

# Pathways to Green Cities

Innovative Ideas from Urban India



EARTH DAY NETWORK





# Green Cities

22 April, 2014

Dear Reader:

Today marks the 44th anniversary of Earth Day. Growing out of the first Earth Day (22 April, 1970), our organisation Earth Day Network now works with over 22,000 partners in 192 countries to broaden, diversify and mobilise the environmental movement. More than one billion people participate in Earth Day activities making it the largest civic observance in the world.

The Earth Day theme for Earth Day 2014 and 2015 is 'Green Cities.'

In keeping with the theme, Earth Day Network, India, has put together this e-book that showcases some innovative ideas organisations have adopted to green Indian cities. Many of these are related to waste and water management, others to increasing the green cover, reducing air pollution, the use of renewable energies and more.

We invite you to read about these novel methods. Most of these are replicable in your cities also. We have provided the contact information

for each of the organisations featured so that you may touch base with them to get additional details about the technicalities involved.

We hope you enjoy reading the 24 case studies. Many more have come in, which we will keep for subsequent volumes. In fact, if you know of other case studies, do have them contact us at [greencitiesindia@earthday.org](mailto:greencitiesindia@earthday.org).

Earth Day Network is very grateful to the many organisations that sent in material and to those that helped with editing. We'd also like to thank Wysiwyg Communications that so readily came forward to design the e-book for us as part of their Corporate Social Responsibility programme.

Regards,

Denis Hayes  
Chairperson

Kathleen Rogers  
President

Karuna A Singh  
Country Director, India



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# Where Have All the Parks Gone?

*Centre for  
Contemporary  
Communication*







# Where Have All the Parks Gone?

Grandparents often reminisce about a park they used to stroll in when they were young. ‘Are you sure it wasn’t somewhere else?’ people question as one can see nothing but an urban jungle in what is remembered as a green spot.

Mallika Jalan, the Secretary of the Centre for Contemporary Communication (CCC), and I (Dr Tapati Ghosh, President of the organisation) were not going to let this go without investigation. Where had these verdant spaces disappeared? We knew how important these were for a city. ‘Green spaces serve several important functions. Each is so crucial for the survival of this city. Parks reduce the levels of air pollution, provide eco-system services and offer an opportunity for rich urban bio-diversity to exist. In today’s globalised world, with

families becoming increasingly nuclear and single-child, where elements of nationality, caste, religion and class are increasingly becoming divisive forces, these spaces provide an opportunity for people to meet and interact with one another and share a common physical space irrespective of the divisive forces,’ Mallika emphasised.

Armed with a strong resolve and convinced that the city planners must have allocated more space for parks than the eye could see, we started making rounds of the Municipal Corporation to get the official list of Kolkata’s green spaces. To our utter amazement only some scattered, illegible, incomplete, outdated lists were available.

With nothing to go on, we decided to gather information about known parks of the city from secondary sources—from those who had presented papers on these in the past, from old books, and from references in old media reports, amongst others.

The next step was on-the-ground verification. Volunteers were needed and the NGO Nature Mates stepped in to help. Teams equipped with GPS instruments spanned out to do physical checks. The young volunteers contributed a lot of their time, even though they received only a very modest honorarium.

The survey took two months. A lot of problems cropped up while conducting it. To begin with, sponsors didn’t come forward to fund the research. ‘To Kolkatans it wasn’t an important issue. No one bothered to ask why the designated green spaces were now urban jungles. Anything but the lovely places elders remembered. Perhaps this indifference and acceptance was the *raison d’être* for these bleak spaces continuing to exist’ Mallika thought. As parks were open for three hours in the



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morning and three later in the day, the survey took longer than necessary and was more finance-intensive. Where the green spaces were encroached upon by local clubs or businesses, we initially faced queries as to why and with what authority we were conducting the survey. 'Were we land sharks?' Once the locals understood our altruistic motives, they cooperated. With no roadside indicators announcing the parks, we had to go from clue to clue (often through narrow gullies) to reach the spot that should have been a park.

Horror of horrors, in most cases garbage dumps, junk yards, and *bastis* were found: neither parks nor gardens. The rare jewels found were the green spaces maintained through the personal initiatives of local politicians.

In 2011, CCC published a map with GPS markings that listed the 514 spaces investigated, as well as a first ever Kolkata Parks Directory.

CCC has been working since then to help the citizens of Kolkata realise the tragedy of lost green spaces, as without awakening consciousness of what they have lost, and why it was important to ensure that these spaces were there in their city, not much progress could be made. CCC holds public meetings to focus on the message that the lungs of the city have disappeared and just a few nodules remain. It interacts with local councillors to garner support to restore disappeared spaces. CCC regularly visits schools so that youth also understand the importance of a city's green cover. It works with NGOs and other organisations to synergise efforts to prevent what is left from being bulldozed by further urbanisation. CCC is also working with the Kolkata Municipal Corporation to develop a long-term strategy for Kolkata City Parks.

This is something that had been put on the back burner all these years.

'I have a young son. I have to ensure that there are parks for him to play in and grow up healthy,' is what drives Mallika to fight for the parks of Kolkata.

Dr Tapati Ghosh  
*President, CCC*

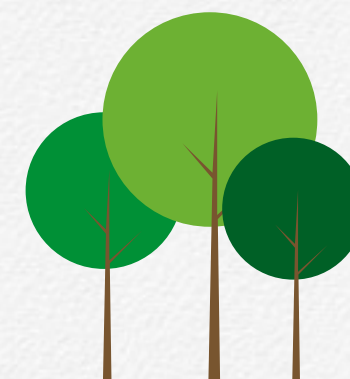
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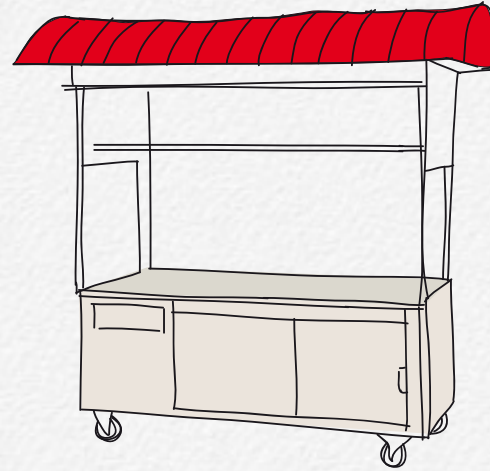


# Sustainable Hawking

*Local Governance  
Network*







# Sustainable Hawking

A familiar sight in all Indian cities is that of a multitude of street vendors or hawkers as they are generally referred to. The hawkers sell almost everything needed for daily living, with products ranging from fresh farm produce, to electronic gadgets.

Many of the hawkers set up shop on a footpath, or in some other public place, where they display their wares on a piece of cloth. This encroaching on spaces meant for pedestrians clogs streets, as hordes of customers stop to make purchases, attracted as they are by the less-than-established shop prices. Traffic snarls often result and a big burden is placed on civic amenities.

Bhubaneswar is one such city that is struggling with the problem of hawkers. It is a state capital that has witnessed rapid economic development. Its rich cultural heritage draws millions of tourists

to visit this 'Temple City'. All these factors combine to make it one of India's fastest growing cities, whose population today stands at one million, a big jump from the 4,000 people at the time of India's independence in 1947.

A natural corollary to more people is a greater demand for goods, resulting in more hawkers!

Realising that one cannot do away with the hawkers who form a major chunk of the informal economy and urban workforce, two unique methods were adopted to alleviate problems resulting from hawking.

First, the Municipal Corporation identified under-utilised spaces and turned these into vending zones. The cost for creating such vending zones was met to a large extent by funds from advertisements and partnerships with the private sector, thus creating a win-win situation. Initially, 40 hawkers were relocated. Today, the number runs in the thousands.

I am with the Local Governance Network, an organisation that works to help improve city management. I advocated an innovative approach to bring about a radical change in energy usage by hawkers. At dusk, hawkers either bring out their kerosene lamps to illuminate their wares, use 100 and 200 Watt incandescent light bulbs, or 40 Watt tube lights. Research studies carried out by our network indicated that, on an average, 1 Kilowatt of energy, or a litre of kerosene or petrol is used per hawker per day. Bhubaneswar has more than 1,00,000 hawkers. Imagine the carbon footprint, the amount of smoke in the air, and the numerous fire hazards!



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Informal dialogues were held with the hawkers to ask that they converted to using other methods of illumination. It took many meetings to convince them that the conversion to Compact Fluorescent Lamp (CFL) bulbs would, in the long run, reduce their spending drastically and the brightly lit space would attract customers.

Some international funding agencies and manufacturers of CFL bulbs were approached to finance a pilot project for one thousand vendors. However, seeing minimal help coming in from them, the Mayor of Bhubaneswar held meetings with the members of the vendors' association to persuade them to voluntarily switch to CFLs, reemphasising the advantages of doing so. After several rounds of discussion, an agreement was reached. Bulk orders for CFLs were placed to help reduce costs. A batch of 20 hawkers took the first plunge. Seeing their success, others soon followed. An immediate advantage (aside from the long term reduction in costs) was more customers, attracted by items that looked so much more appealing in CFL lighting.

By moving hawkers to vending zones, civic amenities improved. Regularised parking spaces replaced random parking. Pollution levels reduced, as did traffic congestion and general cleanliness. Space discrimination amongst hawkers disappeared as there now was uniform space of either 6'6" or 8'8" and not a scramble to grab the best corner. As the vending zones are located in close proximity to residential areas, fresh produce is available easily, thus obliterating the need for refrigeration. On the lifestyle front as well, a walking culture has been inculcated.

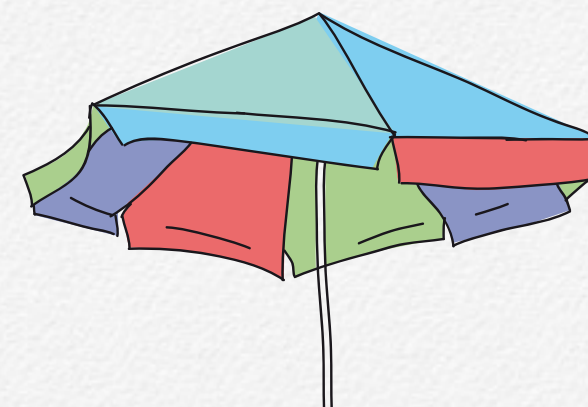
Most importantly, the vendors now have a definite identity.

As for a lowered carbon footprint, now even the poorest of the poor use CFL bulbs, setting an example for other citizens. From 3,500 bulbs in 2008, the numbers jumped to 10,000 in 2011. This collectively saved 689.28 tonnes of CO<sub>2</sub> in 2008, 984.68 tonnes in 2009, and 1406.69 tonnes in 2010.

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# Improving Livelihoods and Localities

*Waste Warriors*







# Improving Livelihoods and Localities

Waste Warriors, an NGO committed to tackling India's garbage problem, has created an urban model that they believe can transform cities across the country.

An example of their work is Anekant Palace, Dehradun. The area was an urban mess with piles of garbage, rotting carcasses of animals, crumbling walls, and rubble. Since many shopkeepers just stepped out to throw their waste, not having any dustbins, the main car park was filled with refuse from the shops. Vehicles were parked randomly, often blocking movement creating a continuous cacophony of car horns. Only 1 out of 42 businesses were getting their waste collected by the Doon Valley Waste Management. Instead, rag pickers would collect the waste generated by businesses, pick out items for recycling and throw the remaining litter into the car park again. Occasionally, someone would

'clean up' the place by burning the garbage, unaware of the dangerous toxins they were releasing. Styrofoam packaging lay strewn in the alleys at the back of the shops. Endless hoardings and sign boards advertising the wares of the shops were placed on every pole and covered the only tree in the locality. The monsoon downpours made the already clogged area even filthier.

Totally fed up with the stench, chaos and disorder around, a local hotel invited Waste Warriors to 'please do something!'

As the founder of Waste Warriors, with many years of experience working with waste management and community clean-up projects, I created a model. Past experience had taught me that people rarely appreciate things unless they are involved in some way. So, the only way to clean the area and ensure it stayed clean, was for all of the businesses to contribute.

Letters of agreement were submitted to 42 businesses. To begin with, there were many challenges, but Waste Warriors saw these as opportunities in disguise. Some businesses insisted they weren't the culprits, so why should they donate. Others shrugged off responsibility saying, 'It is the job of the municipality.' Some were just used to living with the garbage around, 'What was the problem?' they wondered.

Yes, it took persuasion, but in the end, the majority agreed that it was time for change. Donations for the project varied from Rs 100 to Rs 5,000 per month. The work began and the first step was to tackle the garbage that had accumulated over a long period of time. Volunteers, mainly students, helped Waste Warriors to collect all of the waste and put it into bags. Students from the highly esteemed



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Doon School offered their support and helped the NGO to remove dumped construction waste, fill in potholes and dig the soil under the dumping areas to bring it back down to ground level.

Anekant Palace is now clean and a pleasure to walk into. All of the businesses dispose off their waste properly. There is much more awareness regarding cleanliness and the benefits of managing waste efficiently. A Waste Warriors employee cleans the car park each morning, after which he goes door-to-door to collect garbage. He carries two bags: one for recyclable items and another for non-recyclable waste. The non-recyclable waste is disposed off in the nearby waste container. Recyclables are brought back to the Waste Warriors HQ for further segregation and then are sold to a *kabadiwala*. Dustbins have been placed in the car park, posters have been removed, walls puttied, plastered and painted and 45 hanging baskets with beautiful flowers installed. A car park attendant ensures order in this now popular shopping area. 40 of the 42 businesses contribute each month to enable the project to continue.

The NGO did what they said they would do and the businesses respect that. The business owners are happy, their customers are happy and Waste Warriors is obviously delighted to see such a project succeed.

The project has had a positive impact beyond Anekant Palace. Mussoorie Dehradun Development Authority has agreed to fund a 7 km Clean Zone Project working along similar lines. The busy Rajpur Road is to become a poster-free zone with legal action taken against offenders. The stretch is split into 10 zones and each phase has specific dates for the transformation to take place. This is planned with maximum participation from educational institutions and volunteers in those areas. Each area is to be thoroughly cleaned, construction waste removed,

dustbins installed, electric boxes and walls painted, posters cleaned off and wall murals created. If this model is also successful, it will be rolled out across the entire city.

The Anekant Palace model does not require an NGO to carry it out. A few capable individuals, a business, a Rotary Club or other charitable organisation armed with enthusiasm and positivity will be able to do it. Waste Warriors would be happy to provide those interested the know-how and the support they need whatever the size of their project.

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# Ragpickers Turn Entrepreneurs







# Ragpickers Turn Entrepreneurs

South Asian Forum for the Environment (SAFE) runs 'Resolve: Trash to Cash', a project that has empowered ragpickers to turn trash into cash. The effort has been recognised by UNEP in their 'Clean Up the World Campaign.'

Efficient waste management is a major problem in India's urban spaces. The city of Kolkata is no exception. According to estimates, 5,372 metric tonnes of solid waste is generated in Kolkata every day. Waste paper forms 7.4 per cent of the trash. This is increasing by 0.63 per cent per annum.

The overburdened Municipal Corporation services cannot cope with these vast quantities, with the result that waste is often just dumped into open vats. Urban audits indicate that over a half of Kolkata's slum dwellers are settled around these municipal dumps where they eke out a meagre livelihood by scavenging to retrieve items for recycling.

The slum dwellers are engaged in the waste trade as collectors, segregators or suppliers. They wade into garbage heaps to retrieve recyclable items. Their efforts earn them a mere 2–5 per cent as brokerage, as the larger chunk of profits from the activity—crores of rupees—accrue to a handful of powerful traders. What an unstructured and non equitable revenue distribution system. In addition, the ragpickers are exposed to the hazardous diseases they are likely to get exposed to.

