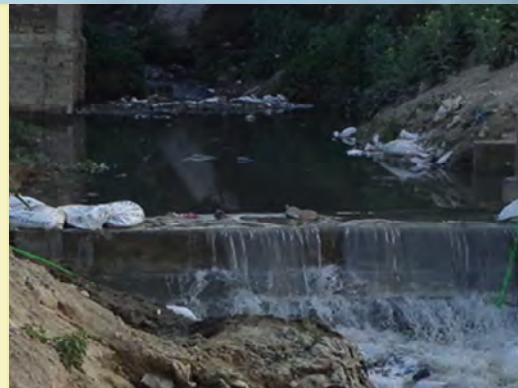
The treatment process first involves boiling the sewage sludge, during which water vapour is boiled off and recovered, leaving a dry sludge which is then combusted as fuel to heat a boiler that in turn produces steam and the heat necessary for the boiling-off process. The steam is then used to generate electrical energy. Some of this electrical energy is used for the final water reverse osmosis purification stages to produce safe drinking water, and to power ancillary pumps, fans and motors, meaning no additional outside electricity is needed.

NALA BIO-REMEDIATION

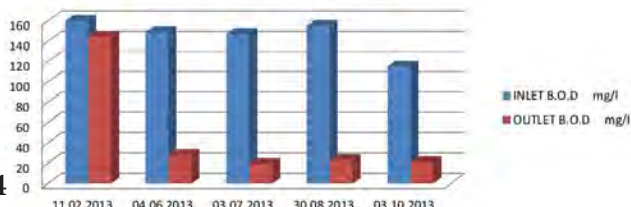
Sewage-Eating Bacteria to Help Clean Nalas



The company, GNT India, uses liquid innoculum (pollution-eating bacteria) as well as mud balls containing innoculum to effectively clean drains, including at the Yamuna, and at sites such as the Maha Kumbh Mela in Allahabad. The results have been very promising, as one can see from the charts below.



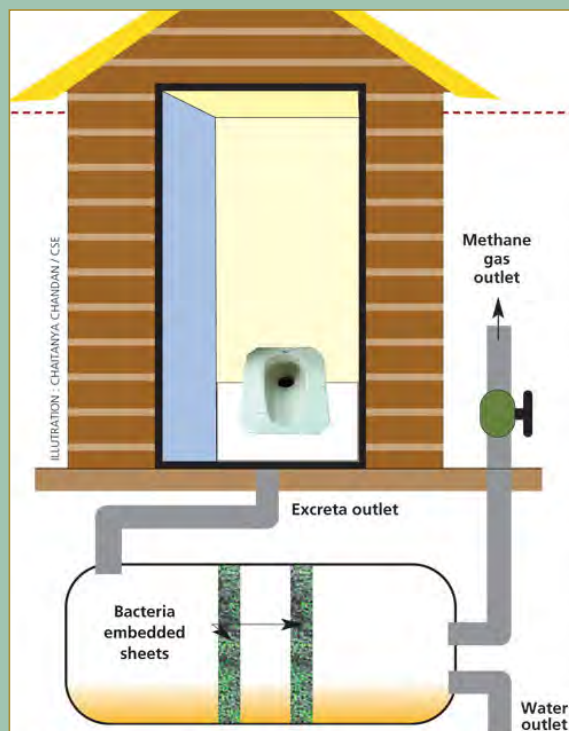
KUSHAK NALLA-BOD CHART



KUSHAK NALLA- COD CHART

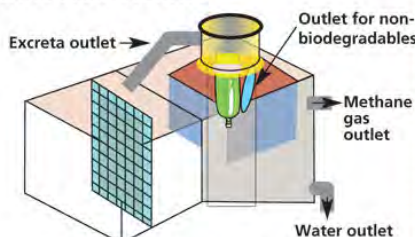


A SIMPLE TECHNOLOGY TO TURN SEWAGE INTO ENERGY & FERTILIZER, ONSITE, WITHOUT STPS



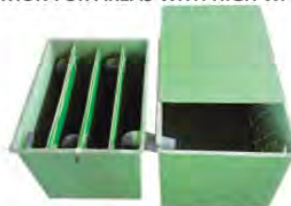
The toilet has a tank fitted below the commode. The tank has sheets with bacteria embedded. When waste comes in contact with bacteria it gets converted to water and methane

MODIFICATION FOR RAILWAYS



A special lid allows for non-biodegradables like plastic bottles to be flushed out. The excreta enters through a separate opening into the digester tank

MODIFICATION FOR AREAS WITH HIGH WATER TABLE



The tank has several chambers. This increases the retention time of the waste and provides more surface area to break down the waste



While toilets are crucial for community health, the handling of the resulting sewage can present a conundrum. Conventional sewage treatment plants are too expensive for most communities in the developing world, and require constant electricity, which is often unavailable or unreliable even in large municipalities such as Delhi. The widely-used alternative of pit-based latrines, including those that compost human waste, require labour-intensive mucking, which can, in some cases, result in the transmission of disease and other problems.

