

Vol. IV Issue IV, 2018



# CSR *Mandate*

Enabling Sustainability

The background of the cover is a photograph of two young girls. They are both looking down at a blue, curved object that they are holding. The girl on the left is wearing a black and white patterned top and a red necklace with a gold heart pendant. The girl on the right is wearing a white lace top and a red necklace with a black pendant. They are both smiling and appear to be engaged in a learning activity.

**Sustainable  
Technologies for a  
Green Future**



# Recognition

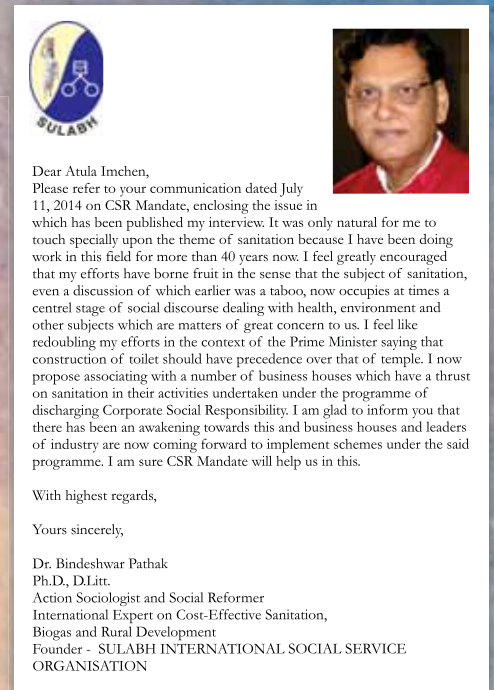
The role and contributions of CSR Mandate in bringing to the fore the initiatives of Corporate India and NGOs has resulted in the magazine being awarded the

**ICE Awards 2016 and  
CSR Community Initiative Awards 2016**





# Accolades



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Dear Readers,

In a recent announcement, India has formulated a National Clean Air Programme to rein in dangerous pollution levels in more than a hundred cities. Of course, environment specialists are a bit skeptical about it as the programme lacks framework and a concrete plan of action.

India's air and water have been posing a threat to health and longevity of life itself. Air and water quality, the level of toxicity which is disturbing the health of water creatures, flora and fauna, as well as their deteriorating availability, have been a major cause of concern. Depletion of natural resources and increasing ozone layer depletion leading to global warming are other severe problems resulting from environmental degradation.

Economic development versus environmental sustainability have been the focal point of talks among the differing political ideologies as it seems the two issues are at loggerheads with each other. Yet, a deeper understanding has proved that both can be achieved if we adhere to sustainability guidelines responsibly while doing business. Policies must also be drawn to provide incentives for businesses and other organisations to adhere to sustainability guidelines beyond their normal legislative requirements. This will in turn create additional jobs and employability to generations that are future-ready. It is all about doing business innovatively rather than adopting shortcut methods of business for profitability. Sustainability takes into account how we might live in harmony with the natural world around us; protecting it from damage and destruction, while achieving economic growth.

Hence, instead of depending on fossil fuels such as coal and petroleum, there is an increasing emphasis on renewable sources or on devising other sources of generating energy. Even if some industries do require the use of fossil fuel for energy, they must find a way to reuse and recycle the residues so they are not released to the atmosphere.

It is also important to encourage and foster incentives for the average person to do their bit where and when they can; one person can rarely achieve much, but taken as a group, effects in some areas are cumulative. The modern life is consumerist in nature and requires a lot of resources every single day, yet we can bring consumption under control, avoid wastage, and live a comfortable, quality life. Ultimately, sustainable development is about giving people what they want without compromising quality of life and reducing financial burden that may come with ill health due to environmental degradation.

Best Wishes,

A handwritten signature in black ink, appearing to read 'K Swaroop', with a long horizontal stroke extending to the right.

**Kamaljit Swaroop**  
Vice Chairperson





Dear Readers,

Sustainable development has gained momentum over the past two decades. We now associate it with improving living standards, poverty alleviation, nutritional improvements, minimising social and cultural instability and resource depletion. The United Nations Conference on Environment and Development (UNCED) defines sustainable development as a process that provides for the present generation without compromising on the needs of future generations.

Our lives are now largely urbane, modern, consumerist in nature, demanding a lot of resource consumption to make things around us comfortable. Our urban centres consume more power than rural areas. We keep our cities' streets and civic areas lighted, for which we use a lot of electric gadgets.

Civilisation and even nature have forced people to adopt newer methods of living and survival. Yet it is widely acknowledged that societies do collapse if we over-use resources as that lead to unsustainable practices. The need is to shift the behavioural pattern in the direction of sustainable living. In this context, it is seen that scientific enquiries and researches have also aided in helping the process by offering technologies that encourage sustainability.

Sustainability and sustainable development focuses on balancing that fine line between competing needs - our need to move forward technologically and economically, and the need to protect the environment in which we and others live. Sustainability is not just about the environment; it is also about our health and society in ensuring that no people or areas of life suffer as a result of environmental degradation. Sustainability implies renewable fuel sources, reducing carbon emissions, protecting environments and keeping the delicate ecosystems of our planet in balance. It looks to protect our natural environment, human and ecological health, while driving innovation and not compromising our way of life.

For example, once the companies offered LED and CFL bulbs, consumers could decide whether to buy a regular light bulb or energy saving, less polluting bulbs. Despite their initial high costs, many people bought them to save on electric bills. As technology improved, these products became cheaper and better and started competing with products made by conventional methods. Consumers today prefer sustainable products over traditional products, even if the cost is higher. Businesses globally are recognising this trend.

Hence, moving towards sustainable living is all about training the mind and adapting to new habits and behaviour. The changes need to be faster through government and private initiatives. We have brought forward many encouraging stories of individuals and groups who have presented the way to modern life while encouraging environmental upgradation, including organic cultivations that promote health and longevity.

Warm Regards,

A handwritten signature in black ink, which appears to read 'Archana Sinha'. The signature is fluid and cursive, written over a thin horizontal line.

**Archana Sinha**  
Editor

# Citizenship: The Force for a Better World

A European diplomat who was very involved in a beach cleaning initiative was asked by a journalist as to why did he do it especially as he was to go back to his country very soon. The very question of the journalist points to a mindset based on three notions – One, when we do anything considered selfless, it is because we owe it to someone or something. Or two, maybe because we want to be charitable and do good. It does not seem to point to any benefit that the individual themselves might receive in the process of doing good (other than a sense of satisfaction of contributing). Nor does it presume that just as we have human rights, we also have *human duties*. And third, if human duties exist, it is within certain boundaries that you are affiliated with, in this case, the diplomat's country.



Karon Shaiva

## Citizenship and Individual Social Responsibility (ISR)

As Corporate Social Responsibility (CSR) takes centre stage, so has Individual Social Responsibility (ISR). ISR is seen as a journey towards being better humans. However, ISR is not about being philanthropic or practicing the *art of giving*, instead ISR goes beyond charity to the *science of living*. In other words, it is not a one way transaction or dependent on the individual giver's mood and priorities, but how we live with and within our surroundings – community and environment - and its impact on our physical, emotional and mental well-being. It is for this reason I prefer to use the term *Citizenship*. Just as CSR has been equated with good *Corporate Citizenship*, we need to relook at ISR as *World Citizens*.

## Citizenship Movements

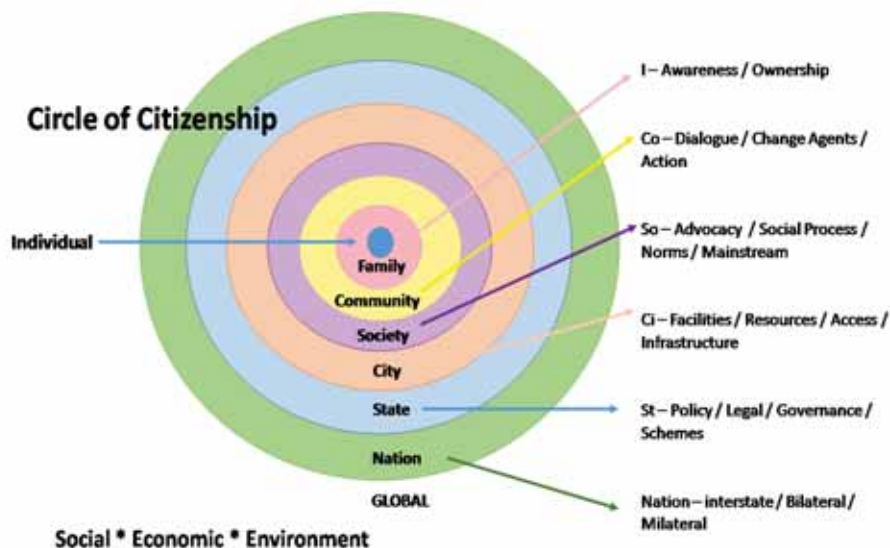
Citizenship has slowly but surely become the cornerstone of socio-eco-

political development especially for policy reform. Across the world, we have seen activism that has changed the course of history in a country or region. In India, judicial landmarks like the Nirabhaya Case that resulted in the Supreme Court judgement in 2013 for the Prevention of Sexual Harassment (POSH) of working women at all work places. The POSH Act finally gave shape and teeth to the Vishaka Guidelines that were set out in 1997. The Vishaka Guidelines itself was a movement to stop child marriage. Recent social movements like #MeToo, by women who have called out predatory behaviour by men, have had far reaching consequences, particularly in the political and entertainment spaces. Other landmark judgements include the Supreme Court judgement on Section 377 of the Indian Penal Code that struck down a law that denied the LGBTQ community of their rights, 158 years after it was first introduced by

the British. Yet another is the Supreme Court ruling in 2018 that all pilgrims, irrespective of gender, including women in the menstruating age group, should be allowed entrance to the Sabarimala temple.

Internationally too, we have seen the Arab Spring protests that spread across the Middle East in 2010 – 11 with uprisings and even armed rebellions to highlight poor conditions in their countries with respective to standard of living as well governance and oppressive regimes. The USA saw its very own Occupy Wall Street movement in 2011 driven by the inequalities in its society both social and economic. Their slogan, "We are the 99%" highlighted the income disparity between the wealthiest one percent and the rest of the population.





People realised that to survive, they had to stay in groups and to keep the group together, they had to ensure that they contributed their bit to everyday life. Their obligations as citizens of the group were as critical as their rights. To quote Aristotle: "To take no part in the running of the community's affairs is to be either a beast or a god!"

This form of citizenship got diluted through the ages as groups became bigger and bigger and the concept of nationality took over. Even though they are used interchangeably, they are not.

Citizenship in modern times has become a more passive and political concept. It focuses on the relationship with the nation and the authorities. It is a form of identity that provides you representation and rights vis-à-vis the State. The obligation or duties is at best to be law-abiding citizens. Therefore, we are more concerned about the rules and laws that govern us, and our responsibilities begins and ends with compliance – paying taxes, driving on the right side of the road, voting, and in general, keeping the peace by not doing anything harmful to others; in short, keeping our public and private lives separate.

Not to say that we do not have enough of concerned citizens going beyond their comfort zones. A case in point was the strong Area Local Management groups that sprung up across the city to take care of certain specific geographies. While they may have had limited success due to the many hurdles and obstacles, they did do yeoman service in highlighting the need for the public to be involved in administrative issues of their areas as well as to engage with the government machinery for better outcomes. This was pretty representative of most citizenship initiatives. It was more of *us* against *them* and so the outcomes though positive did not have society-altering impact. There is a re-emergence of these groups, and hopefully, there will be more change on the ground. Another great example

Europe has seen many citizen movements, the most recent being the yellow vests movement or yellow jackets movement in France. It started as an online signature campaign that was soon followed by mass demonstrations on the ground against high cost of living and the burden of taxes.

In the more distant past, the universal suffrage movement, and in particular, the women's suffrage movement, challenged the right to vote being the prerogative of only the wealthy or landowners. Apartheid was yet another socio-political practise that legalised racial segregation and discrimination. Sustained pressure from both domestic and global communities and institutions finally led to a change in government and the abolition of apartheid.

In the environment space, the Chipko Movement saw people embracing trees to prevent them from being cut down, the Narmada Bachao Andholan that protested lack of proper rehabilitation and resettlement for the people who have been displaced by the construction of the dam and the Save Silent Valley Movement that sought to protect and preserve the environment and the eco-systems of the valley.

All the above are examples of how citizens changed the status quo and

shaped new norms - both physically and socially. However, a common thread is that of confrontation and upheaval. There is a critical need to redefine the roles of all stakeholders in an eco-system as well as a more collaborative process to bring about change.

#### A Changing concept of Citizenship – Past, Present and Future

Citizenship as a concept was first introduced by the Greeks when they made laws to govern their way of life. This first form of citizenship was for small groups and therefore being close-knit, it did not differentiate between public and private lives.

“

What is the kind of citizenship we truly need for our future, a sustainable future? The notion of citizenship has to change. It is probably a combination of the past and present, wherein obligations in small groups are easier to maintain while laws are drafted that govern large populations

”



is that of the Beach Warriors who have been cleaning up the different beaches in Mumbai quite successfully.

What is the kind of citizenship we truly need for our future, a sustainable future? The notion of citizenship has to change. It is probably a combination of the past and present, wherein obligations in small groups are easier to maintain while laws are drafted that govern large populations.

The small groups are not difficult to identify in our everyday lives. We all live within our own circles of influence, starting with ourselves and our family and easily straddling the many communities we belong to on the basis of our residence, caste, creed

“

**So how can we make citizenship work in homes, schools, colleges and organisations? It is by examining and practising the tenets of freedom, but bound by rights and duties. It is also approaching issues with the intent to solve problems rather than to find someone to blame**

”

and religion.

But what of our citizenship that is governed by laws at different levels - City, State and Country? I like to think that these boundaries of our citizenship are simply about jurisdiction. Makes it easier to manage and administer. They should not be divisive, and in fact, should be seen as models of governance.

We owe the Greeks a lot! We need to start thinking again like them. People understood the connection between the survival of the individual and obligations to collective. This propelled individuals to stay in communities and pursue joint undertakings. Alliances may start due to compulsions, but if successful, can lead to real partnerships. Better still, if we actively seek to collaborate, we would see a multiplier effect and that would be the true test of the value of citizenship. And the true test of a concept is in its application. So, we need to move from concept to action!