To help change this radically unequal and explosively unstable urban world that makes 'citizens of dirt', SAFE created 'Resolve: Trash to Cash' as an entrepreneurial opportunity for the urban poor, in particular, women ragpickers. This waste recycling project is steadily taking shape as a micro-enterprise that develops entrepreneurial skills in slum dwellers. It provides social recognition and empowerment to those who were earlier socially ostracised.

SAFE began by holding workshops in slum areas to explain ways to earn cash from trash. The interactions also provided an opportunity to gauge the interest of the slum dwellers in being a part of the project. Those who volunteered to 'give it a try' were formed into Joint Liability Groups (JLGs) comprising 10 members each. The first project was to make papier mâché gift items out of waste paper. Banks were approached to open accounts for the JLGs—a Herculean task, as most of the JLG members had no documents as identify proof. Thanks to well wishers and sheer perseverance of SAFE officials, UCO bank opened accounts for the JLGs.

Training workshops conducted by master trainers began in earnest. All the JLG members were provided basic information on marketing



strategies, business acumen, finance management and the basics of accounting. The women, for whom it was easier to stay home and work, learnt ways to make gift items out of waste paper. Several corporate sector units volunteered to segregate trash at source so that the waste paper needed could be collected easily. Bins were placed in their offices to facilitate this. Male members of the JLGs were trained in communication skills to foster an ability to speak with confidence when visiting the large and sometimes intimidating office spaces to collect the waste paper. SAFE helped in marketing the finished products at fairs, via social media and to the many corporate houses that purchase these as gifts for distribution. A five-star hotel in Kolkata has just placed an order for eco-friendly papier mâché picture frames.

‘Resolve: Trash to Cash’ is fully owned by the women members who elect representatives and have a say in decision making. Initial funding for the pilot project came from Vodafone Essar Limited, followed by support from the National Bank for Agriculture and Rural Development and the Kolkata Urban Services for the Poor programme of the Government of West Bengal.

There are many positive results from this innovative project, the most important of which is that ‘Resolve: Trash to Cash’ helps to mainstream socially excluded marginal urban poor without displacing them from their trade. Instead, they help organise their efforts into a structured revenue return model through technology transfer and an understanding of finances.

Economic empowerment has come by virtue of an increased income of nearly 35 per cent over previous earnings. This is apart from funds that have been kept aside as working capital. Around 400 persons who participated in this programme directly or indirectly are now covered

by micro finance insurance. Tata-AIG Life’s specially designed policy towards risk enabled this. On the environment side, a positive attitude toward the need to segregate waste at source has developed. This has resulted in reduction in landfill emission footprints and environmental pollution.

The success of the paper waste recycling project has encouraged SAFE to introduce other projects as well. These include recycling of wet garbage into vermin compost that will reduce emissions from landfill and at the same time promote sustainable agriculture. Also, a project that focuses on the reuse of non-biodegradable plastic bottles as mould casts for creating home gardens.

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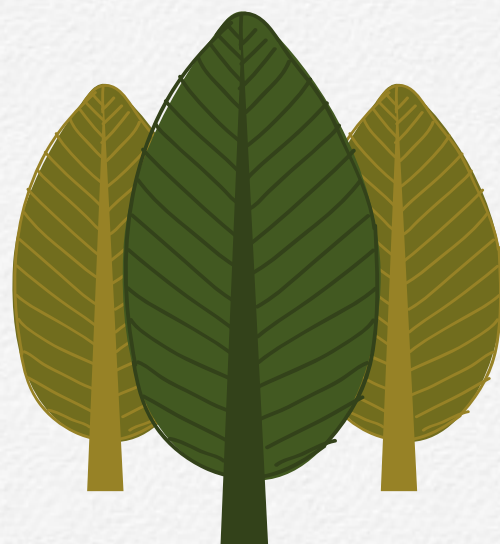




# Urban Forests







# Urban Forests

Our organisation Afforestt Environmental Conservation Services Pvt Ltd creates wild, native, natural, maintenance-free, urban forests at the lowest possible cost, both to the planet and you. Let me tell you why and how we do this.

My team and I believe that the damage done to our forests can be brought back, but only if we act now. It all began when, as an engineer with Toyota, I attended a seminar in Bengaluru by Dr Akira Miyawaki, the world renowned Japanese botanist and Blue Planet Award winner. Dr Miyawaki explained his method of forestry that produces forests 10 times faster and 30 times denser than those grown by conventional plantation methodologies. He asked for volunteers to grow a forest in the Toyota factory area and I enthusiastically became one. I realised that this was what I wanted to continue doing for the rest of my life as well.

And so was born Afforestt, an organisation where we implement the 'Miyawaki Method' to turn urban spaces into forests. Measuring between 100 sq m to about 4,500 sq m, ours are miniature forests. No patch of land is too small for us. Rather than growing lawns and decorative plants and flowers, we urge people to restore a region's natural biodiversity through these mini forests. The densely planted trees help absorb sound and reduce air pollution. There is up to 30 times or more carbon dioxide absorption as compared to conventional forests and 3,000 per cent increase in noise and dust isolation.

Our highly qualified and self-motivated team of professionals comprises environmental engineers, bio-diversity experts and architects. They work passionately on and off-site to provide the best solutions at the lowest possible cost to all those who approach us. We create a completely chemical and fertiliser-free forest that sustains itself and supports local bio-diversity. From planting to the development of a forest takes just three years.

In the first stage, our team surveys the land site and collects samples of soil that are then sent for laboratory tests where different essential parameters such as the pH and Nitrogen-Phosphorous-Potassium levels, electrical conductivity and organic content are measured. The soil survey helps us isolate the biomass (coco peat, crop husk, red soil, or cow dung) best suited to that soil. We next research to identify the native species of trees for the land site and then procure these from local nurseries and government forest departments. The area's top soil needs to be prepared before planting. This phase involves digging up to a depth of approximately 1 m. The biomass materials are then mixed with the soil.



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The plantation pattern follows the *hiejunka* production methodology in which plant saplings of different species are mixed and planted so that same saplings are not planted next to one another. The mixing of saplings guarantees growth of at least 1 m every year in tree height. After the saplings are planted, hay or straw is placed over the plantation area and then watering takes place. The layer of hay protects the soil from direct exposure to sunlight, thereby keeping the soil moist and allowing the sapling to grow its roots faster and stronger.

Plantation time is the most rewarding phase as we try to involve students from schools, local children, elderly people, and company staff to rekindle in these urban residents, a love for nature. Maintaining the plantations involves training on site supervisors about watering and weeding time tables. Of course, we are always available to help monitor the growth.

Our mission doesn't stop at just growing mini forests. We aim to create a new industry sector that can be initiated by anyone with minimal investment. We are happy to share our techniques with those interested so that there is greater green cover built and Earth benefits.

Our clients in India are environment-conscious groups such as Amicorp, and GMR as well as single units and small businesses such as Samsonite, Dr Reddy's, Adugodi Police Station, Deshpande Foundation, and BVB College of Engineering and Technology in Hubli. Our international clients are DeinRegal and Massiv Konzept in Germany.

Afforestt plans to plant more than 50,000 trees in various areas in Bengaluru, focusing mainly on schools and institutions. We believe that Earth has not been irrevocably damaged and that the countless forests

that we have lost over the years are not gone forever. We believe we can bring our forests back and we do this by creating them. We believe that we are at a stage when we cannot afford to just talk about saving the planet, but actually do so.

Shubhendu Sharma  
*Founder*

**Afforestt Environmental Conservation Services Pvt Ltd**

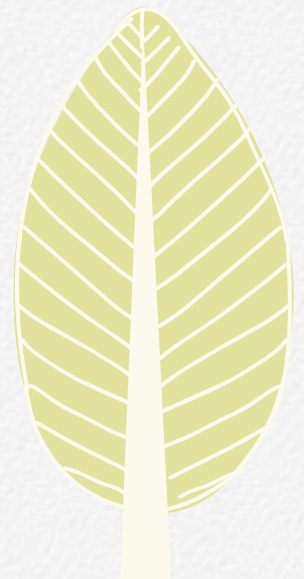
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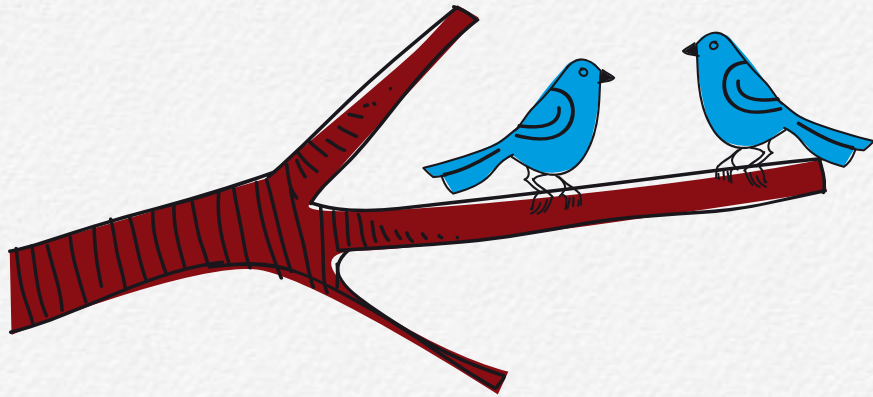


# The People's Lake

***Puttenahalli  
Neighbourhood Lake  
Improvement Trust***







# The People's Lake

Located on the Deccan Plateau at an elevation of about 3,000 ft, Bengaluru was once famous as the 'City of Thousand Lakes'. The city's water source is the nearly 1,000 mm rainfall it receives annually. To prevent the rain water running off the slopes and to save this precious resource for the dry summer months as well, the founder of Bengaluru, Kempe Gowda I of the Vijayanagara Dynasty, had the foresight to have bunds constructed on the natural valley system and lakes (called *tanks*) dug in the region. In the 1800s, Major Sankey, the Chief Engineer of Mysore, interconnected these tanks into a cascading system of storm water drains called *Rajakaluve*. Overflow from one tank filled the next and thus prevented flooding during the monsoons.

In 1981, an expert committee found that just 81 of the 937 tanks recorded in the files of the Revenue Department of the Bruhat Bengaluru Mahanagara Palike (BBMP) were in existence. In other words, 856 tanks were 'not alive'.

The state government has made several attempts to revive some of the dying lakes but without anyone to monitor or maintain them the lakes soon lapse back into a dry state.

The Puttenahalli Lake in our neighbourhood was also on the brink of extinction. We realised that the civic administration alone couldn't be held responsible for looking after Common Pool Resources. With this in mind, four of us began a campaign in 2008 to save the lake. Our first victory was getting the civic administration to agree to rejuvenate the dying water body. However, that was not enough. Continued supervision would be needed to ensure that the fencing was not breached, materials not stolen and workers didn't do a shoddy job. To oversee all this, the Puttenahalli Neighbourhood Lake Improvement Trust (PNLIT) was formed in 2010 as a registered, not for profit, public trust.

We recognised the need to encourage those living in the neighbourhood of the lake to take an active role in the project. Celebrating Earth Day 2010 gave us the ideal platform to awaken interest. The problem was explained and many residents came forward to volunteer services and pledge funds.

Ensuring public participation at every level has helped keep land grabbers at bay as all realised that the well-being of the lake benefits each of us. We keep the residents well informed at every stage of the rejuvenation plans with the result that people respond readily to our appeal for funds needed to hire security guards, gardeners, sweepers and to buy saplings and gardening tools. The momentum of interest is kept going with activities such as bird watching, nature walks, birthday outings at the lake, *shramdan* (community labour), etc. We also invite photographers, ornithologists, horticulturists and other experts to visit the lake and give us advice.



PNLIT has built up an excellent rapport with BBMP. While we ensure that the government body is kept informed of all our efforts, they in turn take our advice on matters that concern Puttenahalli Lake. This was evident when on completion of phase 1 of the lake's rejuvenation in May 2011, BBMP invited PNLIT to sign a Memorandum of Understanding and formally take over the lake's maintenance for an initial period of three years. Thus, PNLIT became the first citizen custodians of a lake in Bengaluru.

Puttenahalli Lake is now a 'saved' lake. It is recharging the water table and is home to several bird species. Those living in the vicinity use the surroundings for walking and jogging. This marshy dumping ground that was filled with debris and trash just five years ago now teems with aquatic and avian life.

Our task is not finished, however. Continuous maintenance of the lake is essential. It poses challenges and surprises every day, compelling us to come up with out-of-the-box solutions to problems such as, 'What do we do about the immersion of idols during Hindu festivals?' With the disappearance of the traditional *Rajakaluves*, we need to find new sources of water and ensure that even in a year of poor monsoon, the lake doesn't dry up and threaten the wide range of bio diversity it now supports. Toward this end, one of our recent successes has been to get BBMP to divert surface run off from an adjacent avenue road into the lake. Rather than rely on erratic rainfall patterns, we are exploring filling the lake with treated water from the sewage treatment plants of two apartment complexes in the vicinity. Subsequently, we will consider installing aerators to increase the level of dissolved oxygen in the water. Keeping the lake clean is another problem. While volunteers from the neighbourhood are capable of cleaning the periphery of the lake, skilled workers are required to remove the excessive growths of invasive weeds such as *Salvinia Molesta* or *Alternanthera philoxeroides*. We are contacting local fishermen for this.

Our biggest challenge, however, continues to be the illegal encroachers who occupy over an acre of the lake bund. Some of them have resided here for years. Initially, we did face some opposition from them to our efforts to rejuvenate the lake. But slowly and steadily we won them over. Today, they help in tree planting, while we run a successful 'Classes at the Lake' programme for their children. However, as our priority is to safeguard the lake, we have been petitioning the government to resettle the encroachers elsewhere. It is likely that our efforts will finally pay off and 118 families will be provided housing in another area of the city.

PNLIT is the recipient of many awards. These boost our morale and affirm the faith placed in us by well-wishers and donors. The wide media publicity we have received has restrained builders waiting to grab land and others from interfering in our work. We encourage resident welfare groups and individuals across the city to consider replicating our work and readily share our experience and our Trust Deed with them. As of now, some 35 resident welfare groups are engaged in similar lake restoration in the city.

*As shared by a resident*

### **Puttenahalli Neighbourhood Lake Improvement Trust**

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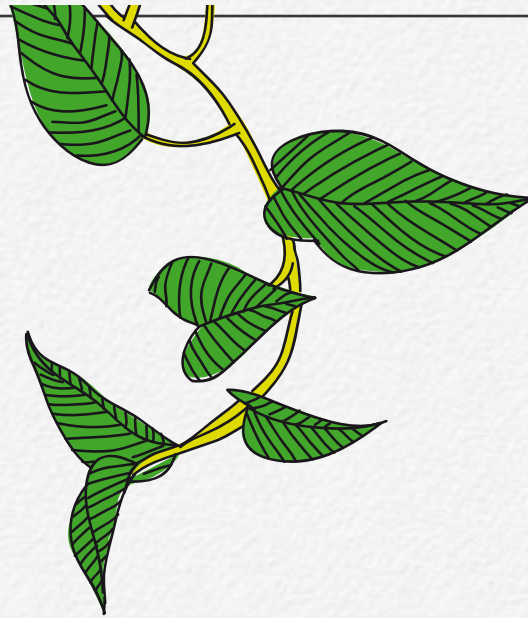




# We Grow Fresh Air







# We Grow Fresh Air

All humans take 23,000 breaths in a day, on average. With every breath we run the risk of inhaling dangerous chemicals that pollute the air and cause health hazards and in some instances even death.