At the same time, sewage treatment plants (STPs) are extremely expensive, require extensive infrastructure, are difficult to maintain, and are reliant on large amounts of electricity, which may not be available 24 hours a day.

A viable solution for colonies, villages and households lining the Ganga and Her tributaries is Biodigester Technology, as developed by DRDO. Requiring little maintenance and no electricity, the Biodigester technology provides notable economic benefits to its users.

Its economically-valuable discharges are:

1. Clear, 99 percent pathogen-free water, which is rich in agricultural nourishments,
2. Biogas. Harnessed properly, the odor-free, nontoxic biogas can be utilized for household, small industry, municipal energy, and even the fueling of automobiles. The biogas from the sewage from 70 homes, according to some researchers, can fuel a car for an entire year.

Mobile Biodigester units may also be provided during times of festivals, when there is an increased influx of travelers. In such a way, units can be quickly placed in as many areas as possible, so that the Ganga need no longer become deluged with sewage with the rise and fall of yatra seasons.

Biodigester tanks can be placed within colonies, slums and other areas to treat the sewage of multiple homes without the need for STPs and expensive infrastructure.

MUSHROOMS THAT CAN REMOVE FECAL COLIFORM, IMPEDE MALARIA AND MORE



According to researchers, mushrooms have an unquenchable appetite for organic matter. Because of this, a new class of scientists have dedicated their careers towards identifying fungi that can remediate our world's most pressing issues, such as polluted waterways.

One species, called Zhu Ling, has found to be 100% effective in stopping the parasite that causes malaria.

Mycelia mats, such as the one to the left, were similarly found by researchers to be able to filter fecal coliform, as well as protozoa. They were also found to be effective in trapping certain insects, which could be helpful in preventing vector-borne diseases such as yellow fever.

In a study conducted with the USA's Washington State University, researchers found, "trials with influent containing both sediment and *E. coli* achieved additional reductions, in some instances approaching 100% removal."

Trials continue with this novel approach, which could be taken up by local researchers at very little cost.

ECO-CREMATATIONS

Preserving Trees and Keeping Ganga Clean



Five crore trees are harvested every year in India for cremations alone. Even then, countless families, who can't afford full cremations, are disposing of their loved-ones' bodies in the Ganga, causing tremendous public health concerns. Yet, we have seen from past GAP and YAP failures, electric crematoriums are not the answer.

In an effort to reduce this damage, an Indian NGO called Mokshda Paryavaran Evam Van Suraksha Samiti (Mokshda) has invented a better crematory system.

The system can dispose of a corpse in no more than two hours, using only 70 kilograms of wood. In comparison, a traditional Hindu funeral pyre takes six hours and requires 500–600 kilograms of wood to burn a body completely.