#### **Citizenship in our daily lives**

By definition, citizenship talks about belonging to a group. By virtue of being a part of the collective, you not only are entitled to equal rights but also equal duties. Again, it is the underlying theory that everyone in a group influences the other and what the group does, affects the individual. This understanding is what drives

citizenship. Of course this does not make it easier to get people to participate but it definitely does provide a better framework as to why they need to work together.

So how can we make citizenship work in homes, schools, colleges and organisations? It is by examining and practising the tenets of freedom, but bound by rights and duties. It is also approaching issues with the intent to solve problems rather than to find someone to blame. Every day concerns such as water, waste, traffic, women and child safety, inclusive spaces for senior citizens or the disabled, health and more can be tackled if relevant groups come together and draw up solutions based on knowledge and understanding of the problem and the people affected by them. Such solutions are not only more effective, but also more efficient if the focus is on leveraging strengths and core competencies as a group.

#### **Circles of Influence and Value Drivers**

Every individual has a circle of influence, from the small unit of a family right up to that of a *global citizen*. We become citizens at each level by the usual ways – by birth and by marriage. However, moving between levels is a conscious choice driven by multiple factors and again is similar to the way a change in citizenship happens - by association (when joining a group) or



by investment (financial or in kind).

The choice of level for interaction and involvement is the prerogative of every individual and there should not be a judgement call on this. After all, we are all different and unique in our own way. We also have our own priorities and interest.

As a citizen, an individual may be very conscious of the world around them. Yet, there is a need for this awareness to be internalised and converted into effort. Motivation that comes from within *after* awareness has been created is typically driven by our beliefs and value-system.

The group can be as small or as big as required. It may look clinical if not funny to talk about citizenship vis-à-vis our families, a personal space. Yet group dynamics apply as much anywhere. Understanding why is maybe more important than how. As the world gets more and more interconnected, our social connections seem to get more disconnected. The rise and rise of 30-somethings suffering from heart attacks, and worse, our children committing suicide is reason enough for all of us to look carefully at the relations we share at home. Peer pressure, or the rat-race of meeting expectations, there is a critical need to create stronger bonds

that can withstand the stress of daily living. One way is to do more together. The other is to learn more about the world around us.

### **Citizenship – Value-based Education Programmes**

There are many organisations that work on citizenship, and of course, a plethora of programmes on citizenships available online. This works best when we combine it with action on the ground. The World Bank organises a programme on *Citizen Engagement: A Game Changer for Development* that encourages citizens to be directly involved in policy making and government service delivery. The United Nations was also associated with the Global Citizen Movement that is creating a community of individuals who want to work on the problems that plague the world.

Our citizenship programme for schools and colleges changes the premise of education to *make them leaders of tomorrow*. Instead, we seek to *make them citizens of today*. A workshop-style, classroom-based value education programme culminates in a collaborative project that has to be implemented. This ensures that it is not mere theory but on-the-ground action. It is truly

heartening to see the process of evolution from wanting to do good to becoming responsible.

The past few years has seen a significant rise in volunteering activities in Corporate India, in part, fuelled by the change in the Company's Act on Corporate Social Responsibility (CSR). The moniker *Employee Engagement* has been used to indicate the benefits of volunteering, where employees bond with one another and the organisation through these activities. Our work on citizenship in organisations is really about taking it to the next level of combining *Colleague Engagement* and *Community Engagement* so that we come together, to not just be together, but to contribute to the larger ecosystem that one functions in!

### **Common Purpose - Collective Impact**

With the realisation of a shared world, we appreciate more how our individual actions can affect our communities and the environment we exist in. The key aspect of citizenship is the collective effect. This helps us to make decisions that go beyond *being good to someone*, to *doing right by everyone*. Not an easy task, given that we are constantly told to *look out for ourselves*. That is when you can practice the concepts of citizenship – past, present and future to see and navigate the bigger picture, and realise its impact on our world. Or as simply explained by the Diplomat, “We are citizens of whichever community we are a part of, and we are affected by the consequences of what happens in any part of the world, now or in the future.” Well said! ■

*Karon Shaiva is the Founder of Idobro, Managing Trustee of the RISE Infinity Foundation and Convenor of the RISE Summit that seeks to break barriers and build bridges on women, social and green issues through Citizenship, Entrepreneurship and Partnerships.*

*She can be reached at  
karon.shaiva@idobro.com*





## Bharat Missing From The India CSR Efforts

### CSR Ecosystem Must Introspect on Partisan Implementation

Your passport reads - “Republic of India” and “Bharat Ganarajya” - written in Roman and Devanagiri script respectively, clearly depicting the two names of the same country. The Indian Constitution says, “India that is Bharat” in Article 1, identifying India and Bharat as one entity. However, in popular culture, Bharat is not India. Bharat lives in villages, while India resides in cities. Bharat is farms and suicides, and India is highrises and opulence. NRIs return to India and not Bharat, and unemployed youth migrate to India; leaving Bharat behind.



Abhishek Humbad



Richa Bajpai

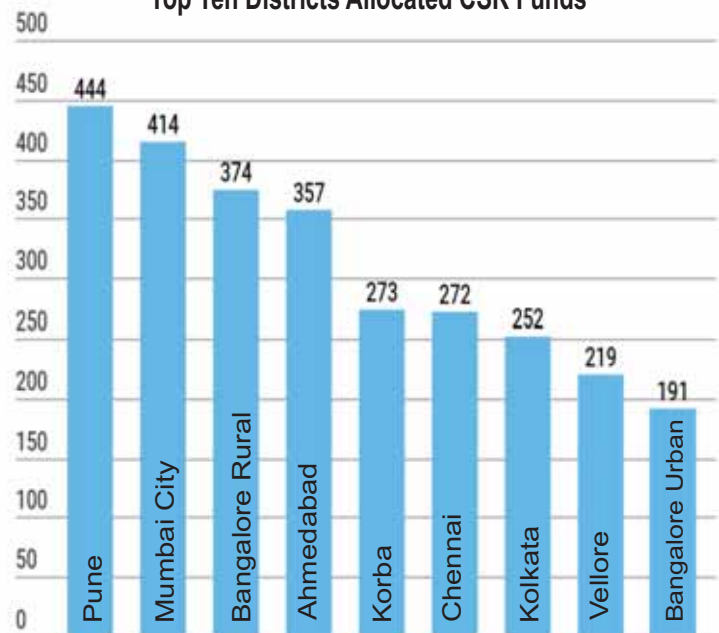
In 2013, when the Government of India directed companies to spend two percent of their net profits towards social development activities through CSR, Bharat thought it would soon become India. After about four years of this legislation, has it happened?

Corporate India – as per the Ministry of Corporate Affairs (MCA) – has spent more than INR 28,000 Crores on CSR during the period from April 2014 to November 2017<sup>1</sup>.

A report<sup>2</sup> shows that Maharashtra has received the biggest chunk of the total CSR fund spent in the country. It will be amusing for readers to know that Pune district tops the chart with the inflow of around INR 444 crore, followed by Mumbai City district (INR 414 crore), Bangalore rural district (INR 374 crore) and Ahmedabad district (INR 357 crore)<sup>3</sup>. Also, 1/3<sup>rd</sup> of India's total CSR spend is received by a mere four States - Rajasthan, Karnataka, Gujarat and Maharashtra – out of which three (barring Rajasthan), are the most developed States. Maharashtra is set to receive over Rs.7,400 Crore development sector boost through CSR<sup>4</sup>.

The most developed parts of our country are the recipients of the largest share of CSR funds. On the other

Top Ten Districts Allocated CSR Funds



<sup>1</sup> [https://economictimes.indiatimes.com/articleshow/63281080.cms?utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](https://economictimes.indiatimes.com/articleshow/63281080.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)

<sup>2</sup> <https://www.thehindubusinessline.com/companies/education-and-skill-development-the-most-preferred-areas-for-csr-funds/article24342946.ece>

<sup>3</sup> <https://www.cnbctv18.com/market/data/india-incs-csr-funding-embrace-wealthiest-cities-backward-districts-lag-behind-187401.htm>

<sup>4</sup> <https://www.thehindubusinessline.com/companies/education-and-skill-development-the-most-preferred-areas-for-csr-funds/article24342946.ece>



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Are companies choosing convenience of implementation over the real needs on the ground? Are they prioritising the needs of the communities? Or are they planning their CSR interventions to fulfil their global mandate?

”



hand, 19 districts of Jharkhand that are enlisted as most backward districts in the country, have not received any CSR funds till date.

#### **Sounds ironical? Let's assess why.**

India being a developing country – the need for social development interventions is omnipresent. There is a plethora of issues that our communities are facing which needs to be addressed. And these issues – be it lack of sanitation facilities, access to affordable healthcare or denial of basic human rights – knows no geographical boundaries such as rural or urban. Only the magnitude and spread varies. In such a scenario, companies have a vast choice of locations and cause areas to intervene and bring about change.

That brings us to discuss – how do companies choose the locations to implement their CSR programmes and causes to support?

Are companies choosing convenience of implementation over the real needs on the ground? Are they prioritising the needs of the communities? Or are they planning their CSR interventions to fulfil their global mandate? A deep-dive approach will help the programmes to become more sensitive

towards the needs. Needs are everywhere. Hence the efforts and investments also should align with the gravity of the issues. Companies need to move beyond their boundaries and assess the requirements and incorporate bottom-up approach in their CSR journeys.

While it is understandable that corporate entities prefer to work in the vicinity of their factories or offices for brand-building and giving back to the community they may have taken something from, the resultant concentration of CSR funds in and around cities leaves the vast majority of the country without any financial support. Many NGOs or organisations working at ground zero are denied CSR funds by companies since their work is *'not within a respectable distance from the companies'* offices. Companies normally prefer to limit their CSR activities within the radius of about 30 to 50 kilometres from their factories or offices<sup>5</sup>.

For companies, it is in their strategic interest that they invest their CSR funds limiting to their areas of operations. However, the negative impact of limiting CSR funds to certain geographies is all too visible. For

example, large parts of backward rural districts of Maharashtra, Andhra Pradesh, Madhya Pradesh and Uttar Pradesh have been facing a severe drought in this decade. Yet, it is mostly areas in Maharashtra that received corporate support, even though an equally severe drought was taking a toll on Bundelkhand in Uttar Pradesh<sup>6</sup>.

Having a credible and experienced implementation partner is critical for any company to deliver impact on ground through its CSR programmes. Hence, companies find it easier to join hands with well-known and large NGOs. This essentially leads to dearth of CSR funds for grassroots NGOs who are closest to the neediest communities. This results in concentration of funds where the large NGOs operate. Companies need to explore the expertise at ground zero by conducting thorough due diligence of the grassroots NGOs and partnering with them to focus on backward geographies.

CSR teams in companies are generally small who execute their budgets through on-ground partners. Hence, convenience of monitoring is one of the most important parameters for these companies when deciding

<sup>5</sup><https://www.livemint.com/Companies/dfGXjOUrgNakSZzLEHbUSP/Corporate-myopia-crimps-CSR-scope.html>

“

It is not only the locations, but Corporate India is biased towards the causes that it supports through CSR. MCA data shows that a big chunk of the CSR money which is almost 75 percent, is allocated to only three cause areas - education, health (including sanitation and water) and rural poverty alleviation. However, Schedule VII of Section 135 of The Companies Act 2013, mentions several more causes that the companies can support. This leads to several questions which the companies must attempt to ponder over. Is there some duplication of efforts and resources that can be arrested?

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locations for the CSR programmes. Programme management is a very time and effort-intensive activity which requires enough human resources – both on and off ground. With changing times, technology will be a boon for companies to optimally use their human resources for CSR. Technology can help companies to monitor programmes even in remote locations, at the click of a button and take prompt decisions. By leveraging technology platforms to design, manage and monitor CSR programmes, companies can now explore untouched geographies that are the neediest and least served in India.

It is not only the locations, but Corporate India is biased towards the causes that it supports through CSR. MCA data shows that a big chunk of the CSR money which is almost 75 percent, is allocated to only three cause areas - education, health (including sanitation and water) and rural poverty alleviation<sup>7</sup>. However, Schedule VII of Section 135 of The Companies Act 2013, mentions several more causes that the companies can support. This leads to several questions which the companies must attempt to ponder over. Is there some duplication of efforts and resources that can be arrested? Are there opportunities to learn from peers and their own

experiences and take them to unexplored geographies to catalyse social change there? Are there synergies that can be drawn between the work undertaken by local community-based organisations (CBOs) at remote locations and companies' CSR agenda? The CSR ecosystem needs to analyse what is stopping them to widen their social impact horizons.

The Companies Act 2013, Sec. 135 mentions that, “the company shall give preference to the local area and areas around where it operates, for spending the amount earmarked for Corporate Social Responsibility activities”. Having said that, companies in India are located only in a few major cities such as Mumbai, Delhi and Bengaluru. If one must only align with the recommendation from Sec. 135, large parts of 'Bharat' will be denied any benefit of CSR funds of companies located in 'India'. Companies – by ignoring Bharat from their CSR agenda – are losing a great opportunity to not only contribute towards the development goals, but also to develop rural markets for their products and goodwill for their brand. Businesses need to sync their CSR agendas with the real needs on the ground to create a tangible impact. ■

**Richa Bajpai and Abhishek Humbad** are  
Founders and Co-CEOs at Goodera



<sup>7</sup> <https://indianexpress.com/article/opinion/columns/indian-companies-act-corporate-social-responsibility-funds-csr-activity-5202579/>



# Every Drop Matter

## JanaJal Makes Safe Water a Reality for Every Indian

India has only three percent of the world's potable water, and the requirement for drinking water according to the Union Ministry of Water Resources is nearly 1100 billion cubic metres per year, which is estimated to be around 1200 billion cubic metres for the year 2025 and 1447 billion cubic metres for the year 2050. Looking at the alarming need for water, JanaJal has started water ATMs across many parts of India, offering some relief to water scarcity in semi-rural areas. It is a small but significant step towards bringing safe drinking water to citizens - a step that could be turned into a movement to make India water sufficient through joint efforts of citizens, NGOs and Corporate houses. **Parag Agarwal**, CMD and Founder of JanaJal, throws a light on how the Company is now serving 85 million people across rural and urban India.

**Since its inception in 2013, how many water ATMs has JanaJal established, and how many people have been positively impacted by this movement?**

Since our establishment in 2013, nearly 550 systems have been installed in a combination of safe water points and water ATMs. During the first two years, safe water points were being created under CSR support from various corporate houses and MNCs. Since 2015, we have only been installing water ATMs given the need for overall sustainability not only in terms of environment but also at the operating level including administering timely maintenance routines. Momentum gained post 2015, when we installed nearly 300 water ATMs, which include 101 at railway stations in Mumbai and Maharashtra region, 100 police stations in Mumbai and several in Gujarat, Delhi and Ghaziabad.