It is assumed that outdoor air is more polluted but the fact is that indoor air is often 10 times more polluted than ambient air. Surprised? Startled? Shocked? Facts are facts. The Global Burden of Diseases Report places indoor pollution as the second largest cause of deaths in India—over a million deaths a year according to the World Health Organization. The Energy and Resources Institute findings show that 27.5 per cent of mortality in infants under the age of five is caused by indoor air pollution.

Indoor air pollution is a silent killer owing to the combustion of solid fuels. Homes and offices harbour gaseous and particulate

air pollutants that get trapped in various objects. Pollutants also enter buildings via paints, carpets, furniture and other objects brought in. Others are found in items placed in storage facilities. Chemicals and allergens accumulate in the dust. Amongst the common air pollutants, the major culprits are Volatile Organic Compounds (VOCs), Particulate Matter (PM 10 & 2.5), Nitrogen Oxides (NO<sub>2</sub>), Carbon Monoxide (CO), Ozone (O<sub>3</sub>) and Sulphur Dioxide (SO<sub>2</sub>).

Poor Indoor Air Quality (IAQ) can cause workers, occupants and even those visiting the building to experience a range of non-specific symptoms collectively known as the 'Sick Building Syndrome'. These include headache, fatigue, nausea, eye, nose or throat irritation and shortness of breath. Pollutants can also lead to lung impairment and several other diseases.

Paharpur Business Centre (PBC) uses green technology to purify indoor air. The story began 21 years ago. Our CEO, Mr Kamal Meattle's lung capacity had dropped drastically to 70 per cent, killing him slowly. Doctors diagnosed this to be a result of Mr Meattle's allergy to Delhi's air. Realising the intensity of the adverse effects that air pollution was causing, Mr Meattle decided to create his own 'healthy haven' of mountain-fresh air, not in the open but indoors.

Thus was PBC born and established as a business model with a USP to care for the occupant's health and comfort in a building environment. PBC's well-equipped business division, 'Breathe Easy<sup>TM</sup>' monitors and maintains Indoor Air Quality (IAQ) for facilities in conformity with the American Society for Heating Refrigerating and Engineering



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and World Health Organization guidelines for enhanced working environment.

While PBC uses several green strategies to improve air quality, the most unique is the use of 'Phytoremediation'—the use of plants to improve IAQ. Three common and easy-to-maintain plants have been identified to turn indoor air rich in oxygen and devoid of toxins. These are the Areca Palm, Money Plant and Mother-in-Law's Tongue. Areca Palm and Money Plant produce oxygen during the day while Mother-in-Law's Tongue produces oxygen at night. By keeping all three, we ensure a constant supply of oxygen in the air. The plants are grown hydroponically, making them 10 times more efficient as the hydroponic system re-circulates water and nutrients within its system for 10–15 consecutive days, thus diminishing the chances of the plants developing rotten roots and getting affected by dust, molds, allergens and soil-borne diseases.

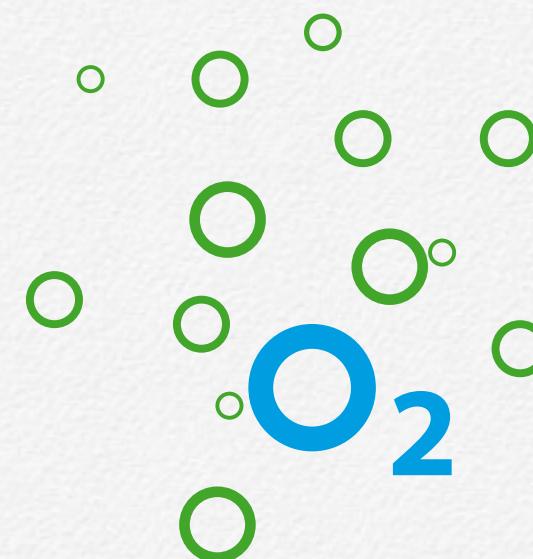
The plants have helped PBC lower instances of eye irritation by 52 per cent, respiratory symptoms by 34 per cent, headaches by 12 per cent, lung impairment by 24 per cent and asthma by 9 per cent amongst regular inhabitants of the building. There is a 15–20 per cent enhancement in productivity level too as a result of good health and fewer sick days.

PBC has also helped to better the ambient air around our office environment by planting over 2,000 trees in a part of Nehru Place which was earlier a slum area. These trees have not only greened the area but have also reduced the CO<sub>2</sub> levels in the neighbourhood.

The PBC office today is recognised as a unique building in Delhi with 'mountain fresh ambience'. It is the first retrofit office building in India with US Green Business Council's LEED Platinum Certification for Existing Buildings. It is also a BEE 5-star rated building.

Barun Aggarwal  
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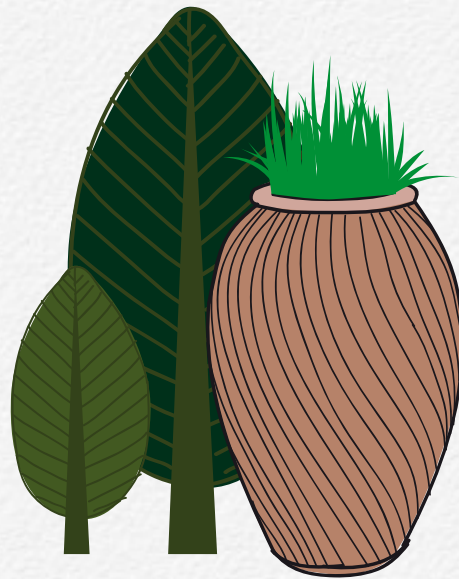




# Green Scraps







# Green Scraps

In 2006, Poonam Bir Kasturi, a National Institute of Design graduate, founded Daily Dump as a for-profit social enterprise in Bengaluru. Daily Dump was designed as a business with three critical aspects: it would promote waste management generally rather than its own products; it would provide education in addition to tools; and it would offer a 'clone' model that allows like-minded parties to duplicate the business.

Daily Dump offers composting and recycling products and services actionable on an individual level. Daily Dump's bottom-up approach to the solution complements the centralised top-down approaches to waste management by municipal authorities.

Today, over 15,000 active customers keep 12,000 kg of waste away from landfills every day. Twenty-one clones in the city of Bengaluru and 16 clones across different cities in India have been established.

The prosperity of India's great cities has increased the personal wealth of many citizens, leading to greater spending, consumption and—invariably—trash. The World Bank's estimates put the figure at 150 million tonnes of waste per year by 2025.

Acting on this waste at the source by composting reduces downstream waste handling needs. It also makes the upstream journey more efficient by enabling easier reclamation of recyclable materials. Municipal agencies responsible for waste management face the problems of incomplete garbage collection, open lorries that leak garbage, paucity of dump sites and other operational inefficiencies. They have also not been able to scale up their facilities for the growth in waste generated.

Numerous waste management projects at every scale from the national to the neighborhood have been attempted but problems persist. This is the context that Daily Dump chose to accept as a basic fact of their work: something to be designed into a solution.

Daily Dump was born out of recognition that Bengaluru was a messier city for all of its growth and that the municipality and various NGOs attempting to fix the situation were stumbling. Due to evident corruption and bureaucratic sluggishness, efforts to enhance the centralised waste infrastructure were deemed by Poonam as an important long-term effort, but one in need of a more immediate counterpart. In her own words, 'There is a limit to how much big, centralised systems can help. There's a



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little bit you have to do and a little bit the community has to do and a little bit the large systems have to do but it can't be that everything is done by the large systems. Actually, you can make a big difference.'

With municipal services faltering, Poonam's focus turned to attitudes and practices. Daily Dump was established as a for-profit social enterprise in order to give the organisation a high degree of flexibility in pursuing their goal of improving urban waste management in India. Free from any obligation to donors, the organisation is able to change tack quickly to act on opportunities as they emerge. Using the market as a persistent reality check, the growth of the Daily Dump comes at a relatively slow pace but is fundamentally durable and road tested.

Acting on the opportunity provided by the high organic content of Indian household waste, Daily Dump chose composting as its first inroad to changing attitudes and practices relating to waste. Using design ethnography, materials research and prototyping, Daily Dump set out to specify their first offering, the Kambha composting pot.

Poonam was no compost expert when she began Daily Dump. She used a learning-by-doing approach to explore different methods of composting in her own home, enabling her to evaluate possible productisation options while learning the process. As an act of unilateral choice that can be made within an individual household, at-home composting became a clear forerunner for the first Daily Dump product.

Through in-home interviews with housewives who were identified as the typical household champions of composting, Daily Dump was able to identify 'make or break' issues for the product's success such as

concerns about cleanliness and ease of use. These interviews led to the development of accessories such as an apron and educational material that clearly explained the process. Daily Dump also regularly follows up with new customers two weeks after they receive their composting pots to help troubleshoot any problems. These conversations form a feedback loop that was used to tweak the product offerings during the first years of the business. Sourcing the main composting products from a rural village in shipments of approximately 20, allows Daily Dump to enjoy a rapid product innovation cycle.

Originally Daily Dump explored the possibility of designing a Nature Mill composter for the Indian Market. However, its reliance on electricity makes the Nature Mill a poor choice for locations with an unstable power grid and does not fit comfortably into the scenery of the typical Indian home.

The designs and idea of the composting pot could have been patented to lock the commercial value for the organisation but Poonam chose to keep it open source, i.e. to allow other players to venture into it. In this way they create small entrepreneurship and allow them to take this idea forward across geographies. Daily Dump helps its clones in setting up the business, locating the suppliers and gives technical assistance related to composting. Clones can copy the business model, use the promotional material and replicate the core product. This is different from being a franchisee as Daily Dump clones are completely free to establish their own for-profit business under their own name with no dues or fees. They may set their own prices and even alter the products as they see fit. They always have an option to buy ready-made products from Daily



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Dump at a wholesale price. Realising the magnitude of the problem, they think that there is so much space for everyone to contribute that having competition is not an issue.

As the acceptability of terracotta products went up, Daily Dump came up with new products, some of which are: Manthan-modular composting unit designed for 12–300 families that can be used in apartment complexes, restaurants, hotels, offices, and schools as well as Store and Compost-Leave-it-pots. The Harm-Less Home range of products include a 100 per cent organic, natural, and non-toxic alternative to cleaning products, a collection of illustrated books, posters and online videos with a special focus on children, miniature sets for kids, aprons, rakes, spoons and spatulas. Also, Trash Trail—a day tour travelling with the waste including visiting a landfill and meeting people who handle waste, aims to sensitise people about waste management.

Itika Gupta

*Core-team Member*

### **Daily Dump**

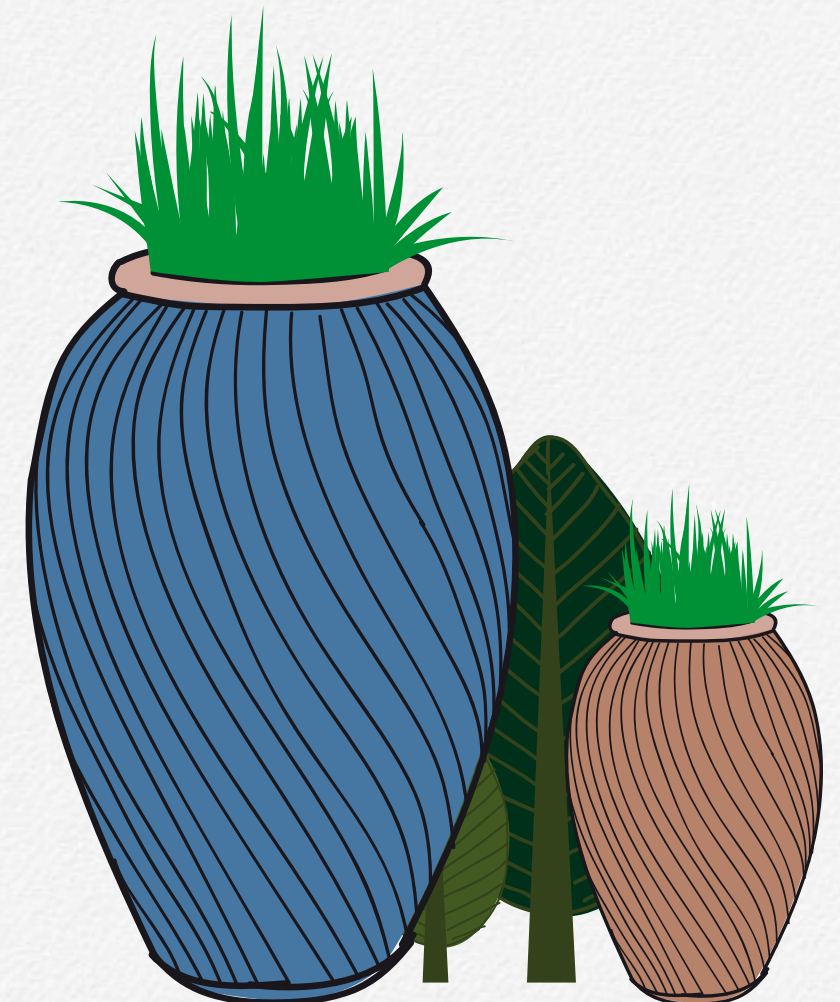
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# Rooftop Farms







# Rooftop Farms

Our organisation Urban Leaves dreams of creating green rooftops and urban food farms all over Mumbai so that fresh, local, seasonal food is available to the city's residents. Added benefits we envision include the return of avian and other species to the city and the opening up of new avenues of healthy activity for city dwellers.

Urban Leaves began with Preeti, who is a catering officer with the Mumbai Port Trust. Preeti began exploring eco-friendly ways to manage the food waste that was generated and trucked away from the canteen. In 2001, Dr RT Doshi's terrace city farm inspired her to take the first steps to change the perceptions of leftover food from being just waste to being a resource. The teachings of Mr Dipak Suchde and of Prof Sripad A Dabholkar who founded Natureco Farming showed Preeti the way.

The 3,000 sq ft terrace above the kitchen where she worked provided Preeti the first space. Using a combination of *Amrut Mitti* (a nutrient rich fertile soil) and pulverised kitchen waste, the farm set-up produced an abundance of vegetable plants, fruit trees and herbs. None of those who worked on the project (Preeti included) were trained in horticultural techniques, leave alone something as complicated as converting a rooftop into a farm. Despite this, there was success. Urban farming enthusiasts and others soon flocked to witness this marvel. Many expressed interest in learning ways to replicate the model in their own spaces.

Urban Leaves is a volunteer-driven movement. As Preeti began to formulate her ideas to reach out to a large cross-section of people, friends came forward to help. Sabrina suggested the name Urban Leaves. Devi, who had just relocated from the US where she was a part of the urban food and sustainable agriculture movement, volunteered her services. Jyoti, an avid home gardener, was a ready role model. With collective vision, diverse talents and a commitment to urban farming, we were ready to launch our own city farming volunteer group. Uday, Preeti's long-standing friend and Vedanta teacher, encouraged and supported us at each step. Thus in April 2009 Urban Leaves was born under the aegis of the Vidya Vaaridhi Trust.

Mr Avinash Kubal, Deputy Director of Maharashtra Nature Park, realised the potential of a community farm and offered the group a space of about 400 sq ft on a water tank within the park. This became Urban Leaves' first community farm. Like-minded people met here every week to enjoy a few hours of gardening. Encouraged by their wonderful achievement,



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Mr Kubal allocated Urban Leaves additional space on a larger water tank.

The initial weeks were spent in building up *Amrut Mitti*. Workshops were held on weekends to allow for maximum attendance. Many volunteers started composting their kitchen waste and used this to develop gardens at home. A few schools also did the same.