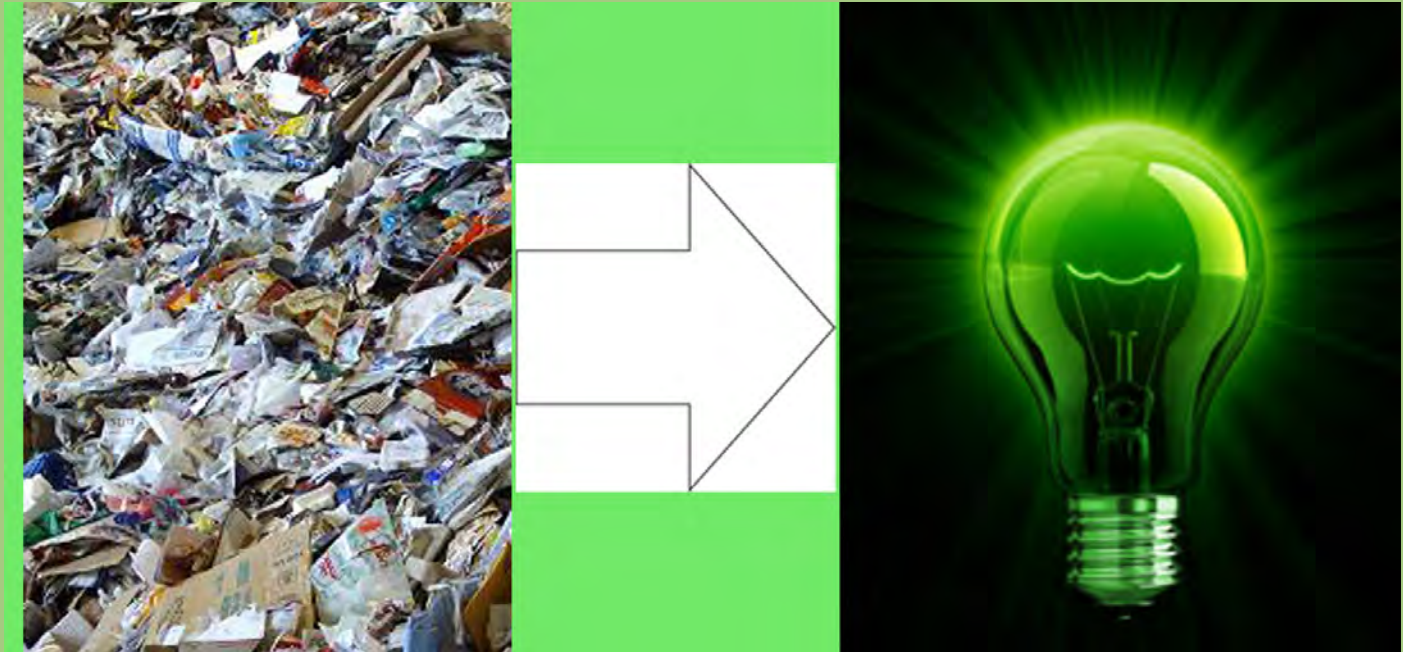
The Crematorium System gives control over the temperature and circulation of the air around the flames. At the same time, the design is acceptable to Hindu traditionalists, as it is open and thus enables traditional ceremonies to be performed, unlike electric and gas-fuelled crematoriums, which are of an enclosed nature.



Bio-Urns are another innovation worth considering: Inside, ashes, soil and seeds are combined. When planted, a beautiful, lasting tree emerges. These can become part of a Smriti Van Tree Plantation Programme to beautify and fortify the Ganga's Banks.

CASH FROM TRASH

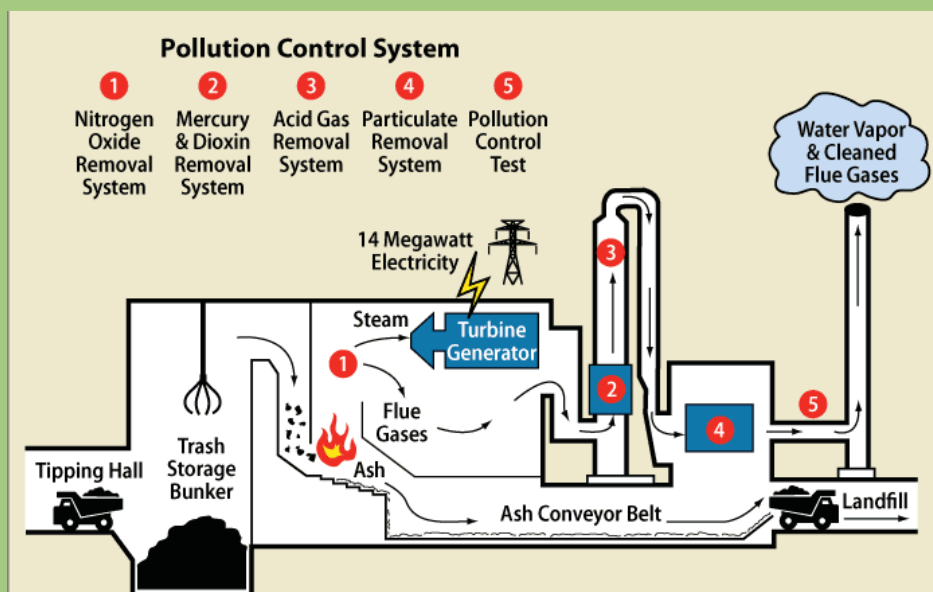
Companies in India that Convert Waste to Energy



The bane of trash in the Ganga and Her tributaries can be turned into a boon for Mother India through systems and technologies that can be installed across the Ganga River Basin that allow people and municipalities to make money from their waste through its conversion to energy.