In the last six years, we have served nearly 85 million people across rural and urban areas in India. This number is expected to increase exponentially going forward with the cluster effect and use of digital mode of payments and prepaid cards across all water ATMs.

**Is there any payment required to access water from these ATMs? Can**

**people in rural areas afford it? How much does a family of four need for cooking and drinking?**

The essence of a water ATM is to make safe water available and accessible at an affordable price to the consumer so that they are able to procure the same in a consistent manner thereby uplifting their quality of life. Chilled safe water is made available in urban areas in various SKUs (Stock Keeping Units) such as 300 ml, 500 ml, one litre, two litres and five litres at a price of Rs.5 per litre. In rural areas, where mainly household level consumption is expected, the price of safe water at room temperature is reduced to as low as Re.1 per litre. The fact that IRCTC approved a uniform price of Rs.5 per litre across all railway stations in India after conducting all consumer affordability studies has been a landmark decision in favour of this sector. The regular feedback we receive confirms that people believe JanaJal water ATMs dispensing water at Rs.5 per litre is cheaper than free. People across every strata of society, including those that belong to the economically weaker sections, find this pricing extremely affordable and are now able to receive safe drinking water regularly. At the household level, it is understood that a family of four persons needs 20 litres per day to meet their drinking and cooking

needs. This is now easily available to them for as little as Rs.600 per month. Households now understand the power of safe water and its benefits such as savings on medical expenses, better health and wellness, higher economic productivity and above all, increased education for children due to higher attendance in school. It is globally acknowledged that increased availability and access to safe water can contribute the highest to the GDP of a nation.

**Rural India and remote rural areas are the most affected lot with little or almost no access to safe drinking water. How do you propose to cover them even if it is in Northern and Western India?**

The three most critical aspects about impact through safe drinking water are its availability, accessibility and affordability. While water ATMs are considered as the last mile connectivity, we have developed the WOW - Water on Wheels, a custom-built electric vehicle that delivers safe water to peoples' doorstep, thereby acting as an instrumental tool in providing last metre connectivity. We have invested a significant amount of time and money over the past two years to develop WOW which will be launched shortly. This will ensure increased reach within communities in







both urban as well as rural parts of the country.

**What is the average quantity collected by an individual per day, and how frequently do these ATMs dispense water? How do you keep them in working condition so service is not hampered?**

Every JanaJal water ATM can deliver safe water in different quantities such as 300 ml, 500 ml, one litre, five litres and 20 litres. Therefore, the consumer can choose to collect water in their preferred quantity at any time. It is seen that at places of transit such as railway stations, busy municipal areas, bus stands, etc. people prefer to collect chilled water in quantities of 500 ml and one litre. However, at locations surrounded by residential communities and urban slums, water is taken in quantities of five litres and

ten litres as it is easier to carry in terms of weight. Every water ATM has an operator that is present at the kiosk for 8-12 hours every day. The operator assist people in collecting water, educate them about the benefits, oversee and manage the upkeep of the system to ensure that any spillage or leakage is attended to immediately. Water ATMs are functional 24X7, but it is seen that off-take is very low or absent when it is functioning in auto-mode. Being an emerging concept, people are gradually getting accustomed to receiving water from a Water ATMs when it is unattended. This practice is expected to develop further over the next couple of years.

**Do you see a change on people's attitude and preference for safe water and a shift from bottled water to Water ATMs?**

There is a global movement against single-use plastic and the presence of micro-plastics in the human body due to consumption of food and water from packaged materials. Over the past four years, initiatives such as Swachh Bharat, and international bodies such as UN Water, WHO (World Health Organisation), besides several Foundations, have created tremendous awareness about the benefits and significance of safe water. Citizens are far more aware about adopting WASH (Water, Sanitation & Hygiene) practices for better health and wellness. Thus, the preference towards receiving drinking water from water ATMs versus packaged

water is rapidly growing.

**Water is a precious commodity, especially for our country where water bodies are contaminated. In such a situation, how much is it possible to have affordable drinking water? By when do you think India will have sufficient safe drinking water and clean water for use?**

JanaJal has worked relentlessly over the past five years to create awareness about unpackaged branded water sector in India. With census and demand being highly dynamic, it is very difficult to indicate when the country will be self-sufficient as far as its safe water needs are concerned. However, the Swachh Bharat initiative is a giant stride forward in that direction, and the water ATMs is the only way in which government agencies at all levels can mitigate the threat of corroded pipelines, rapid urban development and limited capacity of existing infrastructure of water treatment plants that are built and operated by various municipal corporations. High amount of emphasis has to be centred around building community water treatment plants and restricting the use of individual domestic RO systems as they cause tremendous losses on account of quality and quantity of water. However, our management team believe that with the advent of water ATMs supported by mobile water ATMs, India bears the potential to create the world's largest water sharing network by 2030. ■

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**There is a global movement against single-use plastic and the presence of micro-plastics in the human body due to consumption of food and water from packaged materials**

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# Safe Drinking Water: Foundation for Resilient Cities

Cities face a growing range of adversities and challenges in the 21st century, from the effects of increasing migrant populations to climate change, inadequate infrastructure, and pandemics. The availability of safe drinking water is prominent among them. Resilience is what enables cities to adapt and transform in the face of these challenges, helping them to prepare for both the expected and the unexpected. Safe Water Network develops market-based, community-level solutions that facilitate access of safe, affordable and reliable water to populations in need. In April 2018, 100 Resilient Cities (100RC), pioneered by the Rockefeller Foundation and the National Institute of Urban Affairs (NIUA), announced a formal partnership to expand collaborative resilience-building efforts in India. Safe drinking water supply is prominent among the adversities and challenges facing India, and the issue is expected to worsen.



Ravindra Sewak

The Niti Aayog Composite Water Management Index states, “54 percent of India's groundwater wells are declining and 21 major cities are expected to run out of groundwater as soon as 2020, affecting almost 100 million people.” While some claim the situation is not quite so serious, such a strong statement from a leading government policy think-tank cannot be taken lightly as well especially since it highlights that India is facing the worst water crisis in its history with millions of lives and livelihoods under threat. There are around 680 million people in India who lack access to tap water.

In India, nearly 17 percent of the urban population (65 million people) live in

slums and more than 50 percent of the 14 million urban poor families lack access to safe piped water supply. This gap in supply is often met by urban local bodies (ULBs) through provision of community-level standpipes or tankers. However, the quality of water from these sources is usually poor, and water supply is often available for only a few hours a day, resulting in increased costs from water-borne diseases and a lack of access for the poor. To overcome such problems, Safe Water Enterprises has emerged over the last few years because the government's plan of reaching *Har Ghar Jal 2030* yojana, approximately INR 4,96,200 crores of infrastructure investment is needed.

The Government of India launched

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54 percent of India's groundwater wells are declining and 21 major cities are expected to run out of groundwater as soon as 2020, affecting almost 100 million people

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several initiatives in 2015 to address the challenges resulting from the rapid pace of urbanisation, and to promote efforts aligned with achieving Sustainability Development Goal 6 (SDG 6), which addresses issues

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Building a future resilient city is not a matter of building infrastructure alone, but rather creating an environment to support partnerships between the government and the private sector, and to facilitate the implementation of local community initiatives

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pertaining to water and sanitation, and SDG 11, which deals with sustainable cities and communities. Besides this, an investment of Rs. 23,000 crores annually till 2030 (at present cost) and at the present financial outlays, will be required; implying that SDGs cannot solely be realised by NRDWP efforts. Among them are the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and the 100 Smart Cities Mission, which are aimed at recasting India's urban landscape and making urban areas livable, sustainable, smart, and inclusive. The Government has mapped locations and communities that need safe drinking water. They mainly help with infrastructure support and controlling of price point. They enable, with respect to land, raw water source surface tanker water in urban areas, and ground water in rural; existing buildings in rural areas that needs to be refurbished before housing the water treatment plant. In urban areas, usually moulded shelters/insulated kiosks are used to house the water treatment plant.

While these initiatives are critical, the Government of India also need to create a more conducive enabling environment for businesses to contribute to innovation, and for local community initiatives to thrive. Building a future resilient city is not a matter of building infrastructure alone, but rather creating an environment to support partnerships between the government and the private sector, and to facilitate the implementation of local community initiatives. The ULBs' priority has been to meet the piped water standard service level benchmark of 135 litres per capita per day, 24x7 safe water set by the Ministry of Urban Housing and Urban Affairs (MoHUA) for water supply. However, a large number of India's urban residents lack access to safe drinking water in sufficient quantity and on a sustainable basis. About 70 percent of municipal tap water consumers in India get only 69 LPCD for less than three hours per day. Showing another side of the picture, more than 50 percent of the 14 million urban poor families in slums

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To achieve the objective of safe water for resilient cities, small water enterprises (SWEs) need to be included in India's city planning

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do not have access to clean tap water at home despite ULBs' piped-water efforts.

As the rural population migrate to urban settlements, the water requirement per person more than triples with the standard for urban settlements at 135 LPCD vs. the standard for rural of 40 LPCD. Further, there will be a growing need for safe and sustainable water supply. The total water requirement to meet

the basic and essential needs of drinking and cooking of the migratory population across six major cities in India is expected to increase by 56 percent from 10,584 million litres per day in 2015 to 16,538 million litres per day in 2035. The willingness of at least 80 percent of the community to buy their daily can of 20L water at a monthly expense of INR150 and a conducive policy environment of the State government, district collector and the gram panchayat in the villages, municipal commissioner in cities that enables SWEs, is the most important factor for setting up Water ATMs. The two critical points are appropriate affordable pricing of Rs. 5/20L can and the availability of raw water for treatment. Additionally, if we get semi-skilled or skilled persons to operate and maintain the plant, the story then becomes sustainable.

Small water enterprises are a solution that can meaningfully contribute to

safe water supply and resilient cities. With the pace of urbanisation increasing, it is important for the Government of India to increase the number of urban local bodies to promote their role in the planning and development of urban areas, bring efficiency to the conduct of businesses and ensure effective service delivery for, and participation by the neediest population.

Hence, to achieve the objective of safe water for resilient cities, small water enterprises (SWEs) need to be included in India's city planning. A more conducive policy and enabling environment and regulatory framework is needed, and the government and the private sector need enhanced collaboration and partnerships for the advancement of SWEs. Urban small water enterprises (USWEs) can address the unmet need to provide high-quality treated water, complementing the government's piped-water efforts. These USWEs







Prof Jagan Shah, Director, National Institute of Urban Affairs: "Cities face a growing range of adversities and challenges. Resilience is what enables them to adapt and transform in the face of these challenges, helping them to prepare for both the expected and the unexpected. In April 2018, 100 Resilient Cities (100RC) pioneered by the Rockefeller Foundation and the National Institute of Urban Affairs (NIUA) announced a formal partnership to expand collaborative resilience-building efforts in India. Safe drinking water supply is prominent among the adversities and the challenges facing India especially as migration and the pace of growth of urban cities and slums accelerates. The current infrastructure broadly, and the provision of safe water supply specifically, are insufficient to meet the demands of the increasing population. The Government needs to create the most conducive enabling environment to facilitate opportunities for business to contribute to innovation, and for local community initiatives to thrive. Small water enterprises are one such initiative that can meaningfully contribute to safe water supply and resilient cities."

offer the dual advantage of providing reliable, safe, and affordable drinking water 24/7, as well as generating livelihoods. Additionally, Urban SWEs require a lower investment than an alternative supplemental water supply, and also reduce incidences of water-borne diseases, generate livelihoods, and prevent reliance on expensive plastic bottled water, thereby addressing the scourge of plastic pollution.

Including small water enterprises (SWEs) in urban planning for the creation of resilient cities expands the options for government provision of safe water and can facilitate direct investments and development in ways that will support the Government of

India's plan and contribute to urban growth and renewal. For a capital investment of roughly INR 4,000 crores (US\$592 million), 12 USWEs can provide 35 million people, or roughly half of all urban slum dwellers in India, with sustainable access to affordable, safe drinking water.

However, there is still the need to bring Urban SWEs into the picture in a larger format. For local governments to progress to implementing USWEs, there is a need to accelerate local action by addressing supply gaps, standardising approaches, mobilising financing, and forming key stakeholder coalitions. This includes empowering ULBs and setting up performance standards that can provide the basis for the ULBs and other regulatory bodies to measure and monitor USWEs. Digital tools can support efficient, systematic monitoring and evaluation efforts.

Making cities safe from disaster is everybody's business. Mayors, urban local bodies, and other government entities are the key players responsible for delivering essential services to their citizens (water, shelter, health, education, transportation, etc.) and for lessening the risk to cities and making them resilient against the effects of climate change, burgeoning populations, and safety issues. However, in addition to national and local governments, all institutions and

citizens-including associations - international, regional and civil society organisations; donors; the private sector; academia; and professional associations-have a role to play in reducing the risks that cities face. It will be through a collective effort by all of these key stakeholders that we will build resilient cities.

Though SWN has footprints in Maharashtra, Telangana, Uttar Pradesh, operating more than 300 water stations, the role of SWN is not just bound to providing clean drinking water, but also to spread awareness about the future of drinking water and challenges of local sustainability. We help them manage Safe Water Stations by guiding them towards preserving water resources for future generations so the next generation never face a situation such as Day Zero. ■

*Ravindra Sewak is Country Director, Safe Water Network India*

*Safe Water Network was co-founded in 2006 by actor and philanthropist Paul Newman, along with prominent civic and business leaders. SWN develops market-based, community-level solutions that facilitate access of safe, affordable and reliable water to populations in need. Its operating footprint of over 300 safe water systems, providing safe water access to over 800,000 people in Ghana and India, forms the basis for research and innovation to systematically address the challenges of local sustainability.*

*For more information, please visit [www.safewaternetwork.org](http://www.safewaternetwork.org)*



## Upgrading Quality of Life Through Grassroots Interventions

### Swades' Holistic Development Approach Brings Behavioural Change In Rural Communities

Water is the elixir of life. Despite being a water-rich country, India today faces a crisis of water in drinking, irrigation and sanitation. The UN Sustainable Development Goal #6, is aimed at achieving universal and equitable access to safe and affordable drinking water for all by 2030. The recently released 'Composite Water Management Report' by Niti Aayog does a commendable job of showing us the mirror. It points out that 600 million people are at extreme risk due to water-related distresses.