Urban Leaves also runs what we refer to as 'Seva Cafes'. Here, produce from the community farm is cooked by practitioners of naturopathy. Urban growers truly 'reap what they sow' and eat what they grow. Depending upon the season and the vegetables planted in our demo community farm we harvest about 3–4 kg of produce per week. Meals based on this concept are served at all our events.

Urban Leaves has faced many challenges. Time was a big problem as Mumbai's hectic lifestyle and long commutes left very little time for leisure activities. To run a community food garden without seed money and limited funds collected as fees from sessions as well as donations, was indeed a brave step. *Amrut Mitti*, our chosen method of soil creation, is a time-consuming process. Gathering the raw material to produce *Amrut Mitti* (cow dung, cow urine and sufficient biomass) was also a challenge in a city where cows are found in limited numbers. Volunteer attrition was high, despite levels of interest. Mid-week or daily care for the farm(s) was, and continues to be, a challenge. Volunteers struggle to convince their families and communities to start small gardens in their apartments as some people are skeptical about the efficacy of the method, while others are afraid the gardens might

damage the roof. Mumbai being an island city, land is a scarce resource. Most homes are tiny with no terraces or balconies for plants. Even the buildings have minimal or no open land around them.

Today, four years later, Urban Leaves continues to move ahead, despite the challenges. Sometime, the move is not as fast as our enthusiasm demands. We have added four more community urban farms in Mumbai. Our workshops and events have introduced over 1,000 persons to urban farming and *Amrut Mitti*. Several national and international seminars have been conducted. Special workshops are held for students and organised for the corporate sector. The latter includes an Earth Day plantation drive for Lloyd's Register and kitchen gardening workshops for Tata Consultancy Service's Maitree Ecology Club.

Do take a look at our 11-minute video on YouTube. It summarises our work and philosophy. Also, our 'Guide To Set Up a Natureco City Farm' can be downloaded from our website.

*Team Urban Leaves*

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# Environmental Stewards





# Environmental Stewards



Technology Informatics Design Endeavour (TIDE) is a non-profit organisation working to address developmental concerns of needy communities through technological interventions.

India's CO<sub>2</sub> emissions have increased from 1.25 billion tonnes in 1994 to 1.9 billion tonnes in 2007. The energy sector accounts for around 60 per cent of these emissions with a majority coming from electricity supply. Located in what is termed the 'Silicon Valley of India,' Bengaluru is a city that guzzles power. The huge demand-supply gap is estimated to be over 7 MU (Million Units). Diesel generators that spew emissions are commonly used when power outages take place. Another problem is the waste management. It is a mini crisis that explodes quite often and yet, there is no comprehensive solution in place.

To help deal with these problems, TIDE, with support from the Bengaluru Chapter of Social Venture Partners, an international philanthropic forum to tackle social challenges, launched 'Creating Livelihoods through Environmental Stewardship.' This unique city-wide pilot initiative aims at tapping into the city's growing corporate sector and apartment culture. It builds skills and develops livelihoods for needy youth, women and the unemployed, by training them to be 'Environmental Stewards.'

The stewards are trained by experts to carry out walk-through energy and waste assessments for corporate offices and large residential areas.

The walk-through assessments are designed to capture existing patterns and practices in energy consumption and waste management within the organisation. The historical behaviour is analysed and recommendations are made towards energy conservation and waste management.

Typically, the recommendations provided are directed towards changing behaviour and simple house-keeping practices that do not need major investments. A follow-through assessment is conducted to check the actual impact of the recommendations. The entire process including the walk-through study and follow-through assessment is done for a small fee, calculated on the basis of the company's electricity bill.

The fee collected is given as income to the stewards.

TIDE partnered with experts and created templates that included data collected from power bills and information on connected load details. Its team visually checked utilities and recorded employee behaviour with respect to the usage of elevators, computers and lights.



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The studies have consistently shown the possibility of a minimum savings of about 2 per cent, based on the data captured through templates.

Identifying, training and retaining stewards are challenges, especially considering their socio-economic background. To some extent, the strong pre-selection assessments, soft skill and technical training programmes and regular monitoring modules reduce this.

TIDE intentionally over-trains, as they assume that there will be attrition. To help the career growth of stewards, TIDE provides them additional training to upgrade their skills. To ensure regular income for the stewards, TIDE has introduced down-stream and up-stream livelihood options. Training of stewards in marketing of energy efficient products is one example of this.

With this project, TIDE has successfully created an entry level energy assessment that can provide the baseline for a comprehensive energy audit. In addition, 12 studies conducted primarily at offices in Bengaluru have shown an annual savings potential of close to 67,000 Kilowatts—equivalent to Rs 1,830,784. This translates to about 54 MTs of annual CO2 emission savings! In each of the premises studied, annual savings ranging from 2—14 per cent were identified with nil or minimal investments. The project has provided livelihood to around 18 youth with a minimum potential monthly income of Rs 4, 000 with flexible and part time work opportunities. This is also a skill development increasing their

employability in future. The project has mainstreamed youth into the process of climate change mitigation.

Aviva Alvares

*Project Intern, Sumathy Krishnan, Project Manager*

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# Backseat Buddies

*Earth Day Network*







# Backseat Buddies

‘Have you ever been in a traffic jam?’ ‘Strange question!’ you are likely to remark, as traffic jams are the norm in most metro cities. All of us have faced the sheer frustration of being stuck in traffic with engines idling, surrounded by noxious fumes, ears blasted by constant honking, straining our eyes to spy a spot through which to manoeuvre through the congestion. A true picture of urban life!

In Kolkata, around 65 per cent of the arterial roads are choked by bumper-to-bumper traffic, often limiting travel speeds to as low as 20 km/hr. It is no wonder that automobile emissions are said to be the major contributors to Kolkata's air pollution.

Outside many Kolkata schools traffic jams are a regular feature. Children subjected to these might wish for a magic carpet to whisk them through the chaos but sadly, that only happens in dreams.

In 2012, Earth Day Network launched ‘Backseat Buddies’—a fun-filled-student-centric campaign to encourage car-sharing as a way to ease traffic problems. If students could be motivated to want to car-share, they would persuade their parents to ‘let me go in the same car as my friends from the building’ or ‘let’s pick up my friends on the way to school.’

The advertising agency Ogilvy & Mather, Kolkata, generously designed the campaign and did all the art work pro bono. Their very creative team developed a Backseat Buddies Public Service Announcement film, a logo, stickers, badges and posters using characters kids relate to. Harry Potter was seen on the broomstick with Hermione and Professor Dumbledore, while Batman invited Spider-Man and Superman to share his Batmobile. Scooby-Doo had other friends riding the Mystery Machine.

As kids love music, a foot-tapping song was created by Neel Adhikari, a well-known singer and composer who generously came forward to write the lyrics and have students record the song. The chorus goes ‘Backseat Buddies, make a greener town, Backseat Buddies, we can turn it around.’ You can hear the whole song on YouTube.

Armed with these attention-grabbing items, the Earth Day Network team started visiting schools. All the principals welcomed the idea and provided support for the Backseat Buddies campaign in their schools. ‘I have 2,000 students, and 2,000 cars come to drop them every morning,’ one of the principals remarked.



Students displayed great enthusiasm. A competition was announced to see which school best implemented 'Backseat Buddies'. Teams of five students per school were designated to lead the campaign as Backseat Buddies ambassadors. Many screened the Backseat Buddies film at morning assembly. Everyone learnt the Backseat Buddies song. Backseat Buddies stickers were pasted on vehicles that agreed to be part of the campaign. The Ambassadors developed novel ways to get the message across. Colourful posters, skits, songs, poems etc. were prepared for the finals of the Backseat Buddies competition.

Twelve schools made it to the finals. There was palpable excitement in the packed auditorium. Oriental Seminary School carried home the trophy; however no school went home empty handed. Each school was awarded in some category or the other—best cheer leaders, best posters, best song. The Special Commissioner of Police, Soumen Mitra, IPS was the Chief Guest. In his speech, he acknowledged Backseat Buddies as a novel and effective concept and promised support to take the campaign even further.

In this first phase of Backseat Buddies, the campaign reached 70,000 students in 33 schools; 7,000 played an active role in implementing Backseat Buddies. Earth Day Network will take the campaign to other cities as well. More Backseat Buddies will make for a less polluted world where our precious natural resources are judiciously used and pollution reduced.

Debapriya Dutt  
*Manager, Outreach*

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# Traditions Sustain Modern Cities







# Traditions Sustain Modern Cities

Rainwater harvesting, a buzz word today, has been prevalent in India since ancient times. The *tanka*, a subterranean water tank, formed the basis of a traditional rain water harvesting system.

During the monsoon season, rainwater was collected on terraces and channeled into a copper pipe that carried it down to an open chamber or *tanka* below the central courtyard. The water from the first few showers was allowed to flow out, keeping in mind that it might contain some impurities and also, as a way to clean the pipes. This outlet was then plugged and water from the next showers directed straight to the *tanka*. Astrology was used to predict the right time to do this—based on predictions of times when bacteria and microbes grew the least.

The catchment during the monsoon provided a household adequate water to see them through till the next monsoon rains came to refill

the *tanka* and so, water was not a problem even in Ahmedabad, a major city that is located in a semi-arid zone.

Most of the *tankas* below the houses in the walled city (or historic area) of Ahmedabad are lying sealed today. Their closure was ordered years ago by the then British rulers as they were unsure about monitoring the quality of water stored in *tankas*. Also, they feared the *tankas* might be used as hideouts by freedom fighters.

With growing water problems, the Ahmedabad Municipal Corporation (AMC) considered reviving this novel water storage system, one that uses ancient wisdom about hydrology, and rainfall patterns and where water quality surprisingly conforms to international standards. The first task was to identify, open up, and clean a few of the *tankas*. Before beginning the cleaning work, the AMC circulated a form for citizens to fill out. This helped garner their interest as the AMC was keen that there was public participation in the exercise. On the basis of responses, 10 tanks were selected. Keeping in mind that the *tankas* had been lying closed for so many years, an assessment of the risk factor involved was needed. A team of four skilled personnel was formed and equipped to carry out the task. Exhaust fans were used to remove any foul gases and to enhance the ventilation inside the *tanka* while cleaning work went on. After opening the *tankas*, eight of them were found to contain water up to depths of 8–9 ft. A submersible pump was pressed into service for removal of the stagnant water. All the silt deposited in the bottom was removed and the internal surfaces cleaned.

AMC also began research and documentation. One of the most interesting aspects of the research was laboratory testing of the water that was lying locked in these *tankas* for decades. To everyone's



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surprise, the water was found to be drinkable. The factors which contribute to achieving these exceptional results are: rain water is directly collected, minimising chances of pollution, the lack of light in the perpetually dark interior of *tankas* hinders the growth of chlorophyll containing algae and other microbes and bacterial growth is restricted by the presence of lime which is used in the construction of the *tanka*. After the monsoons, the addition of lime changes the pH factor of the water making it more alkaline (many bacteria cannot endure alkaline conditions).

The entire operation generated immense interest in the community. Many ventured down the less than 2 ft wide shaft into the dark *tanka*. The youth in particular were keen to learn about the construction and working of the *tanka* system. They had never seen an operational *tanka*. The owners of homes got completely involved with the process. In one of the houses the lid was missing. The owner made special efforts to find the traditional copper lid and was delighted that he didn't have to use a 'modern' concrete one.

Reviving the *tankas*, triggered an effort to preserve other traditions as well. Many owners of houses where the *tankas* were revived are now looking to conserve other traditions as well. They welcome people to come and visit.

Measure drawings were made of two houses in Dhobi-ni-Pole. The plans and water holding capacity of the *tankas* of the other eight houses were documented.

So that the traditional system of *tankas* has wide acceptance, data based on scientific tests and theoretical explanation of the processes are being disseminated widely.

AMC plans to further the positive atmosphere for rainwater harvesting. There are about 10,000 dormant *tankas* in the walled city of Ahmedabad. Their revival is high on the AMC agenda. Going by a conservative estimate of 25,000 litres of water per *tanka*, there is potential to harness 25,00,00,000 litres per year in the walled city. And the walled city is just a fraction of Ahmedabad! AMC also plans to make it mandatory for any new construction to include a *tanka*. From the health point of view as well, hygienic water, free of chemical pollutants and undesirable salts, will be a boon.

This versatile rainwater harvesting system that provides adequate and safe water and reduces flooding on streets can easily be adapted by other cities as well. A little more research into related issues such as how the use of lime controls the development of microbes, the effect of darkness in controlling bacteria and devising better methods of filtration can make the *tanka* even more efficient.

(This project was coordinated by Debashish Nayak as an advisor to the Heritage Cell, Ahmedabad Municipal Corporation)

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# Catch the Rain







# Catch the Rain

Rain is a predominant source of fresh water on this planet. In India, it is the monsoon season when rain falls. This precious natural resource can either be trapped on the surface or allowed to soak in and swell the groundwater table. Rain Water Harvesting (RWH) is the science of collecting rainwater when and where it falls. We need to make sincere attempts to harvest every drop of monsoon rainwater for immediate use or to recharge aquifers so that water is available in non-monsoon months as well.

Many places in India suffer during the non-monsoon months. Chennai, located on India's eastern coast is one such victim. Taps run dry. Fights over water use are not unknown.

While working with the Centre for Policy Studies, I had the opportunity to visit rural areas and learn about traditional water harvesting systems. In 1995, I initiated a door-to-door campaign in Chennai city

to create awareness among the residents about the importance of rain water harvesting. People thought I was crazy. Even educated people didn't understand that groundwater is essentially rainwater that has percolated into the ground.

Together with other like-minded individuals, concerned about the vital issue of freshwater availability in general and sustenance of its sources through RWH in particular, I formed the Akash Ganga Trust in January 2002. Taken together, Akash (sky) and Ganga (the perennial river Ganges of North India, believed to have descended from the sky) mean 'water received from the sky', or rainwater. Another trustee, Mr Ram Krishnan, an IIT Madras graduate, says that he learnt fairly late in his career that water and energy are the two key resources that make up life.

The group realised that it was necessary to set up a model house so that people could see the benefits of RWH for themselves. That was the genesis of Rain Centre, which was inaugurated by the Honourable Chief Minister of Tamil Nadu on 21 August, 2002. The initial seed money for starting this centre came from a few Non-Resident Indians.

Displays in the Rain Centre explain the benefits of RWH. Traditional RWH methods in use are documented, as are success stories. Working RWH models are on display. Educational films are screened on a regular basis. Outside the main building, visitors can witness how rooftop RWH takes place. Examples of recharging open wells and surface runoff harvesting through gate gutters can also be seen. Experts are on hand to provide cost estimates if a person is interested in installing RWH in his place of work or residence. Contractors trained to implement RWH are available. The Centre is open to all. Thanks to the funds received by the Akash Ganga Trust through donations, no fee is charged.



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The Rain Centre has also introduced the concept of Water Audits. These record demand patterns, the sources of available water and ways water sources can be judiciously managed and sustained. Water Audits have been conducted in some schools and multi-storied apartment complexes in Chennai. Rain Centre also works with the Chennai Corporation officials to harvest urban runoffs by constructing recharge wells on the sides of water-logged streets. A few have already been constructed in Besant Nagar.

Today, Rain Centre is a one-stop information and assistance centre on rain water harvesting in Chennai. It is the first of its kind in India. I head the centre and am directly involved with day-to-day management. Rain Centre is supported by the Delhi-based NGO Centre for Science and Environment, Corporation of Chennai, Metropolitan Water Supply and Sewerage Board and Tamil Nadu Water Supply and Drainage Board, with generous donations.