Companies that are providing trash for cash technologies include:

- East Delhi Waste Processing Company Pvt. Ltd (implementing a 10 MW project)
- A2Z Group of Companies (Gurgaon)
- Lockheed Martin (projects in Pune)
- SELCO International Limited (Hyderabad. Has produced 6.6 Megawatts from trash)
- Bermaco/WM Power Ltd (completed an 11 MW project in Mumbai)
- Mailhem Engineers (has set up 250 energy to waste plants)
- Hanjer Biotech Energies (is developing a 15 MW power plant in Surat)
- Ramky Enviro Engineers (operating India's largest incinerator and providing bioremediation)
- And more.



FROM POLY BAGS TO PETROL

Municipalities to Profit from Easily Converting Plastic Page into Fuel for Cars and More



Every day in New Delhi alone, 10 million plastic bags are thrown away by its residents. Countless millions more are similarly discarded across India, often sullyng sacred pilgrimage sites and India's exquisite bio-diversity.

Now, scientists in India have devised an easy technology that can convert plastic bags into fuel that can be used even in cars.

Says one researcher, "since this plastic is made from petroleum in the first place, we can recover almost 80 percent fuel from it through

distillation."

Pune Municipal Corporation is planning on running a pilot project that will convert plastic into fuel for generators. In so doing, they will convert 9000 kg of plastic a month into 5400 litres of fuel.

Each 300 kg plant, such as the one above, could yield 180 litres of fuel a day. If a similar pilot programme is carried out for the Ganga and Yamuna Rivers, the results can be truly historic.

SOLAR PANELS ATOP CANALS

A Solution for Power Generation and More



Gujarat's renowned solar canals present an ingenious method for preserving water diverted to canals whilst generating electricity without the need for extra land, dams or barrages. Gujarat's aim, to cover 10% of its existing canal network, would produce 2.2 gigawatts of power, which could illuminate a city or region.

By building the same over canals containing Ganga and Yamuna water, extraction could become less intensive and the need for new dams or polluting energy production methods would be negated.

Says one reporter, "the project is much more than another welcome large-scale solar effort, because the design is uniquely symbiotic. The solar roofs won't just generate power, they'll block the water below from the sun's glare to deter evaporation—meaning more of the water moving through the canals will be available for crop irrigation and drinking. The coolness of the water, in turn, will keep the panels at a more efficient operating temperature.

Meanwhile, building solar right on top of idle infrastructure like open canals means the project will face far fewer controversial land use issues—a huge problem that plagues big solar plants."

THE RIGHT TREES

To Preserve Soil, Beautify Banks and Fortify Hillsides



"MY SCHOOL: MY TREE"

School Children can plant and nourish their own fruit trees alongside the Ganga. The fruits, when harvested, can help keep them healthy.

Since the time of British rule, indigenous trees, such as the Himalayan Banj Oak, have been replaced with species such as the Chir Pine. While fallen Oak leaves nourish undergrowth and absorb moisture for underground aquifers, shed pine needles do not, causing increased erosion and siltation, more susceptibility to landslides, and less water to be absorbed into underground aquifers.

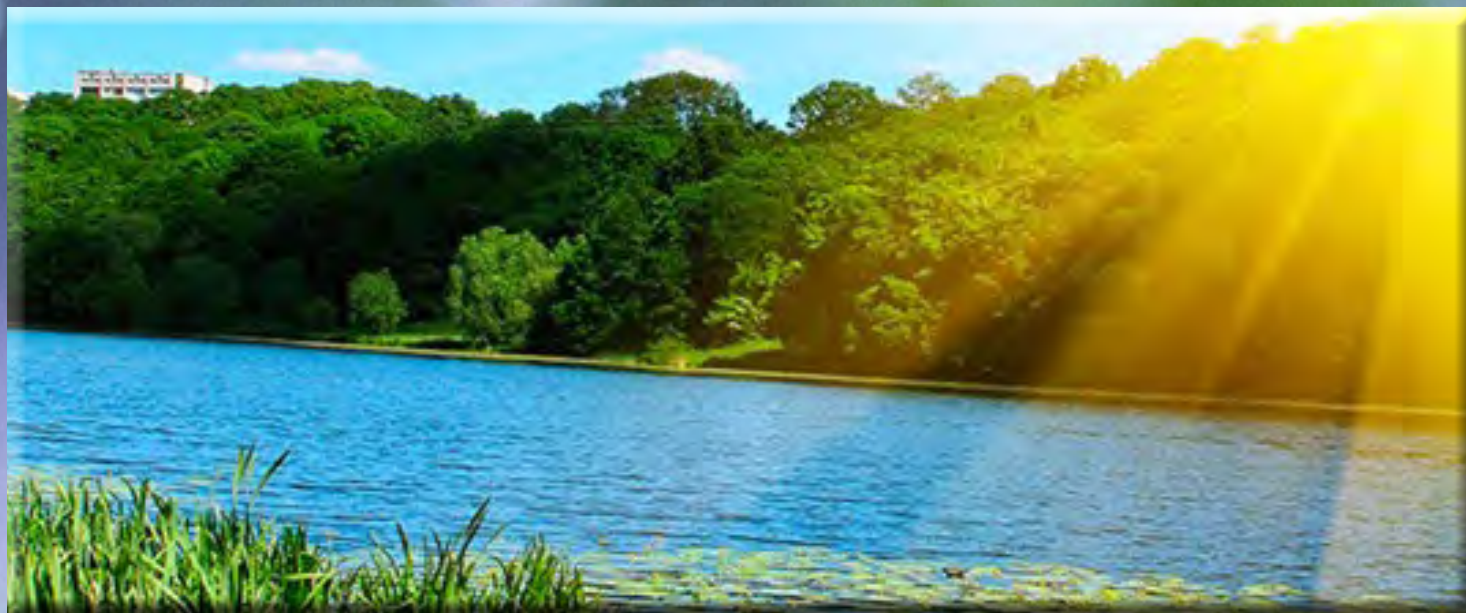
For this reason, the planting of leafy trees, such as oak, neem, bargad, and peepal is of crucial importance for the River Ganga.