The two aspects leading to this risk are associated with access and safety. While access to water has improved markedly in recent years, with almost 87 percent of rural households having access to basic water, the provision of safe drinking water and every house having piped water, continue to remain

a challenge. Today, access to safe drinking water is absent for nearly 75 percent of the households in our country, while in rural areas, nearly 84 percent of households do not have access to piped water to cater to even their basic non-drinking needs. The second factor is safety. A testament to



Zarina Screwvala





Scarcity of drinking water and water for irrigation poses innumerable disadvantages to the rural community impacting every single individual in the family. It hinders economic growth and leads to various health problems which runs through generations



blocks (Mahad, Mangaon, Tala, Poladpur, Shrivardhan and Mhasla) of Raigad district in Maharashtra benefitting over 4,70,000 people. Our strength lies in the deep knowledge of problems in this geography, learnt through a decade of first-hand grassroots interventions. This geography that had poor sanitation facilities, poor agriculture output owing to no water for irrigation/second crop, no local livelihood opportunities, poor quality of education and healthcare, non-availability of drinking water for several months, mass migration etc. are now seeing vast improvement with the efforts of our focussed holistic development approach – the 360° model of development encompassing interventions in health, education, water & sanitation and economic development

#### Intervention in Water & Sanitation

Scarcity of drinking water and water for irrigation poses innumerable disadvantages to the rural community impacting every single individual in the family. It hinders economic growth and leads to various health problems which runs through generations. It also increases school drop-outs as women and girl child at households are primarily responsible to trudge a



this is the fact ~2,00,000 people die every year due to lack of access to safe drinking water. This is the reality today. If this is unnerving, the projections for the future are even more terrifying. The water demand in India is expected to double in the next 10-15 years. This will not only amplify the existing scarcity, where ~40 percent of our population will not have access to drinking water, it is also expected to lead to an economical loss, which amounts to a whopping six percent of our GDP.

On the other hand, India is still an agriculture-dependent economy where large numbers continue to derive their source of livelihood from farming. Agriculture alone uses ~90percent of the water in the country. In this situation with our food consumption rising and water depleting, the future we are heading to seems bleak.

The other aspect to the UN Sustainable

Development Goal #6 is access to adequate and equitable sanitation and hygiene for all, and end open defecation. According to the World Bank, more than 520 million people in India were defecating in the open – the highest number in the world. The Government in India has done a commendable job with its flagship programme - Swacchh Bharat Abhiyan - by building lakhs of toilets to rid the country of the menace of open defecation and the multitude of problems that accompany it. However, constructing toilets is just half the job done. The other half is inducing the behaviour change that drives people to use toilets and not defecate in the open.

As a grassroots implementation NGO, Swades Foundation's vision is to build a model for sustainable and irreversible change by empowering rural communities to become self-reliant. Currently, we work in six



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Children tend to suffer from health issues which can sap their learning abilities. By implementing infrastructural upgrades (separate toilets for boys and girls and drinking water stations) in 146 schools so far under this programme, we have ensured that no child drops out due to lack of basic facility at school

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distance each day to collect water from nearby sources. Owing to all these shortcomings, most youths migrate to nearby cities doing odd jobs to earn a living.

Our intervention in water has a two-pronged approach: water for drinking, and water for irrigation. For drinking water, we harness the existing water sources such as spring, open wells, dams and streams and draw water through pipes which are then delivered to each household through taps. We build ground storage reservoir or elevated storage reservoir with a capacity commensurate with the number of households in the area, with a standard of 200 litres water to every household each day.

The water project, once completed, is handed over to the Water Committee, which is formed at the beginning of the project comprising of equal representation of male/female, caste, religion, hamlets etc. Their role through the project involves ensuring progress of work against the implementation schedule. Post-handover, they maintain the infrastructure, undertake repairs (when needed), and in some instances,



ration water to households to ensure adequate availability of water during the summer months. Our efforts so far has enabled nearly 30,000 households access to potable water in their homes.

For bringing water into the fields, we undertake building of infrastructure like recharge-ponds, construct gate-type check dams on streams (seasonal tributaries) of short rivers ending into the Arabian Sea, with a robust grid of drip and flood irrigation helping farmers do a second crop in fruits/vegetables, and for some, even a third crop, thus enabling the farmer to reap more income out of his land. This initiatives has helped irrigate over 1,500 acres so far.

#### Sanitation

We are focussed on combatting the dire situation of open defecation and the subsequent negative health impact it has on individuals and the community as a whole. We work towards a total sanitation sustainability framework. We not only provide every household (HH) with access to a functional toilet at all times, but we also aim at bringing behavioural shift which would result in actual usage and upkeep.

The behavioural change continuum is manifested through a three-pronged push – individual level, government level, and institution level. The

community is at the core of this initiative and participate in every stage to ensure sustainability of the framework. After constructing toilets in 20,800+ HH across six blocks in Raigad, the number of HHs without toilets has come down to ~two percent basis government census.

There is another facet of this programme which has rural government-aided and unaided schools at its nerve centre where school-going children's right to education is impacted in many ways by poor infrastructural facilities and limited access to water, sanitation and hygiene. Children tend to suffer from health issues which can sap their learning abilities. By implementing infrastructural upgrades (separate toilets for boys and girls and drinking water stations) in 146 schools so far under this programme, we have ensured that no child drops out due to lack of basic facility at school.

Thanks to our partners - Tata Trusts, Reckitt Benckiser, HSBC India, Sun Pharmaceuticals, Deutsche Bank, HT Parekh Foundation, HDFC Bank, RBL Bank, SBI Capital Markets, Macquarie Group, Australian Aid and a few more who believed in us and supported our initiatives in Water & Sanitation.

#### Stories of Impact Anjana: Dignity Restored

Anjana Ashok Kasare is a 52-year-old widow from a small hamlet Tokarde in





Tala block of Raigad district. Her only son found a job in Mumbai through the Swades Direct Placement Skills Training Programme. As proud as she was for her son, living all by herself in the hamlet was challenging for her.

Devoid of a household toilet, she would trudge a long distance every day to relieve herself in the open. The daily embarrassment had become a part of life until she came across our sanitation programme in January 2016.

Motivated by the entire proposition, she agreed to give her donation (a small contribution to ensure buy-in while the major cost is borne by Swades and its partners) towards the programme. The toilet was completed within a month.

With her son placed in a decent job and toilet of her own at home, Anjana Kasare is now more content with her life.

### **Kashibai: A Deserving Gift After a Long Wait**

For 25 years, Kashibai Sopan Mhamunkar had to walk close to 1.5 kilometres downhill to collect water from a well for drinking and other household chores, and then trudge back uphill with her water-filled handa (pot); a tiring four hour commute in total, everyday.

A widowed mother of three whose children had migrated to Mumbai for



livelihood, Kashibai was fighting a very tough battle due to water scarcity, just as her fellow villagers were.

In 2017, the Swades team got in touch with her village representatives and informed them, among other things, the drinking water programme. The fact that the programme entailed providing drinking water through taps in every household felt like magic to them. The villagers agreed to contribute their share of donation and promptly submitted the request letter to Swades.

Swades immediately swung into

action. A geophysical survey was conducted to check the most viable spot for connecting the main source of water to the reservoir. This was completed in January 2018 – all within three months of obtaining the request letter. The reservoir connects the main source to ground storage reservoir using solar as a means to draw water to the reservoir. Each individual household in the small hamlet is now a recipient of tap water connection. In March 2018, Swades also trained Water Committees from the village to sustain and maintain the project.

This latest development has brought about positive changes in the village. Children who had to spend tiring hours post school to collect water, have been relieved of the stress. Furthermore, sanitation efforts in the hamlet have received a good boost due to availability of water. Family members who have migrated to Mumbai and other bigger towns are now more regular in their visits due to the availability of water, which was a rare sight before. The whole village is content beyond measure, and for 60 year old Kashibai, her life is more enriched now.

Our work in Water and Sanitation is well on track, and we aim to cover all households in our current geography with their toilet and drinking water requirements within the first half of the year. We are targeting March 2019 to meet the toilet numbers followed by June 2019 to make clean drinking water available for household in the area. Furthermore, we are empowering our communities through training on regular usage and upkeep of toilets to enable an open and defaecation-free geography. Moreover, through the water for irrigation initiative, we will continue to empower our farmers, helping them augment income by working on multiple crops. ■

*Zarina Screwvala is Founder Director of Swades Foundation*



# People Beyond Statistics: Why Quality of Life Matters

In a city that never sleeps, the garbage on Mumbai's streets also does not seem to be giving its citizens respite from the eyesore and cringing display of unhygienic, unabashed and contaminated mess. Eagles and crows circle the mound of trash, visible much before one is assaulted by its stench. Garbage piled high, strewn all over and sometimes collected into little heaps for clean-up, which happens ever so rarely.

None of this bothers 10-year-old Akshay and his mother as they make their way through the adjacent lanes.

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Choked drains, indiscriminate waste disposal and overflowing central waste container is attributed to a number of factors including poor conceptualisation of sanitation, lack of adequate sanitary facilities, ignorance and irresponsibility of individuals, households and communities, legal and illegal construction, large government infrastructure projects, and the rapid springing up of unauthorised temporary structures

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For years, the two have crossed these roads, knowing that this makes them vulnerable to infections and diseases. They have no choice. Living and working in the neighbourhood, they have made their senses immune to the trash.

Two girls buy vegetables from vendors sitting across the mound of garbage and stop to eat panipuri at the roadside vendor next to another trash collection bin that is shaping into a pile. One can find these trash piles near markets and houses all over the lanes and main roads.

Panning to a highrise nearby, we see Rashmi Shah sitting on a sofa near the French windows of her 12<sup>th</sup> floor apartment, sipping tea. She ignores the jarring view of a mountain of trash on the road opposite her apartment complex. She does not send her six year old daughter to the garden close by because of the trash dumped near it; instead her little girl is homebound, allowed to play only within the confines of the living room.



Meera Tenguria

Mumbai has a peculiar stinking smell which greets its visitors, irrespective of influence. According to an article in Mint, India generates over 150,000 tonnes of municipal solid waste (MSW) per day, with Mumbai being the world's fifth most wasteful city. Yet, only 83 percent of waste is collected, and less than 30 percent is treated. According to the World Bank, India's daily waste generation will reach 377,000 tonnes by 2025. Blame urbanisation or industrialisation; the consequences of India's mega cities producing tonnes of waste are troubling.

Choked drains, indiscriminate waste disposal and overflowing central



waste container is attributed to a number of factors including poor conceptualisation of sanitation, lack of adequate sanitary facilities, ignorance and irresponsibility of individuals, households and communities, legal and illegal construction, large government infrastructure projects, and the rapid springing up of unauthorised temporary structures. Other factors include an increasing number of squatters and indiscriminate street hawking. A large proportion of the waste generated in Mumbai is uncollected and ends up in the drainage system, water bodies and open spaces.

Initially perceived as peripheral to the city (South Mumbai), large parts of suburban Mumbai are now situated within the built-up area of the city with a high density population. With no proper urban planning, it has consequently led to haphazard growth due to the inability of city authorities to enforce construction and building standards. In addition, streets within the community have been encroached upon due to the absence of space within residential compounds.

In some areas, people continue to dump their refuse in the collection areas despite the containers being removed. Other households in the

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**It is becoming evident that waste is a serious multi-faceted development problem with direct implications on the achievement of the Millennium Development Goals (MDGs). While there have been extensive discussions about health and environmental implications of poor sanitation and waste management, relatively little has been said about the social impact of poor urban living environment**

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community also dump their garbage into drains and open spaces. In slum areas, individuals construct small gutters in front of their houses into which they throw their liquid waste. However, because these areas have no drainage system, this liquid waste stagnates, leading to mosquito breeding.

What is surprising are the roadside garbage dumps where cows feast on the refuse in upscale areas, major roads near swanky offices, temples and markets where thousands of people visit every day. The putrid piles of garbage all over the city stand as a landscape to be seen, but somehow ignored.

In Mumbai where more than 50 percent of the population live in slums, and more than two million people live in old dilapidated buildings, addressing garbage collection is a challenge. Besides, it is not just householders who throw garbage on the roads; shops, vegetable and food vendors, and piles of debris that is generated from redevelopment, construction and digging etc., find their way to the streets and every available open space.

According to an article in Mid-Day, currently, of the 7,200 metric tonnes of garbage that Mumbai generates daily and dumped at Deonar, Mulund and Kanjurmarg dumping grounds, 900 metric tonnes comes from Construction and Demolition (C&D) debris from construction sites. The C&D waste generated from infra and development projects are still unaccounted for. C&D waste is used to describe solid waste material generated from the construction and demolition of buildings. It includes everything from bricks, rocks, concrete and other masonry material to wood, plumbing fixtures and glass.

It is becoming evident that waste is a serious multi-faceted development problem with direct implications on the achievement of the Millennium Development Goals (MDGs). While there have been extensive discussions about health and environmental implications of poor sanitation and waste management, relatively little has been said about the social impact of poor urban living environment.



## Children

Given an opportunity, most children choose to play out in the open space. It is a basic human drive and is fundamental to children's development. The impossible surrounding environment they are greeted once they step out of their homes gives rise to many an ailment. Schooling is thus frequently interrupted, affecting their emotional and long term stability.

## Neighbourhoods

The quality of public space influences social interaction. When they are well-maintained, residents are able to utilise them. From a simple act of footpath access to street corners, activity by residents can inhibit anti-social behaviour making neighbourhoods safer and livelier places. In areas where trash and garbage overtake such spaces, community life breaks down and is being replaced by vandalism, drug use and criminal behaviour.

Behavioural, biological, cultural, economic, social, physical, and political factors influence urban health. Urban health invariably relates to living conditions, housing quality,

and poverty. The association of ill-health with areas of high deprivation in towns and cities is in part, a reflection of the state of the urbanecosystem.

## Commuting

On an average, Mumbaiers spend 40-45 minutes commuting every day. Added to the train and bus rides are the challenges of just walking for daily needs. Be it a walk from the house to the railway station, the market or the school, or just a stroll to the nearest garden; walking in this city is simply a nightmare. Garbage lying on the streets obstructs the smooth movement of vehicles and pedestrians. People have to walk on the main road to avoid the garbage that has taken over footpaths. It is not just harrowing, but risky for senior citizens and children to walk in several parts of the city; making it compulsory for them to be homebound. How wonderful it would be if the common man is gifted clean, unobstructed footpaths to walk along in every nook and corner of the city?