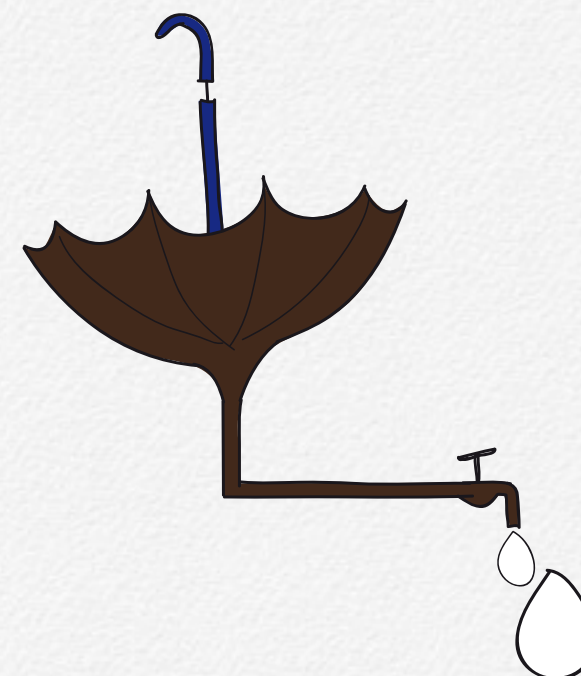
By 2001, when rain water harvesting had gained in popularity, the state government set up a high-level committee to create awareness. I was part of the committee and after a year of intense campaigning, rain water harvesting was made mandatory by the government in all buildings, both old and new. Residents were asked to comply within a year, failing which they were threatened with disconnection of municipal water supply. Tamil Nadu, incidentally, is the first state in India to do this and others are now adopting the model—Maharashtra, Kerala and Uttar Pradesh have now also made RWH mandatory for all new buildings.

In Bayview Apartments, my society in Besant Nagar, a well that had been dry for the past five years has sprung to life and is two-thirds full after the 2005 rains—and the water is potable. I'm sure that other areas will also benefit by adopting RWH.

Dr Sekhar Raghavan  
*Director*

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# Butterfly Gardens



*Nature Mates  
Nature Club*





# Butterfly Gardens

Butterflies conjure up images of sunshine, the warmth and colour of flowery meadows, and summer gardens teeming with life. They are some of the most beautiful and interesting creatures on earth. Sadly, many of their species have become extinct over the last century.

Butterflies are very useful. They are the most significant bio-diversity indicators and the best pollinators after the bees. Butterflies can predict climate change. When they fly around us, it ensures our well-being. Arjan Basu Roy of the NGO Nature Mates Nature Club says, 'Butterflies can help you understand whether the bio-diversity of a region is secure or not. Where there are butterflies, the ecosystem is secure and human beings who comprise the largest component of the ecosystem are not under threat. If butterflies dwindle, mankind will be the worst hit,' he adds.

With this in mind, Arjan decided to create butterfly gardens in urban spaces, as planting a butterfly garden with all of the right kinds of plants and flowers that butterflies feed on and lay eggs on will help revive this species.

In 2009, a small section of Banabitan (The Salt Lake Central Park in Kolkata) was provided by the Forest Department for setting up an open-air butterfly garden. The area received ample sunlight, essential for butterflies as their body temperature needs to be around 28° centigrade.

A three month survey of butterflies was conducted between October and December 2009. The results were analysed and 15 species of butterflies selected as target species for the garden. All of their requirements were studied and plantation began. By the middle of 2010, all the life stages of those butterflies appeared in the garden area. Around 20 per cent of all those in the early stages were taken into the lab for protection and were monitored and maintained till they emerged as butterflies. Once this was done for 15 targeted species, the next aim was to add another 15 species.

The Banabitan Butterfly Park was developed as an in situ conservation. This maintains recovering populations in the surrounding where they have developed naturally and ensures the ongoing processes of evolution and adaptation within their environments.

In order to encourage the growth of butterflies, we needed to conserve the indigenous plant species as larval hosts and nectar plants for the butterflies. An acre of land was earmarked for this, and divided into three plots: one for the larval host plant and the other two for the nectar plants. Additionally, a mud puddle was created in the nectar plant area.



Everyday the three plots are monitored and sighting of eggs, larvae, pupae, adults are recorded in prescribed daily data sheets; monthly and quarterly records are also compiled. All steps of life cycle of individual species are studied and documented photographically.

To date, 45 species of butterflies have been raised in the laboratory and around 15,000 butterflies released in the garden. The overall butterfly diversity of 'Banabitan' has risen from 64 species to almost 80 species during this period.

Basu Roy's initiative to conserve butterflies is also working as a catalyst to conserve some of the predators such as birds and lizards who feed on butterflies. 'We have noticed a steady increase in the mynah, jungle babbler and black drongo, bird species,' says Basu Roy.

The biggest achievement has been the creation of fresh awareness. More and more people have started approaching us, to know of the importance of butterflies. Efforts are being made to guide them to make their own butterfly gardens and hence a mass level conservation initiative for butterflies has been activated.

Some interesting facts about butterflies: the name butterfly was first coined to describe the Yellow Brimstone Butterfly, a variety commonly seen across Europe. It was actually known as 'Butter-coloured Fly' and that later became 'butterfly.' There are about 28,000 known butterfly species throughout the world. Butterflies and moths both belong to the order Lepidoptera. This is derived from the Greek term for 'scale-wing.' The wings of butterflies are actually transparent. The vivid colours are due to overlapping bright scales. Butterfly wings are very delicate and scales can get rubbed off if touched. Butterflies cannot fly if their body temperature is less than 27° Centigrade. Butterflies have a long

straw-like structure called a proboscis for sucking nectar. Butterflies taste food by standing on it. This is because their taste sensors are found in their feet. Butterflies weigh as little as two rose petals. Adult butterflies do not grow in size as they get older. Between emerging from its egg and entering the pupa stage, a caterpillar increases to over 27,000 times its original size. The skin of the caterpillar does grow with it as it increases in size, and so it is necessary for it to shed it. Most caterpillars shed their outgrown skin five times before entering the pupa stage. Butterflies have very brief life spans. Some usually found in the tropics can live up to a year but others live anywhere from a few months to a few weeks to even a few hours. All butterflies are not nectar loving. Some, like the Red Admiral Butterfly, have decidedly peculiar taste. They like rotting fruit and animal dung. Butterflies excrete meconium, a red liquid that looks like blood and is actually made up of waste material from the pupal stage. Male Swallowtail Butterflies habitually adhere around mud puddles to sip nutrients from the mud. Female Swallowtails don't do this, in general. (Quoted from an article by the West Bengal Forest Department).

Arjan Basu Roy

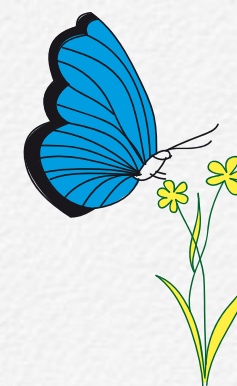
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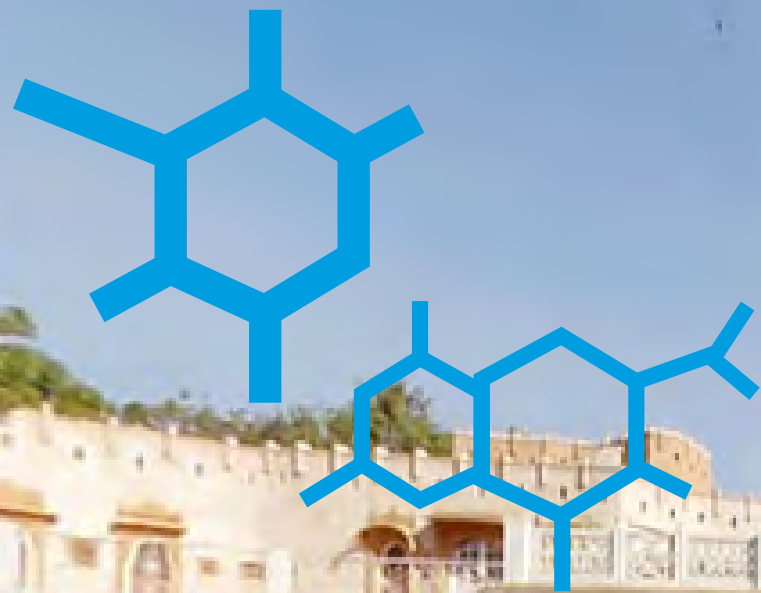
[www.naturemates.org](http://www.naturemates.org)



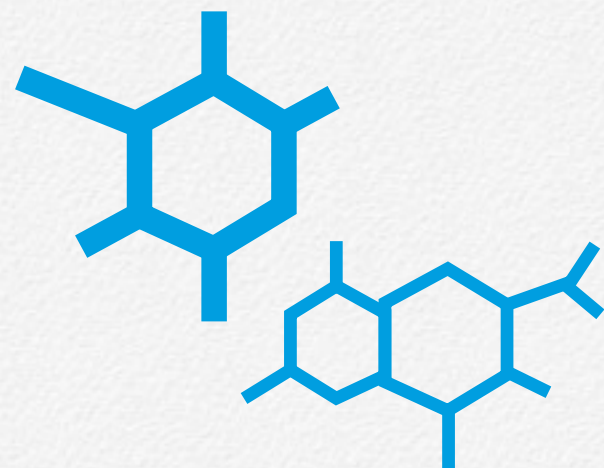


# Bioengineering Wastewater

*Clover Organic*







# Bioengineering Wastewater

Ajit Bhawan in Jodhpur is India's first Heritage Hotel. It stands as an oasis of hospitality and warm Rajput charm. This hotel was built exclusively for Maharajadhiraj Sir Ajit Singhji, the younger brother of Maharaja Shri Umaid Singhji of erstwhile Jodhpur State in 1927. Decades later, his son, late Maharaj Swaroop Singh along with his wife, Rani Usha, opened the doors of this stately royal residence to the travellers coming to the Blue City. They pioneered the 'Heritage Hotel' concept in India.

The palace resort was buying water to the tune of about Rs 20 Lakhs per year to water its beautiful gardens, its rooms, and swimming pool. They invited Clover Organic Pvt Ltd to come and assess the feasibility of recycling their wastewater. On a detailed survey it was discovered that though they had installed a Sewage Treatment Plant (STP) to treat the water before discharging, the same was not functioning properly.

By merging Biotechnology with Environmental Sciences, Clover has come up with unique solutions to deliver multiple benefits to its clients. While others offer mechanical or chemical solutions, we decided to combine Bio-technology to Environmental Engineering to offer enhanced benefits, just the way nature works! Microbes hold the key to treat wastewater most efficiently. We strangely found that though microbes do most of the work, they are rarely addressed except for measuring the Mixed Liquor Suspended Solids (MLSS) or Mixed Liquor Volatile Suspended Solids (MLVSS) which is rudimentary at best. Microbes, not only clean wastewater, but also hold the power to address specific issues like Ammoniacal Nitrogen or Phosphorous removal, increasing the Dissolved Oxygen (DO) levels thereby reducing both energy and chemical usage costs. They can suppress foul odour and reduce the quantity of sludge generation as well.

Thus, after studying these in detail, we decided to incorporate these in all our offerings. We use blends of microbes that are safe and beneficial. These are found in curd, bread, plants, etc. Through Bio-engineering, we have carried out the following interventions at Ajit Bhawan and for other prestigious clients such as Sab Miller, P&G, etc.

Clover helped refurbish the STP for Ajit Bhawan as the microbes present reduced the Hydraulic Retention Time (HRT) needed to treat the wastewater. Clover also trained Ajit Bhawan's personnel on the management of the plant and set up an MIS system to enable documentation of monthly records.

As a result of the above, Ajit Bhawan is today experiencing the following benefits: Pollution Control Board norms are being met at all times. Coliforms (population of harmful microbes) have been reduced



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drastically. There is a reduction in the running cost of an STP as aeration requirements are reduced and no chemicals are needed thereafter to treat the wastewater due to the addition of our special blend of microbes. There is complete suppression of foul odour and vectors from the site, again due to these microbes. Treated water as a result is now being safely recycled throughout the premises for non-potable uses such as watering the gardens.

Today, Ajit Bhawan has become a water surplus entity. It is recycling most of its treated wastewater for watering the gardens. They are now planning to also use the water for flushing in their toilets. The cost they were incurring earlier to buy water has been reduced to a large extent.

Sanjay Aggarwal  
*Director*

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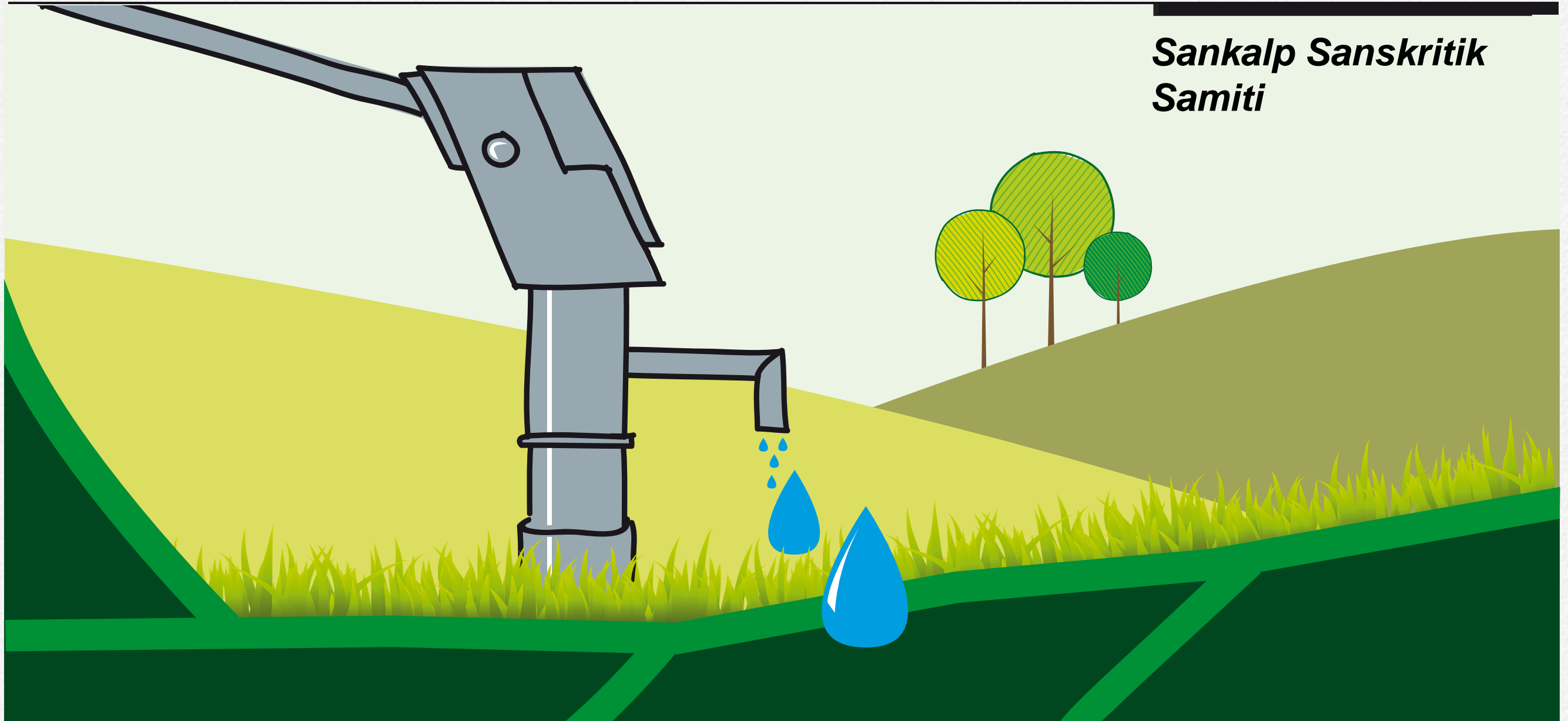
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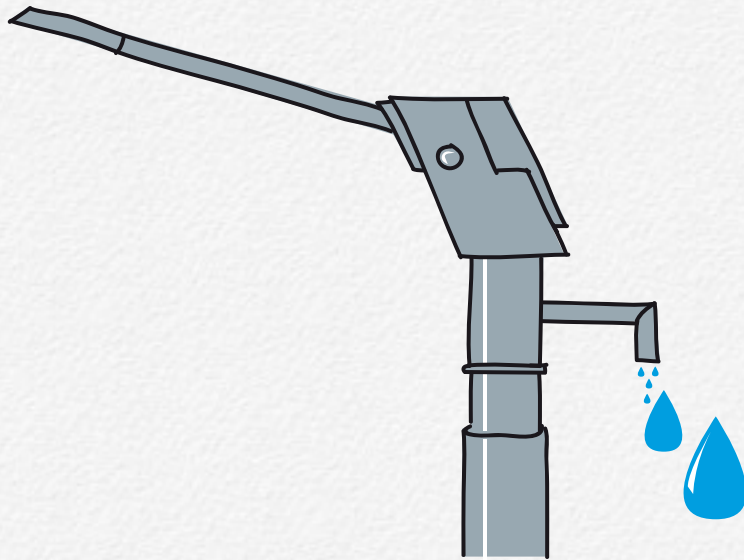


# Student Farmers

***Sankalp Sanskritik  
Samiti***







# Student Farmers

Sankalp Sanskritik Samiti is an NGO based in Raipur, a tribal area of Chattisgarh State. We work on hygiene issues in a few government schools. While doing so, our team noticed that areas around hand pumps were slushy and infested with flies and mosquitoes. Handpumps used by students to wash their hands and utensils after a meal had stagnant pools around them. Each time the hand pump was cranked or shut, some water trickled down. To add to this run off was the water that floated away carrying with it the food particles that had adhered to hands and plates. This messy flow came to a halt when it hit low land and nauseating pools resulted there.