In addition, through inspiring schools and communities to plant fruit-bearing trees through a Mid-Day Fruit Tree Planting Programme, children in particular will have greater access to the health benefits of fruit and families can benefit from selling produce in the markets.

Moreover, the banks of the River Ganga will be beautified by green and inspiring canopies of leaves, providing shade for people and shelter for India's magnificent birds and wildlife. This will, in turn, increase opportunities for eco-tourism and green pilgrimages.

AGRO-ECOLOGY

To Stop Toxic Agricultural Runoff into Drinking Water



To keep the River Ganga free from toxic chemicals, organic farming is crucial. Recognizing that water and soil have a symbiotic relationship, agroecology can serve as a viable solution to meet India's growing needs while maintaining organic farming practices so that the Ganga and Her catchment are not contaminated.

Agroecology does not seek a one-size-fits-all prescription for what constitutes sustainable farming, but instead takes into consideration the surrounding ecosystems and regions so as to best optimise available resources.

As a result, farming methodologies frequently vary. Agroecological systems are, however, typically defined by the following properties:

- Low external input, energy-saving practices that preserve and build soil health, conserve water, and enhance natural pest resistance and resilience
- The use of thousands of traditional varieties of major food crops which are naturally and locally adapted to stresses such as drought, heat, harsh weather conditions, flooding, salinity, poor soil, and pests and diseases.

- Programmes that enable farmers to cooperatively preserve and improve traditional seeds of diversified food crops and indigenous breeds of animals.
- The use of existing crops and their wild relatives in traditional breeding programmes to develop varieties with useful traits.

In 2008, a United Nations report looked at 114 farming projects across 24 African countries and found that agroecological practices achieved yield increases averaging over 100%

- Organic, chemical-free and water-saving techniques that keep our waterways clean and protect the soil

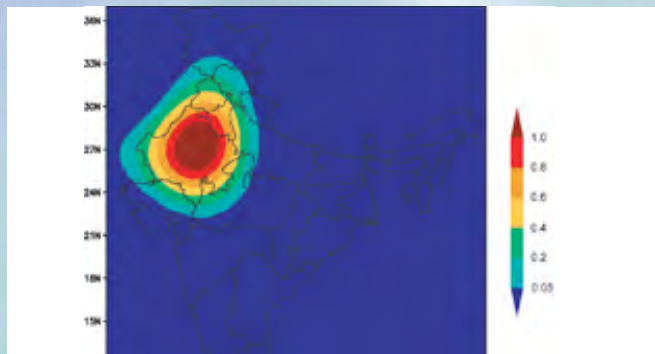
In 2008, a United Nations report looked at 114 farming projects across 24 African countries and found that agroecological practices achieved yield increases averaging over 100%. In East Africa, a yield increase of 128% was found. The report concluded that agroecology can be more conducive to food security in Africa than chemically-based production systems, and that it is more likely to be sustainable in the long-term.

In India, there are a growing number of agroecology success stories at multiple scales, each of which indicate the potential for agroecological practices to not only sustain or enhance yields, but to provide a great many additional ecological and social benefits.