## Families

Anxiety and the frustrations imposed by sub-standard conditions can

undermine patience. Children and women can easily become victims of violence and abuse.

Garbage on the street has a significant effect on the day to day living of citizens - from making senior citizens and children homebound, to frustration and demotivation in people already weary after a long commute; helplessness of citizens in general; anger of the youth who have no place for simple social activities; the travails of women and girls as they jump around the garbage; the cost of medical treatments due to infections, and its economic impact on the household – the filth and debris slowly and steadily eating away at the spirit of the city...

Mumbai City needs to clean up so that the spirit can soar once again. ■

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# How Climate Change Drives Business Strategy

**“It is our responsibility as businesses to deliver ambitious solutions and technologies to bring us low-carbon, inclusive and sustainable growth.”**

**- Paul Polman**

According to renowned environmental author and journalist, Andrew Revkin, the author of *Weather: An illustrated History*, the relationship between climate change and humans has evolved. This relationship has been one dimensional for a great part of history. During the course of the relationship, climate patterns shifted, ice sheets, deserts, and coastlines advanced, extremes of drought, precipitation, and temperatures increased, and communities thrived, adapted, moved, or perished. Now, this has evolved further, and we are currently in a two-way relationship with climate. This transition to a two-way relationship began due to anthropological activities such as agriculture and industrialisation. These activities changed the landscapes drastically and led to altered weather patterns.



Ankush Patel



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Risk identification, management and mitigation will be the biggest factors defining the success of business; perhaps this is the reason investors focus on Socially Responsible Investments (SRI) and are exiting/divesting businesses that do not have a positive environmental and social impact.

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Changes in climate patterns have now reached a point where nations are suffering consequences in the form of forest fires, floods, cloud bursts, untimely rains, high-intensity cyclones etc. And it is not just nations or governments that are experiencing this: the effects of climate change can also be seen affecting businesses and economies at the regional and global level. According to a research report titled, 'Planetary Boundaries: Guiding Human Development on a Changing Planet', earth is moving towards a danger zone as humanity has crossed four of nine environmental boundaries that will cause irreversible changes on the planet. With physical changes like rise in temperatures, fluctuation in availability of water and food, climate change will also affect business processes, fixed assets like buildings and machinery, and availability of resources. Essentially, the overall productivity, efficiency and sustainability of any business will be impacted.



The Kerala floods not only affected people but also took a heavy toll on the value of property in the State. This was soon followed by Typhoon Jebi, the biggest Japan had seen in 25 years. Climate change does not discriminate regions and races, and affects all of us: the communities we work in, and the businesses we run; no matter which corner of the earth we live in.

Changes are being observed in the way businesses and communities adapt: waste water treatment plants in Miami are being rebuilt at higher altitudes due to rising sea levels; car parks are being reconstructed with flood gates owing to frequent flooding. As supply chains span the entire globe, natural calamities can affect the entire financial system. Disruption in business operations in one seemingly small region of a global company's operations can impact global financial performance. According to a business case published by Business for Social Responsibility, during the 2011 floods in Thailand, more than 14,500 companies reliant on Thai suppliers suffered business disruptions worldwide. Electronics manufacturers and auto companies were heavily impacted by this natural calamity; Weston Digital - with one third of the global hard drive market - lost 45 percent of its shipments. The meaning of risk for any business is now centred on sustainability (Environmental, Social, and Governance) more than ever before.

According to a study titled, "The Impact of Temperature on Productivity and Labour Supply: Evidence from Indian Manufacturing", published at Energy

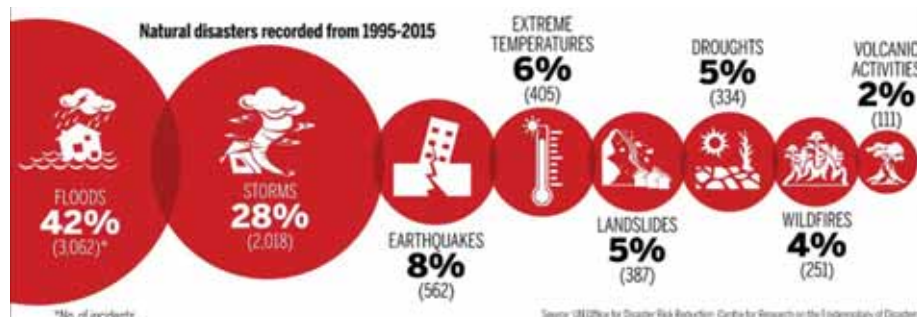
Policy Institute, University of Chicago, there has been a reduction in India's economic output during hot years. The study was conducted by analysing 15 years of data from over 70,000 production plants across India. This analysis has shown a decrease in the output value by three percent for every degree centigrade above the average temperature. Not identifying sustainability ESG (Environmental, Social and Governance) risks can possibly be the biggest risk or blind spot a business can have.

Risk identification, management and mitigation will be the biggest factors defining the success of business; perhaps this is the reason investors focus on Socially Responsible Investments (SRI) and are exiting/divesting businesses that do not have a positive environmental and social impact. According to a study conducted by PwC, more than 85 percent of institutional investors have considered a variety of sustainability issues in at least one, if not more, investment decisions in the past year. Businesses will be required to mitigate climate change by considering it as part of their business strategy and invest in preventive and management measures.

There are five factors which should be considered while devising a business strategy in the context of climate change:

#### Investment in Emission Control Systems

Establishing new emission control systems will be one of the most important steps in mitigating climate change despite the need for an





investment of considerably large amounts. This investment will be a saviour for the organisation and will have a high Return on Investment (ROI) while complying with government regulations.

#### **Considerable Changes in Goods and Services Costs**

Besides direct emissions and pollutants, climate change regulations also influence related businesses and services within a company's sphere of influence and vice versa. Lack of proactive planning and readiness can add considerable transportation and power costs, thereby leading to an increase in the price of goods and services.

#### **Loss of Biodiversity and Food Productivity**

Natural disasters are becoming more frequent, and it is predicted that the severity of these incidents would increase in the future. The effects of these changes will create dangers for oceanic shipping, which will add to the already existing damage to marine biodiversity. According to 2018 Global Food Policy Report by International Food Policy Research Institute, extreme weather conditions and rising temperatures are posing a tough challenge to India's food and nutrition security. Extreme weather conditions are known to cause damage to the fertility of established farming areas

leading to losses for agriculture firms.

#### **Fluctuating Consumer Demands**

Exponential rise in the earth's temperature is causing a sudden shift in regional temperature across continents; areas which used to witness extreme cold temperatures are now warming up and snow caps are reducing. Rising temperatures will affect the product demand across the globe; for example, the demand for cold weather products such as heating oil will reduce and there could be a rise in demand for medications and vaccines for vector-borne diseases such as dengue in Europe, West and Central Africa, and South America.

#### **Reputation**

Today, reputation is extremely important for businesses and consumers are increasingly becoming aware of companies they follow; both for purchases and investments. Public opinion is a key factor for businesses. Many organisations are working hard towards promoting their image as green and sustainable companies. For example, British Petroleum invested heavily in renewable energy and lower carbon opportunities to demonstrate their accountability and transformation after the Deepwater Horizon oil spill in the Gulf of Mexico.

While weighing the above five factors, global enterprises sometimes miss the

importance of using technology to mitigate climate change risks. Enterprise Risk Management is a core part of business strategy, and as established ESG risks are arguably some of the most important risks facing businesses, having a 360 degree view of sustainability data across the enterprise is critical to understanding ESG risks. Using technology solutions that make the most of advances in big data analytics, machine learning and AI to understand enterprise wide sustainability data, and make decisions that help advice and refine business strategy in the context of climate change will provide businesses a competitive advantage.

Climate change has become front and centre as a strategic issue for companies in the past decade, and only companies that recognise it as a strategic driver of business value will be in the best position to combat social and environmental risks imposed by climate change. The organisations that have already understood this and included climate change in their capital investment strategy for long term competitiveness will play an important role in addressing climate change and ensuring a better future for a thriving planet. ■

*Ankush Patel is the Co- Founder and CEO, Treeni Sustainability Solutions.*



## Timely Action Imperative to Save Environment and Reverse Anthropogenic Impacts on Ecosystem

Despite making significant efforts in lowering carbon footprints and bringing down pollution, India still ranks lower than many developing countries in terms of environmental health index. **Archana Sinha** examines the scenario.

Over the last decade, India's strong growth has increased employment opportunities and allowed millions to emerge from poverty, but it has clouded environmental health and taken a heavy toll on our natural resources. Environmental risks are wide-ranging, driven by the growing size and diversity of its economy and are inspired by both prosperity and poverty.

In a recent environmental survey of 178 countries whose environments were surveyed, India ranked 155th overall, and almost last in air pollution exposure. The survey also concluded that India's environmental quality is far below all BRICS countries [China (118), Brazil (77), Russia (73), and South Africa (72)].

Another WHO survey, across the G-20

economies revealed 13 of the 20 most polluted cities are in India. Poverty remains both a cause and consequence of resource degradation: agricultural yields are lower on degraded lands, and forests and grasslands are depleted as livelihood resources decline. To add to this woe, the poor are compelled to mine and overuse the limited resources available to them, creating a downward spiral of impoverishment and environmental degradation.

So as we are trying to pull ourselves out of poverty and increase growth, we are paying the price of worsened air and water quality apart from depleting our natural resources and other environmental gifts. We have posted victories over our poverty, yet our country needs to take big and significantly visible strides in bringing



Archana Sinha

its land and skies under the global standards of environment sustainability.

One of the key environmental issues facing India is heavy dependence on fossil fuels which emanate particle pollution from the combustion of these fuels. This has serious health



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Rivers and other waterways are getting increasingly polluted due to the excessive dumping of wastes into them. This has led to poor water quality for consumption

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consequences, and with the rapid growth in the economy, the impacts are increasing. While economic growth is imperative, it is interesting to note that pollution reduction measures actually could additionally aid economic growth.

Using an established Computable General Equilibrium model, it is understood that impacts of a tax on coal or on emissions of particles that the instruments using coal as fuel result in:

- A ten percent particulate emission reduction will lower GDP only modestly. GDP will be about \$46 billion lower in 2030 due to interventions, representing a loss of 0.3 percent compared to business as usual.
- A 30 percent particulate emission on the other hand reduction will lower GDP by about \$97 billion, or 0.7 percent.

- GDP growth rate will be negligibly reduced by about 0.02 to 0.04 percent in both scenarios. There will be significant health benefits under both scenarios which will compensate for the projected GDP loss.
- The savings from reduced health damages will range from \$105 billion in the 30 percent case and by \$24 billion with a ten percent reduction.
- Under the scenarios, another important benefit would be a substantial reduction in  $C_{o2}$  as a  $C_{o2}$  emissions reduction would have a minimal impact on GDP which would be offset by savings through improving health while substantially reducing carbon emissions and monetising  $C_{o2}$  footprints.

#### Four Crucial Functions of the Environment:

**Resource Supplier:** The environment contains both renewable (air, water, land) and non-renewable (fossil fuels) resources.

**Waste Assimilator:** Economic activities generate waste which the environment absorbs through natural processes.

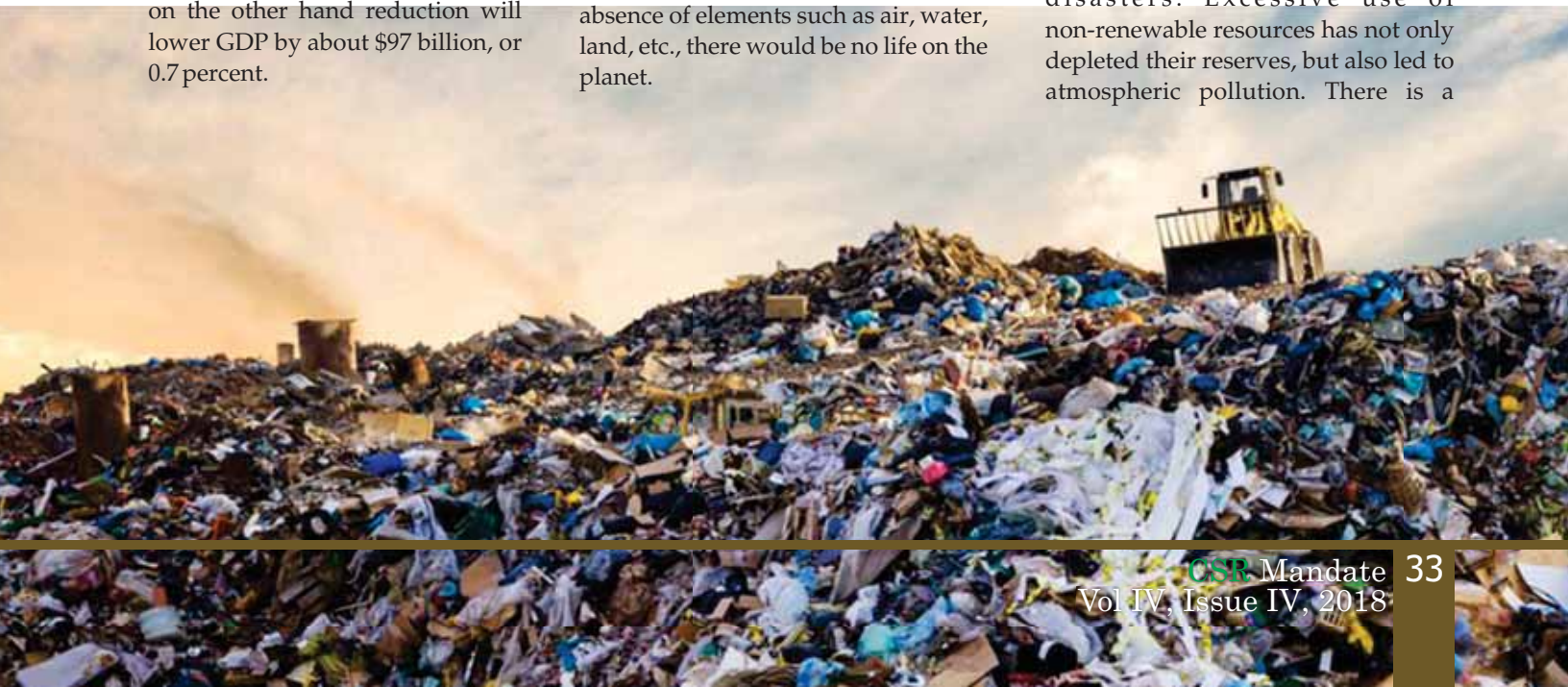
**Life Sustainer:** The environment comprises abiotic components that aid the living of biotic components. This applies to human life as well. In the absence of elements such as air, water, land, etc., there would be no life on the planet.