We racked our brains to find a solution to this unhygienic condition. A thought struck. Why didn't we divert the run off to good use? Perhaps use it to grow vegetables and fruit?

An out-of-the-box idea, but was there any harm in trying it?

We began by explaining the novel concept to the students. The area would no longer be a mess and, at the same time, they could enjoy fresh produce grown with their own efforts. There was much enthusiasm at the thought that every time they went to wash up they could also see the mangoes and bananas growing, as also the carrots and other vegetables.

Since we wanted the project to be completely a student effort, it took some time to implement. It would have been easy to donate some funds and for us to do the spade work but no, we wanted the students to be involved at every step. Only then would they learn to take responsibility.

The first thing to resolve was the issue of procuring saplings. These were not available free, and even the contribution of Re 1 per student toward their purchase was difficult, as most of the students came from lesser-privileged sections of society. So it took time to collect funds. Once this first hurdle was crossed, the next stumbling block was to help the students locate horticultural centres from which these plants could be purchased and teach them to recognise and choose the healthiest plants. In schools where space was a constraint, we suggested the development of compost pits instead. By this time neighbours and families also got enthused and they readily came forward to lend the students gardening tools.

Today, fruit trees and vegetables are seen on patches that were once more like cesspools. More importantly, students are now aware about ways to make the best use of waste water to grow things, a knowledge



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they can put to good use when they go back to their villages. Mosquitoes and flies have been forced to move elsewhere.

What began as a concern for hygiene turned out to be a boon for the schools.

Maneesha Sharma

*Director*

**Sankalp Sanskritik Samiti**

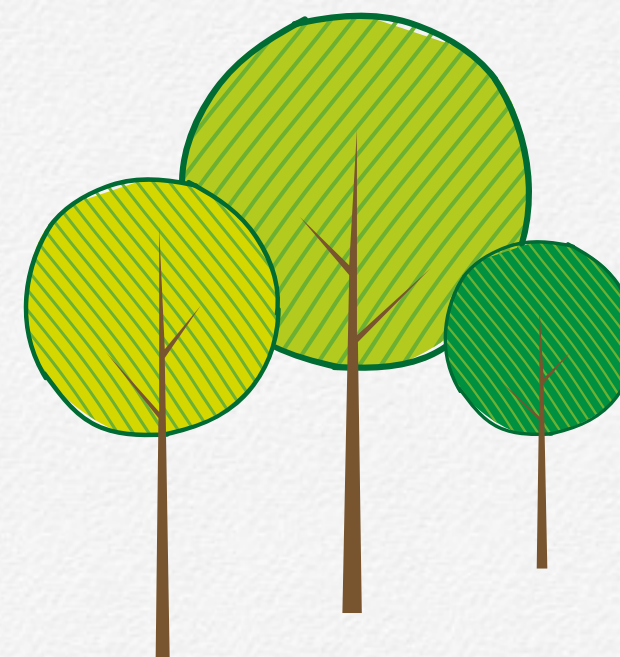
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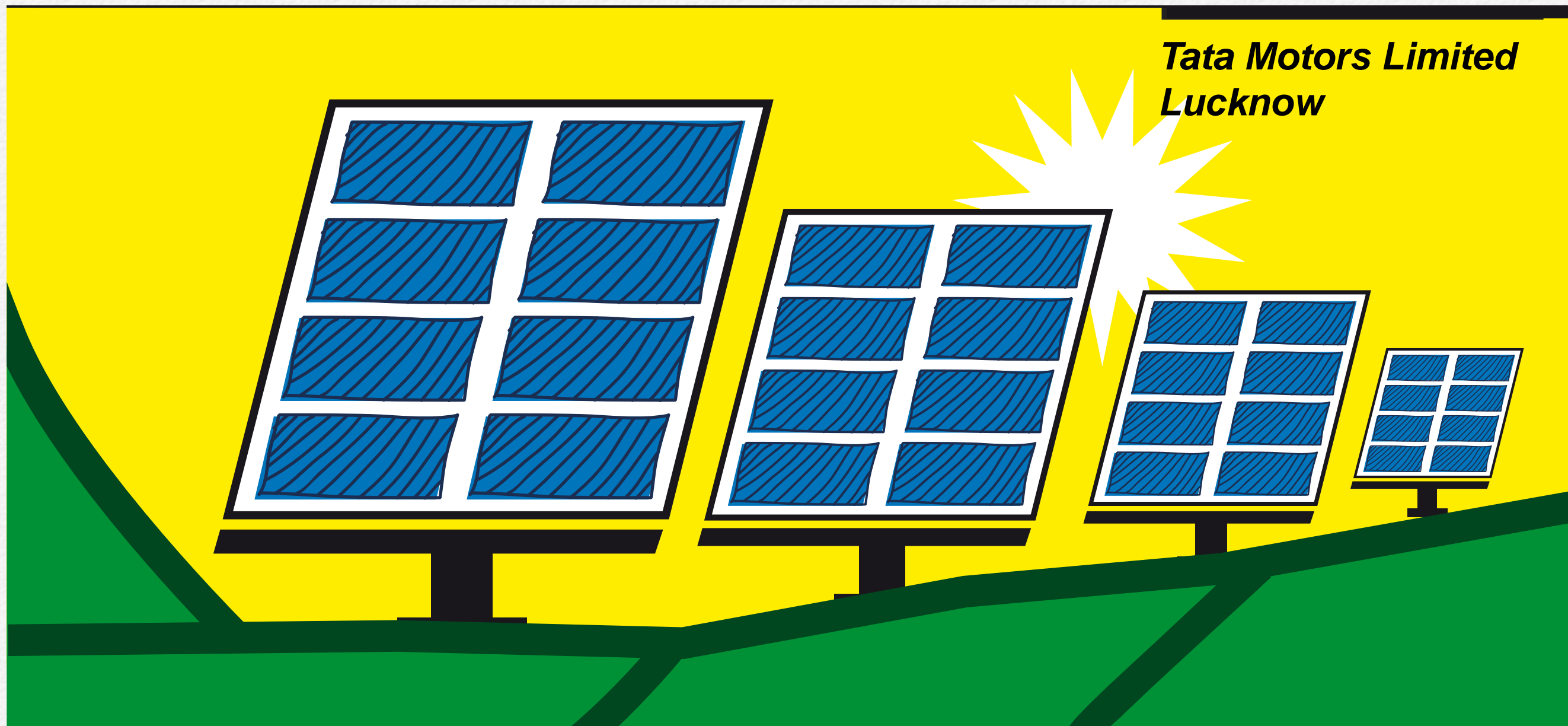
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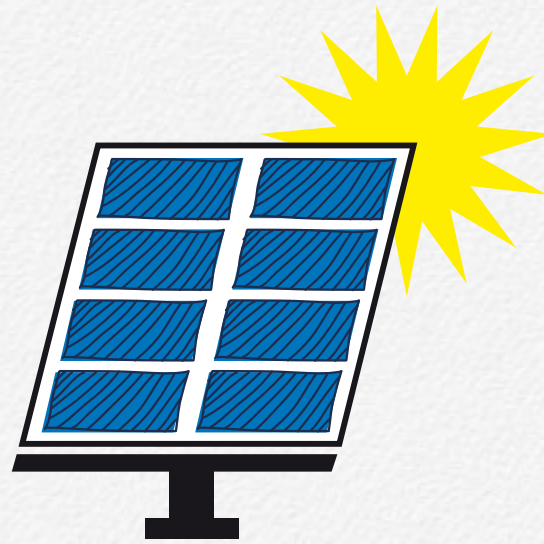




# 25 kWp Solar







## 25 kWp Solar

Earth is standing at an energy crossroad. We now face the choice of setting the course for clean, renewable energy, or continuing with fossil fuels that jeopardise our health and the environment.

Tata Motors Ltd is committed to maximising the use of renewable energy and that too, by using eco-friendly technologies. In Lucknow, a city known for its multiculturalism, courtly manners, beautiful gardens, poetry, music, and fine cuisine, we set up a power plant that has a capacity of generating 25 kWp electrical power using solar radiation. The maximum generation is during the summer months.

While solar plants are there in several places, the uniqueness of our project is in its design. After many brainstorming sessions, our Engineering Services team came up with a solar plant design that requires no standby battery. It auto-synchronises the solar power directly with the plant grid. So, no battery bank is needed.

This eliminates the danger of land and water contamination due to the spillage of acid while operating and maintaining the battery bank. This makes our solar plant more eco-friendly.

The solar plant generates on an average about 80 to 100 units of electricity per day. This is a direct saving of electricity units Tata Motor Ltd purchases from the State Electricity Board. Tata Motors Ltd is a bulk energy consumer in Lucknow. By setting up our solar plant and thus reducing the pressure on the State Electricity Board, the city as a whole also benefits in these challenging times of energy crisis.

The solar plant has led to a carbon abatement of 23 tonnes of carbon dioxide for the city of Lucknow. It saves about Rs 2.36 lakh per year to the company as the innovative design that eliminated the battery bank from the system results in a 27 per cent reduction in the cost of the plant.

We hope that others will also be inspired to set up similar plants all over India so that an optimal design is used to tap solar energy.

Ramit Dutt  
*Manager, Engineering Services*

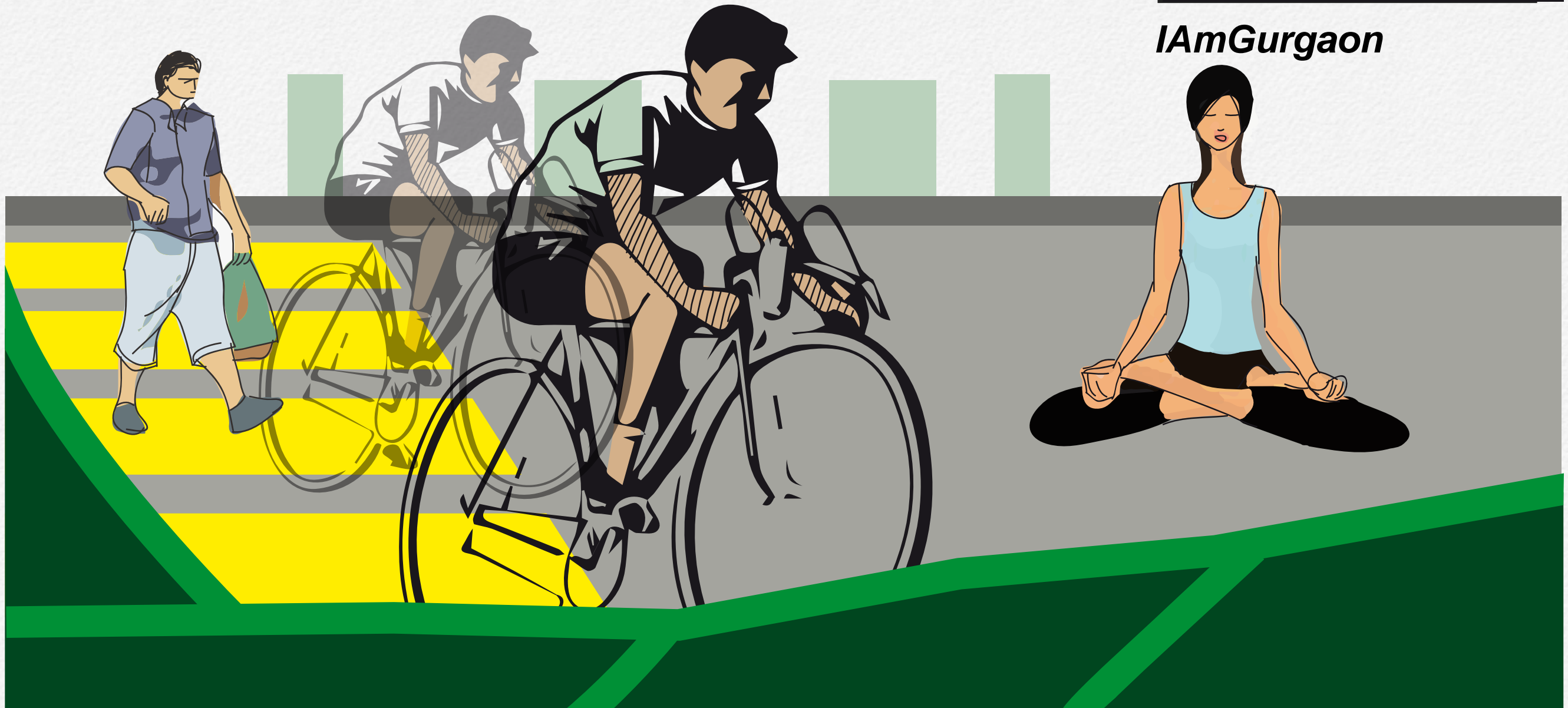
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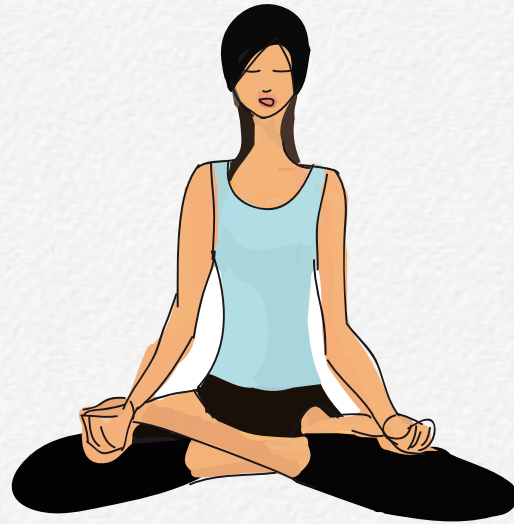


# Raahgiri Day

*I Am Gurgaon*







# Raahgiri Day

Raahgiri Day is a street event held on Sundays. It turns major city roads of Gurgaon into car-free zones from 7 am till noon to allow citizens to participate in community or recreational activities.