MICRO-IRRIGATE BEFORE IT IS TOO LATE

Agriculture must be addressed if we are to have water left for our future, and enough dilution capacity to rid our rivers of toxins and pathogens.



ACCORDING TO NASA STUDIES,
MORE WATER IS EXTRACTED FROM
THE NORTHERN INDIA REGION THAN
ANYWHERE ELSE IN THE WORLD. THE
RESULT: A DRY YAMUNA AND DANGER
FOR FUTURE DROUGHTS



Some 90% of the Ganga's and Yamuna's water is being extracted for agriculture, leaving not enough water in many places for sustainable eco-flows to be ensured. All the while, a tremendous drain is being placed on our groundwater tables, which are being pumped away at excessive rates by farmers using subsidized electricity, often to grow water-intensive crops such as paddy.

Unfortunately, current agriculture methods, such as flood irrigation, waste up to half of the water used. As a result of practices such as these, much of Northern India is water-stressed to the point in which severe water crises may be soon forthcoming.

Thus, agriculture must be addressed if we are to have water left for our future, and enough dilution capacity to rid our rivers of toxins and pathogens.

Methods such as drip irrigation, which use far less water, must be explored and subsidized far and wide, so that water can be kept in the Ganga to better ensure its clean and free-flowing state.

Subsidies for free solar pumps and electricity for water pumps must be phased out in order to deter farmers from over-extracting the most precious of resources: water, before it is too late.

FLOATING RIVER & NALA- CLEANING BILLBOARDS



The grass can also be grown on the embankments of rivers to prevent soil erosion through the strength and depth of their 2-3 metre root systems.



An innovative CSR partnership in the Philippines is using an 88.5-foot-long floating billboard made of river-cleaning grass to purify Manila's Pasig River, which is so polluted that it was declared biologically dead.

The grass, called Vetiver, is native to India and sprouts long, tough blades that easily mat together and have powerful cleaning abilities.

The grass traps debris and absorbs nitrates, phosphates, heavy metals, and agricultural chemicals from water.

Vetiver roots grow to a depth of about 2-3 metres, developing into a root system that is massive, can hold soil particles together, and is able to absorb ground water at a great depth. Floatable river-cleaning mats can be made easily by local populations, with little training.

The grass can also be grown on the embankments of rivers to prevent soil erosion through the strength and depth of their root systems.



POWER FROM FLOWERS

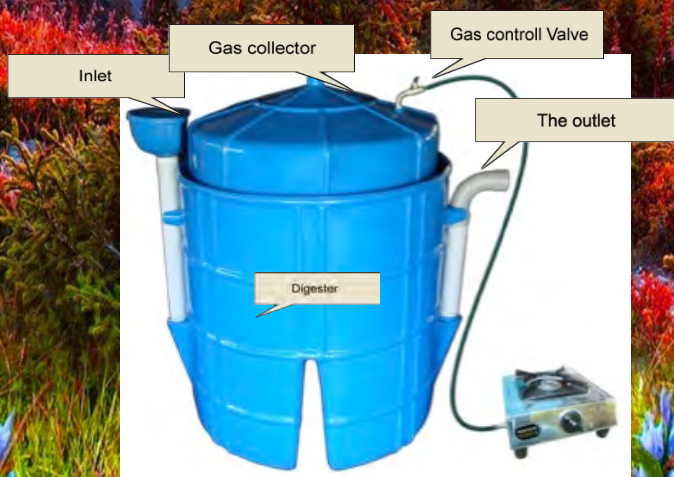
Millions of Tonnes of Flowers Can Become Fuel

In the city of Varanasi, alone, an estimated 3 to 5 tonnes of floral waste are generated in the city every day. This figure touches 6 to 7 tonnes during festive times like the month of Shrawan. Similar is the case with most temple towns and cities that are located near holy rivers. Many of these flowers wind up as pollution within Mother Ganga and Her tributaries.

Now, a simple technology can enable temples and towns to create bio-gas directly from the flowers, cheaply and effectively.

Studies reveal that floral waste comprising both flowers and leaves have higher biogas generation potential than vegetables and fruit waste. Floral waste can yield 1 cub.m of biogas per day from approximately 10 Kg of floral waste and equal amount of organic/floral waste water (10 litres) per day.