**Aesthetic Value:** The environment adds aesthetic value to life. The mountains, oceans, seas, landmasses and other scenery of the environment enhance quality of life. Rivers and other waterways are getting increasingly polluted due to the excessive dumping of wastes into them. This has led to poor water quality for consumption.

#### Adverse Effects of Development

**Global Warming:** Indiscriminate breaking down of mountains, infrastructure and agricultural expansion, logging, over population etc., are leading to deforestation; burning of coal and petroleum as fossil fuels have led to global warming and frequent occurrence of natural disasters. Excessive use of non-renewable resources has not only depleted their reserves, but also led to atmospheric pollution. There is a



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Model simulations suggest that policy interventions such as taxes on environmental destruction and use of natural resources could potentially be used to yield positive net environmental and health benefits with minimal economic costs. This needs tremendous vigilance, moral responsibility for each citizen, and immediate reporting of non-compliance with the norms.

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gradual increase in the lower atmosphere of the earth, and release of greenhouse gases like carbon dioxide into the atmosphere. These gases can absorb heat and thus contribute to global warming and melting of ice caps.

Ozone Layer Depletion is yet another phenomenon observed in the earth's stratosphere. The main cause is due to the release of chlorofluorocarbons (CFCs) into the atmosphere resulting in the earth getting more and more exposed to the ultraviolet rays of the sun which in turn are harmful to human health and are known to cause

skin cancer. They also affect the growth of aquatic and terrestrial plants.

#### Key Takeaways

**Green growth is necessary.** With cost of environmental degradation at US \$80 billion annually, or equivalent to 5.7 percent of GDP (recorded ten years ago), environment could become a major constraint in sustaining future economic growth. In fact, it may be impossible or prohibitively expensive to restore and reconstruct later.

**Green growth is affordable.** Model simulations suggest that policy interventions such as taxes on environmental destruction and use of natural resources could potentially be used to yield positive net environmental and health benefits with minimal economic costs. This needs tremendous vigilance, moral responsibility for each citizen, and immediate reporting of non-compliance with the norms.

**Green growth is desirable.** For an environmentally-sustainable future, India needs to value its natural resources and ecosystem services for which better and informed policies and decision-making is required as India is a hotspot of unique biodiversity and ecosystems.

**Green growth is measurable.** Conventional measures of growth do not adequately capture the environmental costs. Therefore, it is imperative to calculate Green Gross

Domestic Product (GGDP) as an index of economic growth with the environmental consequences factored in.

To understand the impact of economic growth and development on the environment, we need to be aware of the concept of sustainable development as an alternative solution. Resources are limited and therefore, their overutilisation is leading to their extinction. The waste generated is also exceeding the absorptive capacity of the environment.

#### Attaining Sustainability with Development

A low-emission, resource-efficient greening of the economy is possible at a very low cost in terms of GDP growth. Aggressive low-emission strategy comes at a slightly higher price tag for the economy while delivering greater benefits, but this offsets the impending high costing economy in the long run, delivering greater benefits.

Solar energy is an effective alternative that we can harness using photovoltaic cells. It is less costly and environmentally-friendly and does not impact the environment adversely. A shift to wind energy is also an option. Setting up windmills in areas with high-speed wind can help convert the natural resource into electricity for commercial or household usage. Another effective solution can come through the use of





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Only when the severity of the situation and a moral responsibility towards forthcoming generations is understood well can we act upon our agenda of working towards creating a sustainable environment seriously. The work has started, but we need to accelerate the process, and time is running out

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natural manure or bio-compost as a substitute for chemical fertilisers. This helps avert soil erosion and soil pollution. Subsidised LPG as a fuel in rural areas and CNG as a fuel for vehicles in urban areas could lead the way forward.

**Pollution Control:** Air, water, noise, soil are some of the major forms of pollution plaguing the environment today. Pollution control boards can be set up or regulatory standards must be enforced to keep pollution within the lowest levels.

**Forest Conservation:** Increased industrialisation has come at the cost of deforestation. The implication of

such actions is that the ecology is significantly affected. Afforestation measures need to be taken, and forest conservation regulations must be seriously implemented.

**Waste Management:** This must be carefully managed in urban areas. Methods of composting and separating non-biodegradable wastes have to be used rigorously. Reuse and recycling must be imposed with complete banning of plastic use for shopping and other such activities where alternative methods could be used. Rural waste has the potential of being used as natural manure by converting it into compost, and this has to be taught and encouraged as community activities.

**Water Management:** Rainwater harvesting and conservation of water can help with the long-term potent problem of scarcity of water. India has only a few glacial rivers; the rest of the rivers and water bodies are seasonal; hence, water has to be used with care. Groundwater recharging is yet another method of conserving and raising water levels in dry and arid areas.

**Social Awareness:** Until people are made aware of the gravity of the situation, the problem of environmental degradation cannot be dealt with. Creating awareness through campaigns and movements can help avert the problem of the ongoing environmental crisis.



**Implementation of Policy Programmes:** Enactment of environment-centric acts and policies is not enough; their effective implementation and careful observation are what will actually make a difference to environmental conservation efforts.

The rest of the change can come majorly through increased awareness and consciousness. Only when the severity of the situation and a moral responsibility towards forthcoming generations is understood well can we act upon our agenda of working towards creating a sustainable environment seriously. The work has started, but we need to accelerate the process, and time is running out. South East Asia, Africa and even the Middle Eastern countries are facing these problems. Yet India's ranking is still at the lower end of the index. We need to move faster. ■





“When you let your own  
light shine, you  
unconsciously  
give others permission  
to do the same.”

– Nelson Mandela

# Man on a Mission: Ecologist and Reformer

**Dhoom Singh Negi**



Every once in a while, a bright light appears in the sky, shining and leading the way as an example for others to follow; for others to see. With deep conviction towards a cause, daring to evoke change, sacrificing time, energy, family and comfort for the greater things they believe they need to do to bring about overall change in society; giving life greater significance.

Meet 79 year old Shri Dhoom Singh Negi. He hails from Pipaleth village in the Tehri Garhwal region of Uttarakhand. A passionate social worker, he is one of the pillars of the people's environmental movements in Uttarakhand and the Himalayan region.

A true Gandhian warrior, Negi is a confluence of an activist, sensitive writer, agriculturist, soldier, scientist and a sociologist who works with unwavering commitment. He contributed greatly to the Chipko Movement and later movements related to environment protection.

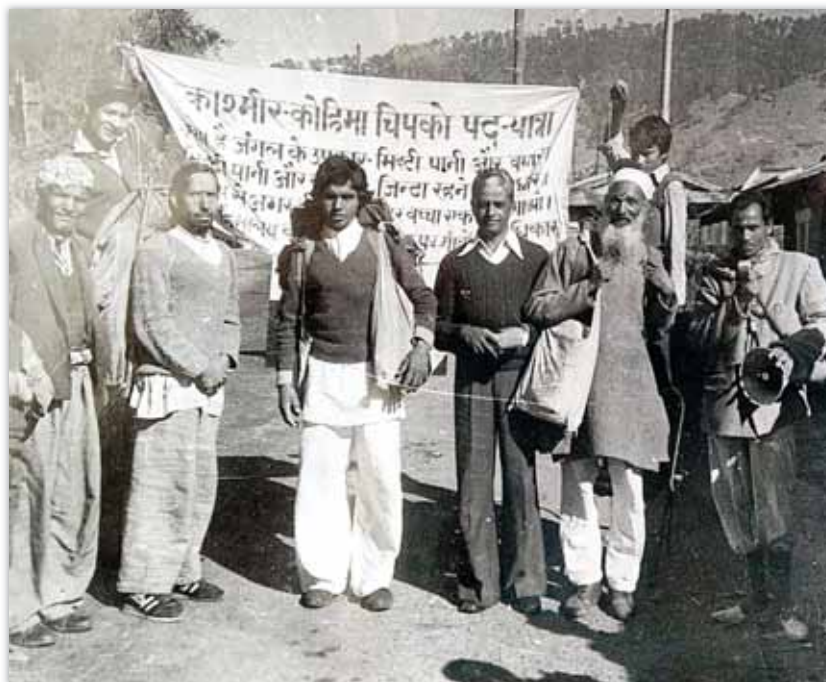
Guruji, as Dhoom Singh Negi is popularly known, was born in a moderate family. After completing his primary education, he went to Delhi and Kolkata to earn a living to support his family. When he returned to his village from Kolkata, he found out that there was need for a teacher, so he decided to take the job on a temporary basis. He worked as a primary school teacher in Manjiyadi village, Uttarakhand, and later on, he was a junior high school headmaster in Jajal. With the surroundings and the community being his laboratory for teaching and awakening, Dhoom Singh took the school to new heights.

In the mid-sixties, Dhoom Singh Negi participated and took along his students to old Tehri town for a dharna to impose liquor prohibition in the area. This resulted in them being jailed, but it did not deter him from the conviction in his heart to stand up against issues that are harming the society. He encouraged his students to take part in the cause of social reforms. He was confident that the new generation will emerge as nation builders.

The turning point in his life came when environmentalist and father of the Chipko Movement - Sunderlal Bahuguna along with eminent people of the Sarvodaya fraternity, started visiting schools. (The Chipko Movement began in Chamoli district of Uttarakhand in 1973). Bahuguna also visited the school Negi was teaching. It was through him that Negi was inspired and influenced to become a social worker. Negi took part in Gram Swaraj (Village Self-rule) of Gandhiji-Vinobaji, and actively participated in the many programmes of social transformation.

Negi later gave up his teaching profession to dedicate his life for a social cause. He joined the Sarvodaya Movement and became a committed Sarvodaya volunteer. Dhoom Singh Negi's Gandhian approach to look at the world around him made him an active participant in the various activities. He encouraged women to be in the forefront of the movement and was instrumental in forming Mahila Mangal Dal in the surrounding villages. He helped develop a new generation of people by sensitising women and youth. In 1974, Negi was made the Joint Secretary of the Chipko Movement. Alcoholism, untouchability, deforestation – were issues that were part of Chipko. He extraordinarily and extensively sensitised and mobilised the people on these issues.

Risks to life became a part of the norm. A prime example of this was in



December 1977 when the auctioned forests of Adwani, Narendranagar, Tehri Garhwal District, were to be commercially felled despite public discontent against it. Large groups of women led by Bachhni Devi came forward to save the forests. Interestingly, Bachhni Devi was the wife of the local village head, who was himself a contractor. Dhoom Singh Negi and his volunteers went to support the women's struggle against this action and started a fast in the forest itself. The officials withdrew then. A second attempt was planned by the contractors on February 1, 1978 with the help of two truckloads of armed police. When Negi got wind of the plan, he and his volunteers reached the forest. By the time the police and contractors arrived, they witnessed a sight never seen before. Each tree was being fiercely guarded by three volunteers. Whenever the designated labourers approached a tree with their axes, the activists would sound their drums and shouted slogans. They held on tightly to the trees even as the axes glitter in the sunlight. Seeing the determination of the volunteers, the police made a hasty retreat. The activists were willing to face the lathi or bullet to save the forest. His dedication, advocacy and



perseverance eventually led to banning of tree-felling above 1000 meters.

There were many instances when his life was at risk defending and prohibiting the commercial felling of trees.

Negi encouraged and promoted tree plantation for forest conservation in the Himalayan region. Nurseries were set up to distribute saplings/plants to



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“It is not the critic who counts; not the man who points out how the strong man stumbles, or where the doer of deeds could have done them better. The credit belongs to the man who is actually in the arena, whose face is marred by dust and sweat and blood; who strives valiantly; who errs, who comes short again and again, because there is no effort without error and shortcoming; but who does actually strive to do the deeds; who knows great enthusiasms, the great devotions; who spends himself in a worthy cause; who at the best knows in the end the triumph of high achievement, and who at the worst, if he fails, at least fails while daring greatly, so that his place shall never be with those cold and timid souls who neither know victory nor defeat.”

**Theodore Roosevelt**

25<sup>th</sup> President of the United States

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the villagers. Plants fulfilling the five F's viz. Food, Fodder, Fertiliser, Fuel and Fibre, were planted. Till date, 90 percent of these trees are still surviving.

Thus arose a movement - Beej Bachao Andolan (BBA) in the late 1980s, led by farmer and social activist Vijay Jardhari. The Andolan started in Jardhargaon village of Tehri district of Uttarakhand, famous for its unique movement to save the traditional seeds of the hills. This movement is not only a crusade to conserve traditional





Such forest satyagrahas took place in regions where survival of the local population was intimately linked with access to the forests, as in the Himalayas, the Western Ghats, and the Central Indian hills. Himalaya forest resources are the critical ecological elements in the vulnerable Himalayan ecosystem. The natural broadleaved and mixed forests have been central in maintaining water and soil stability under conditions of heavy seasonal rainfall. They have also provided the most significant input for sustainable agriculture and animal husbandry in the hills. Undoubtedly, the forests provide the material basis for the whole agro-pastoral economy of the hill villages. Green leaves and grass satisfy the fodder requirement of the farm animals whose dung provides the only source of nutrients for food crops. Dry twigs and branches are the only source of domestic cooking fuel. Agricultural implements and house frames require forest timber. The forests also provide large amounts of fruit, edible nuts, fibres and herbs for local consumption. (Excerpt from: The Evolution, Structure, and Impact of The Chipko Movement By Vandana Shiva and J. Bandyopadhyay)

seeds, but also to promote agriculture and local tradition.

Sharing his thoughts, Negi says, "I believe that humans have a lot of potential, a lot of possibility inside us. We just need to look inside ourselves to see what we can do, how much we can achieve, and what is our potential."

Dhoom Singh Negi did a deep study on the forests in the Himalayan region. He witnessed, and was concerned about the bonded forest labourers that were deprived of their rights by the forest contractors. This led to him working for the rights of the labourers. He wrote many articles on people's rights on forest and natural resources as a source of livelihood.