The first-of-its-kind Raahgiri Day in India was held on 17 November, 2013. 10,000 people participated in the inaugural event. That number has grown each week, reaching over 90,000 by week 8 and nearly 2.5 lakhs by Week 16. With the event garnering significant public and media attention, a strong message is being sent that Indian roads have great potential to positively benefit urban residents when they are made accessible not just to vehicles but also to pedestrians, cyclists and for recreational purposes as well. More importantly, the event has succeeded in driving home the fact that many of India's urban residents are willing to use sustainable modes of transport, provided they have access to safe and secure infrastructure.

The term 'Raahgiri' brings together two ideas: 'raah' refers to a path or journey towards a final goal and 'Gandhigiri' is about taking charge of one's own life. The concept is modelled after Ciclovía, an event initiated in Bogotá, Colombia in 1976, that closed streets to cars and opened them for the exclusive use of people for running, cycling, skating, or other recreational activities.

On 18 October, 2013, Mr Alok Mittal, Commissioner of Gurgaon Police, announced the launch of Raahgiri Day at a press conference saying 'Raahgiri Day will not be a one-day event, but an ongoing festival until March to celebrate vehicle-free and pollution-free roads, and will be supported by all the major administrative units in Gurgaon... and Traffic Police.'

The conceptualisation and planning of Raahgiri Day in Gurgaon goes back over a year. The idea about non-motorised transport was first sown in Gurgaon in November, 2012. This was when various residents' welfare associations and government officials came together for a workshop on 'Finding Traffic Solutions for Gurgaon' and discussed civic matters pertaining to the Millennium City. Speakers at the workshop reflected on the manifold increase in volume of the city's inbound and outbound traffic, leading to perpetual jams at key intersections. Amit Bhatt, Strategy Head of Integrated Transport, EMBARQ India, called traffic a symptom of a bigger problem—mobility of people. Amit opined that giving priority to non-motorised and bus-based public transport and restricting indiscriminate automobile use could provide a solution.

This thought resonated with some like-minded people. They included: Latika Thukral (Co-founder, IAmGurgaon), Prabhat Agarwal (Founder and Coach, Aravali Scholars) and Nisha Singh (a local government



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councillor). On the ground implementation began with The Heritage School approaching EMBARQ India and Pedal Yatri, a recreational cycling group in Gurgaon, to assist their students with a research project 'Making Gurgaon a Bike-Friendly City 2013.' As part of their project, students learnt about cycle-friendly cities around the world, participated in traffic observation fieldwork, conducted neighbourhood surveys, and interviewed cyclists of various socio-economic backgrounds. Their research findings raised a few basic questions: can we experience freedom and self-reliance in our cities? Is Gurgaon a cycle-friendly city?

The Heritage School's project culminated with a 12 km cycle rally in Gurgaon that was held in April 2013. 300 cyclists participated, including students, parents, and teachers from the Heritage School, senior government officials from Gurgaon and members of Pedal Yatri and EMBARQ India. Enjoying generous public support, the rally was the first event to draw attention to the notion that roads are public spaces as well. Not just carriers for transport. From there, the idea of Raahgiri Day was born.

Every Sunday, Raahgiri Day participants can be seen cycling, running, working out, playing soccer, taking street Zumba classes, honing skating skills or just soaking up the winter sun with their families, friends and even their pets. It is also common to see kids singing, dancing, and performing martial arts. One of the highlights of the event is how many diverse groups come forward to participate. People of different age groups brave the elements to spend a day out with the community. Crossing all barriers, both the rich and the poor share space equitably.

Raahgiri Day has had an overwhelming impact. The initial 4.8 km loop has been doubled. Sarika Panda, transport planner at EMBARQ India, looks to developing this further to include permanent bikeways, sidewalks and public transport systems, etc. If the overwhelming response received is any indication, we will get there soon.

Latika Thukral  
*Co-founder*

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# Art Inspires Civic Action



*The Harrington  
Street Arts Centre*





# Art Inspires Civic Action

There is a saying that ‘One man’s trash is another man’s treasure.’ Is it possible to make something of worth, something of beauty from garbage? Is it possible to evoke civic action with it? Yes, it is! Artist Vivan Sundaram has proven it. He shows us that the environment can be helped by looking at trash in a different way—something of value, instead of an eyesore. And we took it a step further by using it to evoke civic action.

Aside from being things of beauty, I believe that art and artists provide powerful means to draw attention and give voice to issues that impact us all. An event at our gallery The Harrington Street Arts Centre around well-known artist Vivan Sundaram’s exhibit ‘Landfill’ is one such example.

Litter, waste, garbage, dirt and muck are ordinary, everyday sights in much of Indian urban spaces. Vivan focused on these to create the art

works that comprised ‘Landfill’. What emerged was an exhibit of startling realities that spotlights debris and discards. It entraps the viewer’s attention, projects a strong message and stimulates, as we saw, thoughts for civic action.

Vivan explained to me that his singular objective in creating the off-centre masterpieces that make up ‘Landfill’ was to give wide exposure to his message ‘Don’t ignore the garbage around us but face the reality of the problem. This unhealthy mess could gradually push humanity to doomsday, unless corrective action is begun right now,’ he says.

Vivan had picked up junk from the streets, rubbish from dumping yards and from *kabaadi* (ragpicker) colonies to create ‘Landfill’. He used discarded cola cans, plastic bottles, canisters, the innards of computers, toy trains, bubble wrap, a one-eyed Barbie doll, old television sets, clay figures and myriad flotsam and jetsam that any contemporary megalopolis throws up every day, to create stunning art works.

Working in collaboration with waste-pickers who are members of the non-governmental organisation Chintan: Environmental and Research Action Group in New Delhi, the artist sorted, re-assembled and turned the found objects of trash into finely detailed models of monumental urban landscapes. Something broken here, something discarded there—different items that people had thrown out—were pieced together to coalesce and emerge as cityscapes of high rises, complex network of streets and other urban vistas.

What mesmerised viewers was the ‘Landfill’ installation titled ‘Black Gold.’ Vivan flooded the work with muddy water and added millions of peppercorns (‘Black Gold’, in cross-oceanic trade). He then filmed the terrain and the deluge created. All this was projected on the floor of our



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gallery using three-channel videos that are synchronised to produce a seismic rhythm. The earth plates shift and archipelagos with brilliant glazes emerge.

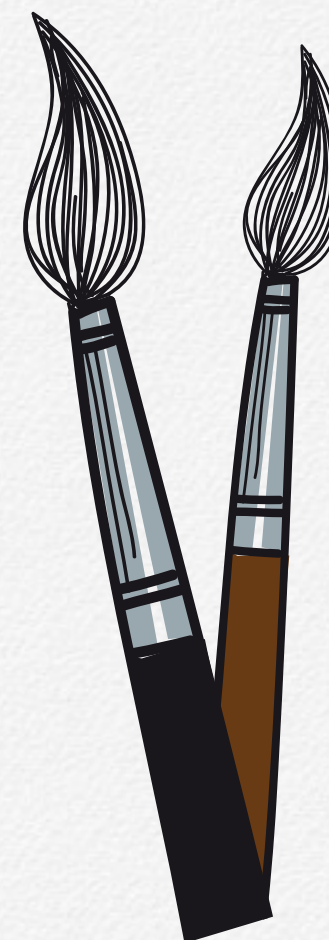
With the display at The Harrington Street Arts Centre, viewers were drawn to think about the need to do something to ensure efficient waste management. To explain ways by which this can be done, we invited organisations working on waste management to speak before an invited audience. With 'Landfill' in the background, discussions on practical ways to save our city, Kolkata, from this inundation of litter that lines the streets and from the rapidly multiplying garbage dumps that are visible all over, were held. Civic action groups such as Garbage Free India and SAFE shared information on ways they had inspired communities to keep their neighbourhoods clean. A representative from Nokia spoke about e-waste management. The company offered to place bins in schools to collect and recycle this waste. Students attending the programme were inspired to pledge to ensure that in future, their toffee wrappers, ice cream sticks and other small trash would go into bins and not add to street litter.

Vivan Sundaram's 'Landfill' certainly inspired civic action. Once people start talking about a problem, results can happen. With art, people's imaginations regarding solutions to problems are lit up. Such is the case with 'Landfill.' Our gallery will continue to help bridge the gap between art for imagination and appreciation alone with art for a cause.

Kavneet Khullar  
*Proprietor*

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# Going Tapeless







# Going Tapeless

Star India, a leading media and entertainment company that is part of the 21st Century Fox family, took a conscious decision to innovate and upgrade its traditional tape-based workflow into a more comprehensive tapeless environment. This resulted in greater efficiency and substantial benefits to the environment bringing about a true Green Revolution.

In the past, our network received around 280 hours of new programming per week. This came to us on approximately 2,245 tapes. In addition, we handled some 2,500 commercials every day, also on tapes. Tapes arriving at Star went through lengthy processes such as digitisation, rough cut edit, Standards & Practices checks, subtitling where necessary and then play out. All these operations had to be completed in a sequential, assembly-line workflow. Coupled with the short lead times generally available to get content to air, any hurdle in the chain, no matter how small, majorly impacted the

programming schedule. Moreover, calculations suggested that the tapes were, on an average, physically transported over 80–100 km per show, per day. And Star has over 50 shows on air each day. This amounted to a staggering figure of 18, 25,000 km every year per rider. And the carbon dioxide emitted by just this one rider? 153.3 tonnes!

Star visualised that moving ahead, we needed a more eco-friendly way of operating. One that helped the move to HD, enabled multi-platform content delivery and allowed the switch to file based operations as well as concurrent transmissions of our network to international regions. As Star advanced towards its 20th year of leadership in the television industry, we looked for and found a solution. Our Broadcast Technology Team, along with Prime Focus Technologies, indigenously designed and developed architecture to support integrated multi-platform content operations called 'Content Live'. True forerunners in the industry. Star thus became the first broadcaster to make this move that totally eliminated the use of tapes.

'Content Live' is driven by three broad components. First, a dedicated network infrastructure connecting the digital media supply chain to Star through a domain-centric cloud, accessible by production houses, brands and advertisement agencies. Second, an integrated content operations platform where all the content is placed at the centre of the eco-system, allowing content operations to be carried out concurrently, rather than sequentially. Lastly, a multi-platform processing, packaging and delivery infrastructure.

'Content Live' allows Star to monetise our content (aided by data modelling and cataloguing), and to quickly customise content for distribution across different platforms. This doing away with tapes truly



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revolutionised the way broadcasting business is done, not only in India but around the world.

‘The future of the broadcasting industry lies in digitisation,’ Sanjay Gupta, COO, Star India says. He adds, ‘With this world-leading initiative, Star is opening the door to digital workflows, allowing us to more effectively scale our business, embrace the migration to HD and increase our focus on non-linear platforms. This is a great step forward, not just for Star, but for the broadcasting industry, and we are proud to be leading the change.’

Killing the need for tapes and its transportation has an incredible positive impact on the environment with hugely reduced carbon footprints. Star, not using or accepting tapes, has eliminated the emission of 153.3 tonnes of carbon dioxide into the atmosphere. Eradicating the use of magnetic tapes amounting to 2,245 tapes used per week plus 2,500 tapes received from advertisers per day, has also resulted in almost zero plastic usage. Our old tapes have been recycled through e-waste management processes. An additional benefit of ‘Going Tapeless’ is the reduction of manpower and in turn, their carbon footprint. Sharing content with other channels for network promotion only in file-based formats has correspondingly created awareness across the industry about this environment-friendly procedure.

The migration to ‘Content Live’ has certainly simplified Star’s workflows and increased our overall efficiency. But above all, it has ensured the environment is taken care of by the adoption of greener practices. Additional benefits are likely to be seen in the future with new initiatives that continue to be developed—such as an iPad and mobile app, which allow the creative and technical process owners remote access to content and workflows.

Our pioneering project to digitise content has indeed placed Star in the position of being the green innovators of the industry.

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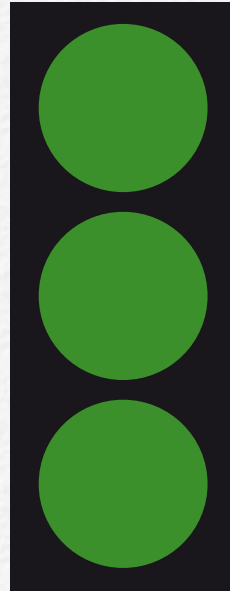


# Designer Roads

*Centre for  
Green Mobility*







# Designer Roads

In the famous pink city of Jaipur, the total number of registered vehicles has crossed 1.8 million. On most arterial roads, the traffic volume exceeds the designed capacity and service level for the road. To add to the woes, only 40 per cent of road capacity is available for movement. The larger chunk is utilised to park vehicles.

A typical Jaipur road scene depicts a large presence of two and three wheelers that make up 51 per cent of traffic. Cars, less popular, constitute 18 per cent, while buses, the mainstay of public transport are few and far between and account for a surprisingly low 4 per cent only. Cyclists and pedestrians who jostle their way through the ever-increasing traffic are a high 27 percent. It is no wonder that around 140 pedestrians succumb to road accidents every year.

To find a solution to this mayhem of traffic chaos, The Traffic Control Board of Jaipur formulated 'The Rights Steps Programme' in 2012.

They invited the Centre for Green Mobility (CGM), an Ahmedabad based non-profit organisation to partner with them. A section of Tonk Road, a major two-way arterial thoroughfare was chosen for the pilot project. Tonk Road connects Jaipur with Tonk, a town south of the city. It also links the employment centres of Sanganer, Durgapura and Lal Kothi where Jaipur's famous block printing and hand-made paper units are located. The aim of the project was to accomplish the almost impossible task of easing traffic flow and ensuring safety of vulnerable users of Tonk Road.

As a first step, CGM conducted perception studies, street audits, activity surveys and volume counts (pedestrians as well) along the pilot project stretch. The major problems identified included limited and often no access to footpaths as these were blocked by parked vehicles, broken pavements, transformers, telephone boxes and other structures. Even bus stops protruded into walking areas. As major sections of Tonk Road housed public buildings, hawkers were everywhere selling their wares on space reserved for pedestrians. For cyclists, the situation was worse as they had to watch out for traffic coming at them from every possible direction. Crossings across traffic junctions were the cyclist's worst nightmare—there were no traffic signals or dedicated crossings that assured them of safe passage. The absence of demarcated lanes for slow and fast-moving traffic resulted in a haphazard mess where vulnerability to accidents increased and movement slowed down to a snail's pace.

Once the data was compiled and analysed, the CGM team took on the challenge of redesigning Tonk Road so that safety improved for users. There was easier and swifter mobility and the road became a more livable space overall. Keeping their guiding principle of 'moving people



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and not cars' in mind, a redesign map was drawn up for Tonk Road. CGM's experience and successes in providing equitable design solutions in other cities helped the process.

The team met with engineers of the Jaipur Development Authority on a regular basis so that a consensus was reached on what would work best. One of the first solutions offered was to segregate slow and fast-moving traffic. The same was achieved by providing a wide pedestrian and cycling zone so that people felt safe and secure from motorised traffic and stayed away from the motorised lanes. This was a tough decision to take, but CGM was able to convince decision makers of the efficacy of limiting carriage way to optimal width and increasing the area for slow moving, non-motorised transport users. CGM projections showed that once the project was completed, just the 5 per cent shift to non-motorised modes by the public would result in reducing CO2 emissions by 55,000 kg per year.