In addition, effluent comes out of the biogas unit/plant after the bacteriological digestion of the organic/flower waste, in the form of slurry. This slurry, rich in nutrients find applications as organic manure in kitchen garden, agriculture and horticulture. The manure can be directly sold to farmers as wet slurry in bottles or it can be dried and sold in sachets of organic fertilizer. In terms of quantity, organic slurry of 10 litres comes out per cub.m of biogas. In other words, the waste water added along with the organic waste (floral waste) comes out as slurry. This slurry owing to its rich nutrient value, can fetch even more income than the biogas itself.



Small digesters, like this one, can be used by temples and ashrams to make fuel and fertilizer from flowers



Larger plants, like this one in Kerala, can transform tonnes of flowers into fuel and fertilizer for municipalities and temple cooperatives

IDOL IMMERSION TANKS

To Keep Toxic Paint and Materials out of the Ganga



The current trend of building idol immersion tanks should be propagated across the entirety of the Ganga River Basin by promoting a call to action by religious leaders paired with funding and mandates for municipalities and places of worship to construct tanks alongside the Ganga and Her tributaries.

The importance is crucial, as modern idols are far too often fabricated with toxic paints and other materials. Even when they are not, the natural pollutants that come from immersed idols increase the growth of bacteria and lower BOD, according to studies.

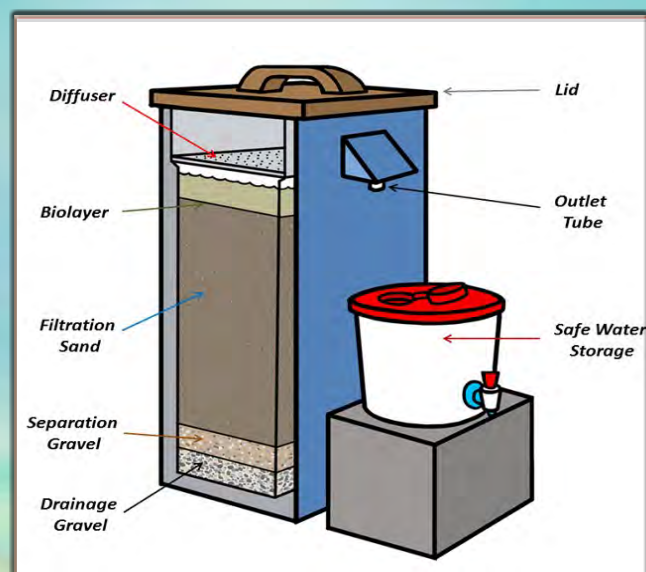
The construction or rehabilitation of temple tanks should also be sponsored for the dual purposes of providing places of idol immersion whilst also giving other benefits, such as rainwater harvesting (see page 28 for more details).



BIO-SAND WATER SYSTEMS

Natural. Safe. Clean. Water for Life.

- In nature, answers are often simple, if we only look for them. Such is the case all-natural Bio-Sand Water Purification Systems, which have proven tremendously effective in making water clean, healthy and drinkable.
- Bio-Sand Systems can be made by local populations, after only days of training, from simple materials such as sand and gravel.
- Bio-Sand Systems have passed exacting scientific testing worldwide.
- Bio-Sand Systems have been approved by the World Health Organisation, and are currently purifying water for the people of 66 nations.
- They have an average life-span of 30 years, requiring very little maintenance
- They are efficient: able to purify over 80 litres of clean water per day
- They save lives: preventing people from becoming sick from diseases including Typhoid, Cholera, Hepatitis A, E-coli, and more.



Learn More at
www.gangaaction.org



RESTORING ANCIENT WAYS

Worship for WASH (Water, Sanitation and Hygiene)



ANCIENT TECHNOLOGIES SUCH AS TEMPLE TANKS COLLECT RAINWATER, RECHARGE GROUNDWATER TABLES AND SIPHON AWAY FLOOD WATERS



A pond and groundwater recharging trench (above) and traditional well (below) provide ancient, working and affordable solutions



The traditions of India are steeped in the conservation of nature, especially of water resources.

In the rush for “modernization,” many villages left behind their traditional methods of groundwater recharging and rainwater harvesting, including open wells, village and temple tanks, and the digging of trenches.

Today, many of those same methods are being re-awakened as technologies that can inexpensively and easily ensure our water is conserved.

In addition, the worship of our water sources, through practices such as Ganga Aartis, helps to promote inner recognition for the sacred importance of conserving and not polluting water.

For this reason, we recommend:

- Helping villages and temples to restore or build new wells and tanks to harvest rainwater and recharge groundwater tables
- Inspiring rural areas to bring back ancient groundwater recharging methods, such as the digging of trenches
- Propagating organic agriculture, cow culture and hut culture
- Working with GAP and the Global Interfaith WASH Alliance to inspire and equip leaders of all faiths to promote water conservation among their followers.
- Honouring pioneers who are bringing traditional practices back by allowing their example to inspire others.