Negi also led the movement against illegal resin tapping as it was weakening and causing permanent damage to the trees. His Satyagraha was to oppose the illegal system and injustice based on science and ecological conservation. "Trees are our brothers. Injury caused to them has to be treated and cured." This ideology resulted in the State Government's decision to ban illegal

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The forest is a gift to us, and the soil, water and pure air are the gifts the forest has given us. It is our only means to stay alive. Save us from being looted. We managed to save our forests and even the government agreed to our plea of not cutting down the forests. Our fields, our soil are getting degraded and we need to improve them. Our seeds are disappearing. The Green Revolution took away our seeds from us. We wanted to save our seeds and we had a lot of it

Dhoom Singh Negi

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resin tapping and resin collection.

Between 1980-1982, Dhoom Singh Negi participated in a 300 day Padyatra of 4800 kms covering places across Jammu & Kashmir, Himachal Pradesh, and areas that are now part of Uttarakhand, and Nepal. The mission was to sensitise the government and people about the denuding Himalayan forests and its severe ill-effects.

In 1989-90, he actively participated in the Anti-Tehri Dam Movement. He was the President of Tehri Garhwal Sarvodaya Mandal. Post 1990, he became an active participant of the Seed Protection movement. His work for liquor ban, anti-mining and Greening Himalaya and related constructive works to save the mountains made him a veteran Sarvodaya worker.

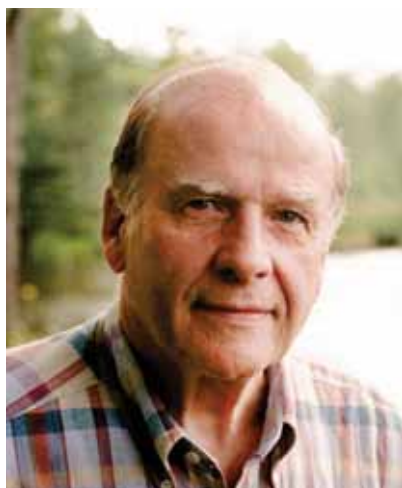
Apart from being a social and green activist, Negi is also a proactive writer. He has published articles in local newspapers and magazines to enlighten the people on the various social issues and needs.

Dhoom Singh Negi's voluntary work has been consistently going on for over four decades. An effective mobiliser and motivator, Dhoom Singh Negi's dream is Gram Swaraj and self-respect for all. He is a Satyagrahi, a devotee of Sarvodaya, social reformer - all in one - who has sacrificed his life to Mother Nature and the people's cause. His life mantra is that the Himalayas and the forests have to be saved. His values and actions have been revolving around community mobilisation making people realise the importance of collective responsibility in solving their own problems. ■



# Pathways to Green India:

## Innovative Ideas from Green Warriors



To emphasise the urgency of environmental protection, after witnessing the ravages of the 1969 massive oil spill in Santa Barbara, California, politician and environmentalist, Gaylord Nelson, the then U.S. Senator from Wisconsin, organised an event on April 22, 1970. The day witnessed 20 million Americans in colleges and universities, primary and secondary schools, and communities taking to the streets, parks, and auditoriums to demonstrate for a healthy, sustainable environment in massive coast-to-coast rallies. This momentous event known as Earth Day is one of the largest civic observances in the world with more than one billion people participating each year in Earth Day activities. Thus, emerge Earth Day Network, the NGO behind this movement. We now work with over 50,000 partners in 196 countries to broaden, diversify and mobilise the environmental movement.

We at Earth Day Network - India believe that our Earth's future relies on developing environmental learning opportunities for youth of all ages and backgrounds so that they can be wise stewards of the environment that sustains us today. To drive home the point, we have, through the years, showcase innovative ideas students, individuals, groups and communities have adopted to green India. Many of these are related to waste and water management, others to increasing the green cover, use of renewable energies, site orientation and materials, to the judicious use of resources (in one case, even discarded ones), increase of green cover and many more and more. We share with you four case studies on how individuals and groups have chosen to go from grey to green.

We invite you to read about these novel methods that have been adopted. Apart from being green and economical, all of the case studies are adaptable and replicable as well.





# Mother Earth



'The best way to encourage others to learn is by setting an example,' is an advice that has come down the ages. At St Mary's Ramganj Mandi School at Kota, Rajasthan, this saying was once again reinforced.

The school, run by the Franciscan community of nuns, is located in the rain shadow of the Desert State of Rajasthan. It is a member school of Tarumitra (Friends of Trees), a students' movement to protect and promote a healthy environment on earth. Started by students in 1988, the movement has spread far and wide to hundreds of schools and colleges all over India.

On a visit to Tarumitra's Biosphere Reserve, the Principal of St Mary's was amazed to see how nature grew abundantly, and more importantly, without the application of any of the harmful chemical fertilisers and pesticides that most growers continuously pumped into their fields. Only natural ones were used. Seeds sprouted in abundant numbers. Plants were healthy and survived the inroads of pests. 'What was it,' she wondered,

'that convinced farmers that the use of chemicals was essential to cultivation? 'Why is it that despite knowing that chemical use degrades the quality of the soil, people continue to go that way?'

The Principal of St Mary's School wanted to replicate the natural method at her school and decided to experiment growing wheat on a two-acre plot of the convent's land. If students at Tarumitra's headquarters could do this, she was convinced that her students could do it as well, regardless of the fact that Rajasthan was water scarce, and thus, any effort to grow anything would be doubly difficult. She wanted St Mary's School to engage in agricultural practices that did away with the use of poisonous pesticides and chemical fertilisers that create havoc both for the land as well as the inhabitants around. The Principal is convinced that people's health has deteriorated in the last 30-40 years and is inversely proportional to the expansion of the Green Revolution propagated in the country. She found support for this

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On a visit to Tarumitra's Biosphere Reserve, the Principal of St Mary's was amazed to see how nature grew abundantly, and more importantly, without the application of any of the harmful chemical fertilisers and pesticides that most growers continuously pumped into their fields

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from the doctors that practised in the hospital close by.

To encourage the students to pick up the shovel and not hesitate to dirty their hands while planting, the nuns at St Mary's decided to lead by example and began tilling the soil themselves. After all, Tarumitra had always taught





them to ask themselves, 'If not us, then who? If not now, then when? If not here, then where?' During the morning assembly, the Principal elaborated on how people traditionally respected nature and lived in harmony with it. She went on to explain that with the passage of time, this was fast disappearing.

She wanted the students to grow up with reverence for the land that supported them with food, water, and life. 'If this life-giving earth is not sacred, then what is?' she asked. She went to stress the point that loading the land with chemicals was not maintaining the planet's sanctity, but abusing it.

Enthused by their teachers, the students gladly came forward to prepare the land for sowing. Organic

manure made from dried leaves and cow dung was used. The Head Boy and the Head Girl of the school took the lead in procuring the seeds.

Amidst great jubilation, a local variety of wheat was sown. The neighbourhood farmers were amazed at the scene of nuns and students working on the land, determined to grow natural produce. Many local farmers came forward to offer free advice on how futile it would be to attempt this in arid Rajasthan. Everybody who mattered disagreed with the non-chemical method adopted and put forth several arguments in favour of continuing with the practice of loading the land with chemicals to ensure quick growth as well as protection to crops from pests.

The neighbourhood farmers continued to spread chemical fertilisers such as urea and sprayed pesticides in their farms. The school's community resisted the urge to follow suit. They stood steadfast in their resolve not to use these polluters. Their produce would be natural, not chemical-tainted.

With bated breath, the school waited

for the crop to turn green and tall. Then came the moment they had all been waiting for – the maturing and ripening of the wheat!

The harvesting was nothing short of a festival. After the threshing was completed, they found that to their amazement, they were blessed with 27 quintals of wheat! The by-product of over 10,000 worth of hay was a bonus. The seasoned neighbourhood farmers could not help but admit that the school's crop was the best harvest. They appreciated the fact that the school had achieved all this with so little investment as no money was spent to buy fertilisers and pesticides. The two-acre plot now serves as a natural classroom for environmental education.

The eco-friendly way of farming adequately demonstrates sustainable living in close proximity to nature. The students now understand that nature gives back abundantly when cared for.

The hands-on learning has inspired the students to spread the good word wider and deeper so that farmers in the area also turn to natural, agricultural systems and give up the old ways of chemical-fed farming.

## Zero Waste Himalaya

The Himalayan mountain range is awe-inspiring. It fascinates people across the globe and draws many to experience its breathtaking majestic stature first hand. The range is an area of pristine beauty, with biodiversity hotspots that teem with wondrous flora and fauna. It is rich in minerals and other natural resources. Considered an abode of the gods by Hindus, its vast snowfields and large glaciers are sources of several mighty rivers of Asia. It is no wonder that the area is considered sacred and revered: a truly

precious one that needs careful care and protection.

Modern technology has facilitated greater human mobility across the range. Where once people hesitated to tread as weather conditions are often inhospitable and the rock faces too treacherous, improved mountaineering equipment now available has opened up the area. It is a sad fact that the growing number of people traversing the Himalayas has upped the risk of increased amounts of





litter being left behind by careless humans.

In 2010, Zero Waste Himalaya was formed by a group of like-minded people who were concerned about the mounting waste (non-biodegradable items in particular), and the effect this polluting would have on the fragile eco-system of this once untouched area.

Sikkim, which nestles in the foothills of the Himalayas, seriously took up the initiative. The State is recognised as the greenest in India. It has the distinction of being among the first to ban the sale and use of plastic bags across its districts. In the past, people unceremoniously flung plastic products into drains and waterfalls. This was identified as a menace that resulted in blocked drains and landslides.

Young students and other members of Zero Waste Himalaya in Sikkim went a step further to also ban the sale of another polluting item—Styrofoam. This is the common name for products made from polystyrene, the petroleum-based compound that is moulded into disposable dishware and packing materials. It was a tall order as styrofoam is such a popular item, used not just in urban areas, but rural ones as well. Its features of being lightweight, relatively cheap, and easily disposable made it a hot favourite. For example, the use of styrofoam products at large functions ensured that the tedious and water-consuming task of washing up was done away with. All one had to do was pack the used items into garbage bags and cart them off to dumping sites. Long hours of labour was not required. Instead, the clean-up was completed in a jiffy.

Niraj Sapkota, a student member of Zero Waste Himalaya says, “Just imagine the burden on landfills with so much dumping? And, this is just one of the many disadvantages of using styrofoam. There are so many more,” he adds. Along with team



members, Niraj conducted a survey to see who the major users of styrofoam were. The answer was: *the common people*; particularly when large numbers of people are to be fed. The more affluent, the team concluded, could afford the luxury of using reusable crockery. They do not feel the pinch when they have to pay extra money to have someone wash the

crockery after use. Those with monetary limitations opted for styrofoam.

With the target group identified, the students began a house-to-house campaign. “We are champions at this,” said Niraj. With statistics and well-researched information in hand, the group trudged the streets of Gangtok, the capital of Sikkim, to make people understand why they thought another word for styrofoam was D-A-N-G-E-R. The material, injected as it is with gases, is definitely to be avoided. They explained that scientific research indicated that suspected carcinogenic matter present in styrofoam containers could percolate into hot or cold food or even beverages carried in them.

Continuous sensitisation of people was carried out—from the street to institutions. Exhibitions, public performances, and other effective mass communication channels were used to ensure that awareness reached a sizeable number of people. To approach the issue from another angle, food providers that people hired to cater for big feasts were persuaded to avoid serving in, and providing styrofoam dishes. Their standard response was that people ask for such. To counter this, caterers were persuaded to give a discount to those

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The determination of Zero Waste Himalaya members to see this material being done away with made them trudge for miles and miles; many pairs of shoes worn out, and many doors knocked on. Their zealotry and commitment to the cause came to fruition when in May 2016, the Government of Sikkim imposed a ban on the sale and use of styrofoam in the State  
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customers who opted to have their guests served in reusable items.

As the use of styrofoam was also common in rural areas, special campaigns were designed for outreach to rural populations. Sessions were programmed around village fairs and large gatherings such as those associated with the harvest festival. As in every journey towards change, there were many hurdles. The adamant nature of some was a big hindrance. They were just not willing to give up the use of styrofoam and brushed off the members of Zero Waste Himalaya saying that they were creating unnecessary hype about its dangers.

Sometimes, even if people wanted to make the change, circumstances prevent them from doing so, as in the case of the neighbouring town of Darjeeling. The 'No Styrofoam' campaign failed in this area as, unlike Sikkim, Darjeeling is water-scarce. "The people of Darjeeling were compelled to implement use and throw away items," says Niraj.

The determination of Zero Waste Himalaya members to see this material being done away with made them trudged for miles and miles; many pairs of shoes worn out, and many doors knocked on. Their zealousness and commitment to the cause came to

fruition when in May 2016, the Government of Sikkim imposed a ban on the sale and use of styrofoam in the State. Niraj and the team are however cautious about celebrating this victory. They understand that a law often needs strong enforcement. Their next step, therefore, is to hold another survey. This time to document how many people have actually made the change. "If many have, then we can celebrate," Niraj says. "There will be many instances where people will discourage us, but for me, it will not matter. I will stand by my pledge to get rid of harmful waste in the beautiful Himalayas. I am a Waste Warrior after all," Niraj says.

## Putting India First

Sustainability is embedded in the heart of ITC's business model. ITC's abiding vision to create larger societal value has powered a multi-pronged strategy that fosters innovative interventions that support sustainable livelihood creation while enriching the environment at the same time. The Company measures its performance along the triple bottom line that builds and enriches the country's economic, environmental and social capital. ITC has been carbon, water and solid waste recycling positive for the last 12, 15 and 10 years, respectively—the sole company in the world to have achieved these milestones. Moreover, it has created sustainable livelihoods for over six million people.

ITC's commitment to creating larger societal value is manifest in its innovative interventions, which are aimed at providing livelihood security and ensuring environmental replenishment. These large-scale efforts encompass agricultural and rural communities residing near ITC's agri-sourcing operations or near its production units. Agriculture, which forms a major share of India's

economy, remains to a large extent, dependent upon natural resources; in particular, water. With almost half of India reeling under severe water stress for decades, agriculture continues to be in the grip of a crisis.

Recognising the critical role that water resources play in ensuring sustainable development and inclusive growth, especially for the farming community, ITC set itself a target in the late 1990s to be water positive by 2003. The Company achieved this target and has maintained its water positive status for many years since then.

A two-pronged strategy was adopted

to achieve this. At one level, ITC focused on reducing the net water consumption at all its manufacturing units. Technology upgrades improved water efficiency. The intake of fresh water was reduced. Practices were implemented to increase water reuse and recycling. ITC spearheaded rainwater harvesting systems and worked toward zero effluent discharge.