CGM also recommended clearing the carriage way of road blocks such as parking lots and vendors by providing specified areas for these activities. This, they stipulated, would increase traffic speeds by 20 per cent. They designed intersections to ensure safe crossings by raising these to pedestrian heights and providing cycle boxes at the mouth of junctions that helped cyclists be the first to go when traffic lights turned green. By removing free left turns, safety was further enhanced as the speeds were reduced by restricted turning movements. Removing left turns also provided pedestrians a vantage point to make an informed judgment as to the safest time to cross the street. By careful signal phasing, delays were reduced by 30 per cent, resulting in further reduction in CO2 emissions by an additional 15,000 kg per year.

The blue print for Tonk Road included planting 3,500 trees that on maturity will reduce temperatures in the area by 10 degrees. The green cover will also help suck in air pollution and reduce noise.

At CGM we didn't have a magic wand to wish away traffic but instead redesigned Tonk Road so that conditions on it improved for all.

Anuj Malhotra  
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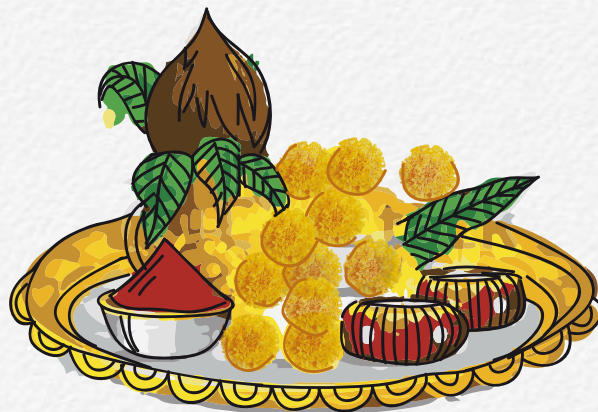




# Gathering Flowers







# Gathering Flowers

Do pause a moment before throwing away your old puja flowers, garlands or bouquets. You might think that these dried up items need to be discarded before they begin to putrefy. However, you are wrong. The faded blooms could be the raw material that a group of lesser-abled youth needs to produce organic colours.

Our story begins with The Society for Child Development (SFCD) that runs a Vocational Training Centre and Employment programme for 20 youngsters who are differently-abled. As funds were limited, purchasing raw material in bulk was out. Many of the trainees were slow learners, so wastage was more than usual. All these factors hampered training. Our best option was to look for free raw material. 'Nothing comes free' you might say. But something did.

Adjoining our facility is a small temple. As is usual in most religious places in India, the daily rituals included the offering of garlands and

other fresh flowers to the deities. Every morning, the priest would remove the old flowers and bedeck the precincts and idols with fresh ones. The temple had hired a young man to dispose of the previous day's flowers in the nearby Yamuna so that the river waters carried these away. However, the employee was a lazy man. Instead of doing his job on a regular basis, he would pile up the flowers in an alcove in front of our facility and only once in 10 days or so carry them down to the river. In the interim, the flowers would decompose day by day and their once beautiful fragrance, turn nauseous.

The trainees and workers at the facility had a choice: either suffer the odour, or clear away the discarded flowers. We opted for the latter out of compulsion, as no one could bear the stench. But there is a silver lining to the story, because out of this forced-upon-us activity, grew project 'Avacayam'.

The word 'Avacayam' means 'gathering flowers' in Sanskrit. And that is exactly what we did. We gathered the discarded flowers, but didn't burden the river with this waste. Instead, we developed a process to recycle these into vibrant, organic colours that could be used as dyes, for *rangoli* and during festivals such as Holi. Here was the free raw material we were looking for. It was given to us by the blessing of having a temple next door.

The process is simple and uncomplicated. The collected flowers are first segregated, cut, dried, and finally pounded. Approximately 100 kg of collected flowers yield 1 kg of dried petals. Although the aroma has gone, the natural colour is still there and emerges as powders of different colours. The final stage is packaging and marketing of the end product. The price is approximately Rs 600 per kg.



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After much experimentation and test runs to ensure that the process was economically feasible, The 'Avacayam' cooperative approach was formalised in 2008. We really wondered why no one had thought of it earlier as there were so many plus points to the strategy.

The manufacturing process and equipment is low-cost and hence replicable and sustainable. The raw material is available year round from religious sites and hotels. The quantity might increase during festivals such as Janamashtami and during the wedding season, but nevertheless, there is no time when it is not there. The market outlets are assured as the Ministry of Environment, as well as the Delhi State Department of Environment supports the initiative by setting up sales outlets in government departments and at Dilli Haat. Demand is high, especially since organic colours are strongly recommended by environmentalists. The ecological problem of disposing of waste flowers, especially the vast quantities generated by temples and hotels, is resolved to the benefit of all.

We now receive flowers from 11 hotels and 60 temples in Delhi. An additional 250 temples and eight hotels are providing flowers to six other NGOs associated with us. Our gross sales amount to around Rs 18 lakh.

Though only 600 young adults are part of this first attempt, the strategy has the potential to reach extremely large numbers of those who have a disability across the length and breadth of India. For temples are found in all corners of our country: even the remotest and the offering of *pushpanjali* (flower offerings) a usual custom. In Delhi alone, there are 6,000 temples. My aim is to get flowers from all of these, soon.

'Avacayam' fulfils the vision of SFCD of a world where each

differently-abled person has access to opportunities to use and develop his/her inherent talent to the fullest potential and be valued for his/her efforts. This enables them to grow in confidence and be recognised as equal members of society.

The Ministry of Environment and Forests has acknowledged our strategy as an environment educational tool. Our work has also been recognised by the United Nations and was awarded the UN-ESCAP Disability-Inclusive Entrepreneurial Business of the Year in the Asia-Pacific region.

Flowers will no longer pollute our waters—the rivers will be cleaner, our children will learn to preserve and conserve and the planet may just survive longer.

Madhumita Puri  
*Executive Director*

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# Green Buildings

*Indian Green  
Building Council*







# Green Buildings

Spearheading the Green Building movement in India is the CII—Indian Green Building Council (IGBC). Launched in 2001 by the Confederation of Indian Industry (CII), the vision of the council is to ensure sustainable built environment for all and facilitate India to be one of the global leaders in sustainable environment by 2025.

With a modest beginning of 20,000 sq ft of green built-up area in the country in the year 2003, today more than 2,450 registered green building projects with a built-up area of over 2 billion sq ft are being constructed all over India, of which 461 green buildings are certified and fully functional.

Green homes can play a catalytic role in addressing environmental issues and concerns. Worldwide, the building sector, especially residential, accounts for 30–40 per cent of global Green House Gas

emissions. The construction sector therefore must play a responsible role towards preserving the environment.

A green home is defined as one which uses less water, improves energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building. A Green Home can have tremendous benefits, both tangible and intangible. The immediate and most tangible benefit is in the reduction in water and operating energy costs right from day one of the life cycle of the building.

Below are two examples of green homes in India.

The Avani Residence is India's first Platinum rated Green Home. It is located in Hyderabad. The Residence is an epitome of how a residential building can effectively and efficiently use resources. 50 per cent of the building's electricity consumption is produced by PV panels. Bamboo, which is a rapidly renewable material, has been extensively used in the flooring. Wood salvaged from old buildings has been used for doors and windows. Sufficient windows and skylight areas have been provided to achieve the daylight factor of 2 per cent for 80 per cent of the regularly occupied spaces. Light pipes have been used to achieve daylight in the basement areas. Sewage treatment plant of 5,000 litres/day capacity to treat all grey water generated within the site has been provided. The treated grey water is reused for flushing and landscaping. Low flow water fixtures (showers, faucets and flush systems) have been provided. In addition, the electric fixtures installed are energy efficient.

The T-ZED Homes, Bengaluru, is the first Platinum rated multi-dwelling development in India. It is the first residential campus in India that has certification for carbon credits and sequestration. It is recognized as



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India's first centrally air-conditioned (with no CFC and HCFC) residential campus. The campus has no water supply connection from the outside. All waste water is treated and reused for gardens in a way that such water eventually percolates into the open wells. Residents pay 30 per cent less on power and 20 per cent less on monthly maintenance. Every resident stands to gain about Rs 12,000 on an annual basis, due to carbon credit savings in T-Zed. The materials used for construction are low embodied energy materials. The bio-gas generation caters to the cooking needs of all the residences.

In the future, even greater impetus will be provided to green buildings with the development of many new green materials and equipment. Some of these are high reflective paints, electric charging for vehicles, home irrigation technologies, small grey water treatment systems, efficient water fixtures, high performance glass, insulation materials, low VOC adhesives, sealants, paints and carpets, BEE labelled electrical appliances, solar water heaters, bio-fuel based captive generators, home automation systems, timer based controls for lawn sprinklers, efficient pumps, motors, lighting sensors, efficient lift management control, dimmer controls for lighting, movement sensors for lighting, LED lighting fixtures, materials with recycled content (fly ash blocks, tiles, etc.), bamboo based materials, eco-friendly chemicals, etc.

Do contact us if you have any queries about green buildings.

M Anand  
*Principal Counsellor*  
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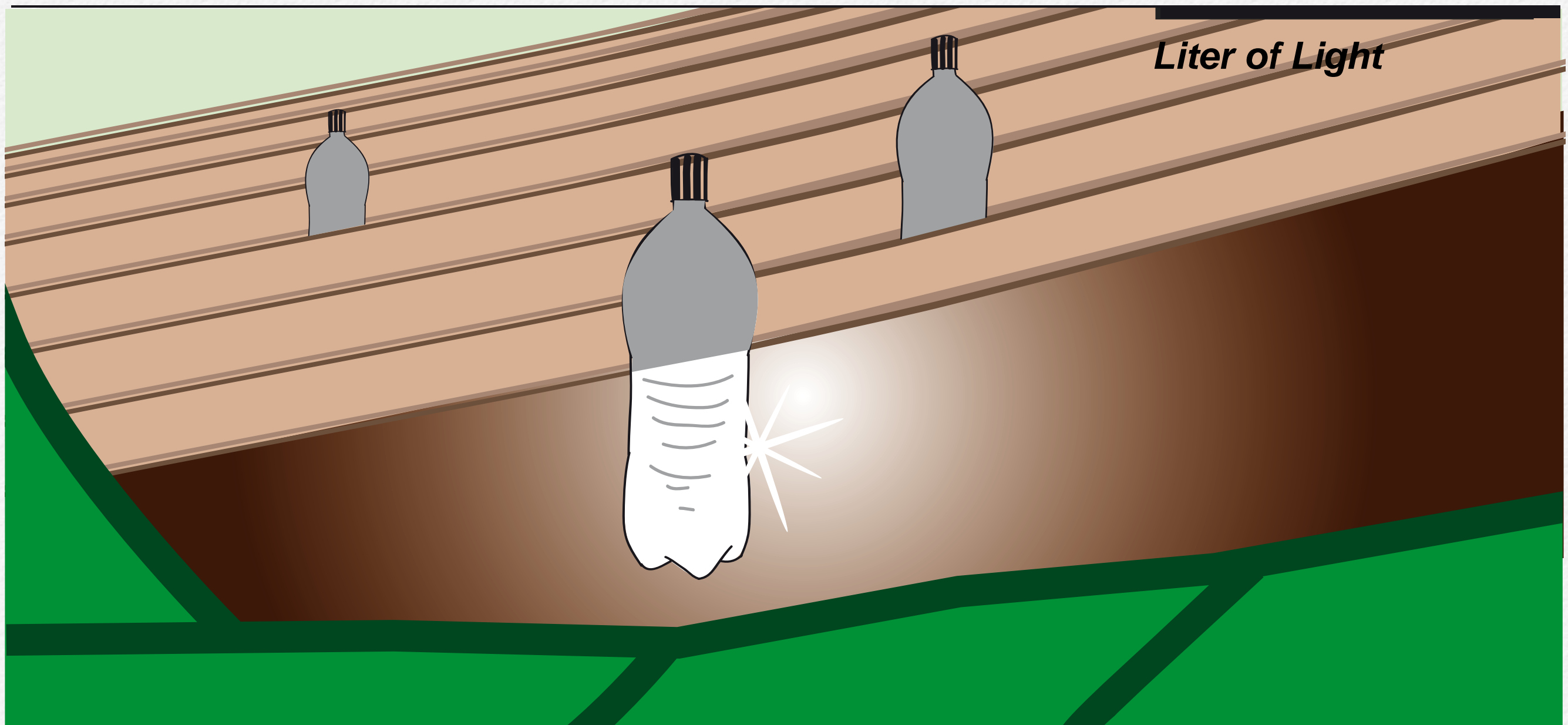
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# Lighting Up Lives







# Lighting Up Lives

Liter of Light is a unique programme that uses simple technology to light up modest households and buildings whose inhabitants either don't have access to electricity or cannot afford it. Even in large metros with flashing neon signs, areas of darkness exist. What is even worse is the darkness during the day that shanties in urban slums face. This absence of light is due to the minimal (or even non-existent) openings for ventilation that prevent sunlight from streaming in. Those thousands who live in tenement housing cannot replace this absence of natural light with artificial light as electricity is too expensive for their meagre budgets.

Liter of Light provides an eco-friendly and cost effective means to illuminate such areas. The project aims at igniting that spark of change, to help these hapless slum dwellers get some light. Ilac Diaz experimented with it in the Philippines in 2011 and now Liter of Light

has chapters in India, in the states of Andhra Pradesh, Maharashtra and Karnataka.

Technically, the concept is very simple:

- A 1.5 or 1.25 litre discarded PET bottle is filled with water and liquid bleach. (The plastic bottle is therefore also recycled)
- This is then stuck to a plastic/galvanic sheet
- The prepared bottle is hung through the roof of a home with one-third of it above the roof.

When sunlight falls on the upper part of the bottle, water refracts the light and the solar bottle illuminates, equivalent to a 55 Watt bulb! The bleach is used to keep the water clean. It also prevents algae, moss etc. from growing in it. The bottle is expected to have a life of five years. So far, these bottles provide light during daylight hours only. We are trying to also develop technology to bring light when there is no sunlight available.

Reaching communities, generally suspicious of outsiders, is a tough task. To circumvent this, we take the help of NGOs that are already working in the areas. We first convince the NGOs about the efficacy of the project. Presentations are made to them using pictures from before and after the installation of the bottles. Procedures to be followed are explained. Surveys of sites where Liter of Light bottles are already installed are organised. The next step is for the NGOs to connect us to the community. Again, the process of convincing is repeated. This round, the work is even tougher, as the dwellers are worried about the possible damage to their already fragile roofs by drilling holes in them.



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The cost for each installation is about Rs 500. The most expensive item is the special glue that is required. Fortunately, Sika, manufacturer of specialty chemicals for construction and industry, has been providing this to us. However to scale up our operations significantly, we will need additional sponsors. Getting an adequate supply of discarded, good quality PET bottles is also an issue. We reach out to caterers, event managers, restaurants, students, rag pickers, wedding planners, friends and others. As we generally work through volunteers, getting dedicated and adequate numbers of volunteers is another challenge. We use social media, programmes in schools and colleges, and volunteer forums to recruit them.

The hard work has paid off, and there is success to report. Even those who previously used electricity have partially switched to Liter of Light, halving their bills as a result. The money saved is often used for education, which they might not have been able to afford earlier. There is ease of movement in the house, light for reading, and so many more possibilities. A school reported that earlier, dimly lit classrooms had students complain of eye strain and headache. Now, there are smiles spread all across children's faces and for once, the backbenchers are in the spotlight as well. Who would have thought that bottles filled with water would radically change lives.

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# Produced by Earth Day Network, India

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It is our aim to publish further volumes of this e-book in order for more people to benefit from tried and tested techniques that help cities gain sustainability. Do write to us with ideas you may have to find pathways to green cities at [greencitiesindia@earthday.org](mailto:greencitiesindia@earthday.org).

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