GANGA CULTURE & EDUCATION

Inspiration and Education as an Innovation



The culture of the River Ganga is more ancient than the Vedas, bringing to mind a rich heritage of worship, song, dance, poetry and prose.

Through propagating Ganga Culture through events, museums, performances, worship and more, one can evoke a deep sense of reverence, awe and devotion toward Mother Ganga, which immediately dissuades people from polluting Her sacred waters.

At sunset, for example, Ganga Aarti ceremonies in locations including Varanasi, Allahabad, Haridwar and Rishikesh draw thousands of visitors each year from all cultures, all languages, all religions and all walks of life. After witnessing or participating in a Ganga Aarti, no longer do people wish to use the Ganga's waters as a toilet or trashbin, for the waters have instead become a temple.

In schools, the sacred culture and ecology of the Ganga River can be taught through special curriculum that can instill within children a deep understanding and reverence for our National River, which is the lifeline for 500 million and the lifeline for billions.

THE NATIONAL GANGA RIGHTS ACT



Laws have been enacted since the 19th century to protect natural resources such as Mother Ganga, yet they have largely proven ineffective in stopping actions which could very well threaten the aquifer's future existence. For this reason, the proposed National Ganga River Rights Act has been drafted to specifically remedy gaps left by previous laws. The draft Act also presents modern modalities and a novel legal framework for the remediation and maintenance of this crucial resource.

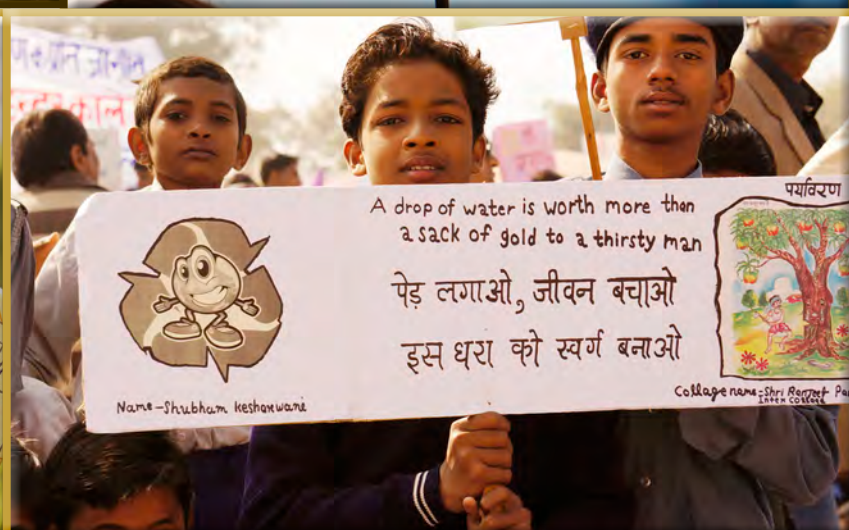
THE PROPOSED NATIONAL GANGA RIVER RIGHTS ACT'S UNIQUE FEATURES INCLUDE:

- A rights-based legal framework for nature;
- Innovative environmental protection mechanisms, including community monitoring
- A dedicated policing system;

- Strong anti-pollution measures combined with the designation of Protective Zones;
- Robust enforcement methodologies, including additional layers of oversight;
- Anti-corruption clauses; and
- Updated penalties, which render repeat violators financially accountable for environmental remediation.

Your decisive support of this crucial legislation could very well pave the way towards ensuring a lasting legacy that could connote the very survival of our National River and the well-being of the approximately 500 million people who depend on it. For this reason, we humbly ask for your commitment to the National Ganga River Rights Act, on behalf of the population, flora and fauna for which Mother Ganga means life itself.

For a copy of a proposed Ganga Rights Act,
email Swamiji@GangaAction.org





GANGA ACTION PARIVAR & GLOBAL INTERFAITH WASH ALLIANCE

Parmarth Niketan Ashram

P.O. Swargashram

Rishikesh, Uttarakhand- 249304, India

Phone: (+91) 135-244-0070, Mobile: (+91) 757-902-9225

Fax: (+91) 135-244-0066

WEBSITES:

www.gangaaction.org

www.washalliance.org

Facebook: www.facebook.com/gangaaction

www.facebook.com/washalliance

swamiji@gangaaction.org, swamiji@parmarth.com