The second prong had ITC implement large-scale watershed development programmes in its catchment areas. In 2001, ITC launched its Integrated Watershed Development Programme,





which revives, builds and maintains water-harvesting structures so that land degradation is reversed, critical irrigation is extended, and agricultural productivity is raised. It facilitates community-based participation in planning and executing projects. Currently, the total water harvesting potential created by ITC is over three times the net water consumption by its operations.

ITC works with NGOs to mobilise local people to form Water User Groups, trained to carry out the entire spectrum of activities: from planning to execution and maintenance of water harvesting structures. Ways to formulate regulations and fix water user charges are additional skills imparted to the members. The funds are used to maintain existing structures and build new ones.

The model is highly replicable and scalable as traditional methods and modern techniques combine to build location-specific, low-cost water harvesting structures, relying on simple technologies and locally-available materials. The participation and contribution of local communities, both in terms of finance and labour, along with the creation of a maintenance fund from user charges, generate high levels of ownership. This is crucial to long-term sustainability of the projects.

The benefits of the programme are both multiple and multi-dimensional. Employment is generated by the

requirement of civil work for the structures, and by increased availability of water for farming activities. This helps benefit the marginal/landless, a key factor in reducing seasonal outmigration. The areas see improvements in both quality and quantity of natural resources, enhanced green cover and restored soil health. The availability of water resources also contributes to farmer incomes through increased productivity.

Take, for example, ITC's Social Investment Programme, Mission Sunehra Kal (Mission Golden Tomorrow) in the Sehore district of Madhya Pradesh. Launched in 2003-04, the objective was to enhance land productivity and thus farm incomes as well as augment non-farm incomes through the creation of alternative livelihood opportunities. A beginning was made with Integrated Watershed Development and Livestock Development programmes. The project was later scaled up to include Sustainable Agriculture Practices and Climate Smart Agriculture, as well as Community Development initiatives such as the Empowerment of Ultra Poor Women, Vocational Training, Health and Sanitation.

At present, four soil and moisture conservation projects cover 55,280 acres in 66 villages in Sehore. Altogether, 70 stop dams, 161 irrigation tanks, 11 check dams,

495 farm ponds, 141 group wells, and 99 well recharge units have been constructed as part of the projects. To date, the programme has benefitted 2,500 families by treating 19,148 acres of land. These activities have generated over 170,000 person days of employment.

According to a third-party impact assessment study, ITC's interventions in Sehore have had a significant impact on major economic indicators in the area, namely, improvement in the yield of crops, improvement in net income from agriculture and non-agriculture sources. The report further indicates that other than village development, the bio-physical condition of the villages has shown improvement - groundwater levels have improved, and so has soil quality. Soil erosion has been reduced; there is an improved supply of water and irrigation facilities that in turn have contributed to increased income and more productivity. Social harmony has also increased, and along with it, the awareness of the benefits of the programme. Simultaneously, health and hygiene, education and the overall living conditions of the people have also shown considerable improvement.

ITC's Integrated Watershed Development Programme currently covers over 822,000 acres in 12 States with over 11,000 rainwater harvesting structures. It has benefitted over 26,100 households and created over 5,600,000 person days of employment. The programme has received several awards and accolades, the latest being the Best Practices Award for Sustainable Development Goal (SDG) 15 - Life on Land, for ITC's Integrated Natural Resource Management Programme, which covers its initiatives in Watershed Development and Afforestation by the United Nations Global Compact Network India (UN-GCNI). The Company proves that aims can be achieved. And in the case of ITC, it lives by its credo of "Putting India First".



# The Mountains Reach the Plains

Kamal Meattle, the Chairperson of the Paharpur Business Centre (PBC) is a resident of Delhi. Some 20 years ago, he began to suffer from respiratory distress. His lung capacity had dropped significantly causing chest congestion and breathing problems. All the doctors he consulted made the same diagnosis—his breathlessness was due to the high levels of pollutants in the air, in particular, benzene. Doctors were unanimous in zeroing in on one possible remedy: **Leave Delhi**. However, Kamal Meattle is not one to abandon ship so quickly. He had read about the Clean Air Study led by the National Aeronautics and Space Administration (NASA) and wondered if that could provide a solution.

NASA scientists researched for years to find evidence that confirms that plants could serve the need for biological life support systems aboard orbiting space stations. How could biological processes help solve environmental problems, both on earth and in space habitats, they wondered? The results were a revelation. Data that emerged from the study concluded that common plants had the capacity to purify and revitalise closed spaces, as the tiny openings in their leaves act as filters that absorb contaminants present in the air. Could these findings help Kamal Meattle improve the air quality around him? Armed with this information, he worked with experts at the Indian Institute of Technology and The Energy Research Institute in Delhi to identify locally available plants that can naturally remove toxic agents such as benzene, formaldehyde and trichloroethylene from indoor air and also help neutralise the effects of the sick building syndrome so that there is improved Indoor Air Quality (IAQ).

Three plants were shortlisted: Money Plant (*Epipremnum aureum*), Mother-



in-law's Tongue (*Sansevieria laurentii*) and Areca Palm (*Dypsis lutescens*). All three help remove chemical toxins from indoor air and also oxygenate it. Each converts carbon dioxide (CO<sub>2</sub>) into oxygen (O<sub>2</sub>). Money Plant and Areca Palm perform the conversion during the day, while Mother-in-law's Tongue (also known as the Bedroom Plant) does it at night. The *miracle*



**By placing over 7000 air-purifying plants all over the building, the decades-old PBC sees a significant reduction in the quantum of air pollutants such as carbon dioxide, in levels of fungus and bacteria, and also of particulate matter. To ensure the continuous availability of plants, PBC has a rooftop greenhouse with vertical green walls of plants. All this helps PBC grow fresh air**



*workers*, as Meattle calls them, have helped create mountain-like fresh air for the occupants of PBC offices in Delhi. This, despite the fact that PBC is located in the heart of a bustling commercial hub that sees a footfall of 100,000 people every day! High counts of Particulate Matter levels (2.5 and 10), sulphur oxides, nitrogen oxides, volatile organic compounds, ozone and more are expected. However, the PBC team has still managed to create a healthy micro-climate inside and outside the building that brings about good indoor air quality.

By placing over 7000 air-purifying plants all over the building, the decades-old PBC sees a significant reduction in the quantum of air pollutants such as carbon dioxide, in levels of fungus and bacteria, and also of particulate matter. To ensure the continuous availability of plants, PBC has a rooftop greenhouse with vertical green walls of plants. All this helps PBC grow fresh air. The brilliant outcome of plant use has earned for PBC the distinction of receiving the National Australian Built Environment Rating System certification for good Indoor Environment Quality - the only building outside Australia to receive this.



PBC's Management adheres to the thought that better offices make for better thinking. The Central Pollution Control Board, Ministry of Environment Forest and Climate Change, Government of India, and the Chittaranjan National Cancer Institute, Kolkata, tested the air quality at PBC over a two-year period. Their conclusions were that the good IAQ has brought about a reduction of 52 percent in incidences of eye irritation, 34 percent in respiratory problems, 24 percent in headaches, 12 percent in impaired lung functions, and 9 percent in asthmatic attacks. The improved health parameters have brought about a 20 percent increase in productivity of those who work in PBC. This matches studies by Harvard Centre for Health & Environment and others that conclude that lowered CO<sub>2</sub> levels coupled with lower pollutants



in buildings raise cognitive scores when compared to conventional buildings.

PBC is today a model of *Health and Wellness at Work*. It, along with its 27 support services, is certified with ISO:9001, 14001, 22000; SA 8000; OHSAS 18001; and Food Safety and Standards Authority of India. It is also

a signatory to the United Nations Global Compact (UNGC) and Women's Empowerment Principles (WEP), and the only one from the Micro Small and Medium Enterprise category among the six signatories to WEP from India. It also became India's first Healthy and Sustainable Operational building to get CETEC 5-Palm Rating.

Research is ongoing to identify other plants to add so that the air quality improves even more. While each plant comes with its own health benefits, each also needs special care to grow. In order to help other spaces also get mountain-quality air, PBC has incubated Breathe Easy, ([www.breathes easylabs.com](http://www.breathes easylabs.com)). The Company offers a wide range of products and services as solutions to purify air. ■

Credit: Earth Day Network, India

## NEWS

# Splash and Natur-Tec Pioneer New Sustainable Garment Packaging Solution

Splash, a brand owned by the Landmark Group, has partnered with Natur-Tec, to pioneer a new sustainable biopolymer-based packaging solution in India, South Asia and Middle East.

The brand's 80 million polybags a year have been replaced with bioplastics - a bio-based and compostable plastic alternative to conventional plastics. The bio-based carbon is helping reduce 298 tons of carbon dioxide emissions a year. At the end of a useful life, these eco-friendly bags are safely and completely digested (biodegraded) by macro and micro-organisms in natural composting and soil disposal. This approach reduces the carbon footprint of the company's packaging and provides for an environmentally responsible end-of-life through composting. The

Company's new approach is in line with the Circular Economy model and eliminates leakage into the ocean environment and landfills.

Use of conventional plastics such as polyethylene and polypropylene are facing harsh societal and political criticism due to environmental and waste-disposal concerns. As widely reported in print, electronic, and social



media, these non-degradable plastics find their way into the oceans and negatively affect marine eco system and habitats. As a result, demand for certified biodegradable and compostable packaging is expected to become the norm.

"This alliance promises to bring significant benefits to both parties," said Vineet Dalal, Vice President for NTIC. "Natur-Tec has internationally recognised expertise and patented technologies in the bioplastics space, while Landmark Group is a global leader in the Retail and Hospitality segments with a dominant position globally. The combination of these unique and complementary capabilities, has allowed us to develop an innovative biopolymer-based packaging solution." ■

# Road to Resilience

## Using Nature-Based Solutions to Mitigate Disasters

Every year, disasters put millions across the globe at risk and cause trillions in economic losses. The impacts of climate change are only magnifying the frequency, intensity and magnitude of such disasters. According to the UN Office for Disaster Risk Reduction (UNISDR), in the past 20 years, 90 percent of major disasters have been caused by weather-related events such as heatwaves, storms, floods and droughts.

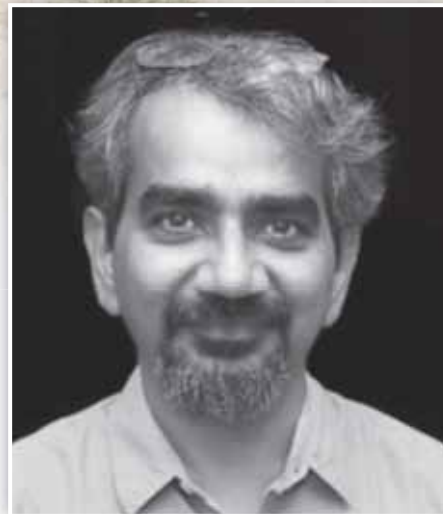
Sustainability is often defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Our pace of development and our changing climate bode that the future may be unlike anything we have seen in the past. Anticipating risks, being prepared individually and collectively, recovering when hit, and thriving in spite of everything, is the way to move ahead. This is the essence of a resilient society.

The unprecedented impact of the floods in Kerala is the latest example. Extreme rainfall, exacerbated by the discharge of large volumes of water from dams, build-up in low-lying areas and degradation of natural ecosystems caused havoc. Such damage can be minimised by nature-based solutions that complement conventional engineering measures.

As the humanitarian relief is now complete and Kerala is getting back on

its feet, it is crucial to also consider the long-term reconstruction effort that will need to follow swiftly. The crisis must not be allowed to hamper Kerala's impressive social and economic development. If anything, the reconstruction process should be geared towards allowing for better means of growth, developing the



Anshu Sharma







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The Western Ghats, which have traditionally served as a water reservoir for Kerala and five other States, were the subject of a 2010 environmental protection assessment report which recommended a ban on mining and stone quarrying, and limited various economic activities in the Ghats.

However, the report was not implemented and subsequently did not see the light of the day, leading to ignoring the environment and continued exploitation of natural resources and resultant degradation of shock absorption capacity of the catchment areas

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physical, institutional and human infrastructure to facilitate achieving long-term goals. As the Member of Parliament from Kerala's capital - Thiruvananthapuram, Shashi

Tharoor, suggested, five 'R's need to be addressed — *rescue, relief, risk, rehabilitation and rebuilding*. Further, humanitarian and reconstruction interventions must not be thought of independently, but rather as a continuum aiming to rebuild Kerala better.

The reconstruction process must consider both existing, but also future environmental needs. Unfortunately, we must consider the possible repetition of such events, with the torrential rains that Kerala has received being only part of a pattern of increasingly violent natural hazards backed by a runaway climate change. A deeper understanding will therefore need to be developed to anticipate the future occurrence of such climatological events, and reconstruction will have to internalise those projections.

Industry pioneers have already gotten into the skin of the matter and some of them agree that the impact of the floods could have been mitigated if prior environmental assessments had not been ignored. For example, the Western Ghats, which have traditionally served as a water reservoir for Kerala and five other States, were the subject of a 2010 environmental protection assessment report which recommended a ban on mining and stone quarrying, and limited various economic activities in

the Ghats. However, the report was not implemented and subsequently did not see the light of the day, leading to ignoring the environment and continued exploitation of natural resources and resultant degradation of shock absorption capacity of the catchment areas. It is believed that ignoring these environmental warnings may have contributed to the scale of flooding and destruction that Kerala has seen after a century.

As a country, India does not have any articulate policy on environmental protection from the climate and disaster perspective. Without a clear environmental protocol especially for different regions, there will never be clarity on approval which can be either granted, or denied, within a short period. That said, looking at the environment after such cases is a necessity. An urgent reversal of the trend is crucial — not only for disaster prevention, but also for economic and human sustainability as part of our commitment to the Sustainable Development Goals (SDGs).

Coming back to the discussion on Kerala, where rehabilitation is the task at hand, this is probably the best time to relook at nature to be integrated as a way of life. Repair and construction of homes and infrastructure should thus look beyond reconstruction the way things were, but to build according to where we want to go. The first step

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would be to study past experiences around the world and avoid common mistakes that would curtail Kerala's path to development, while closely studying the situation on the ground before and after the floods to devise suitable pathways forward.

As part of the recovery phase, it is vital to focus on environmental and ecological aspects, and hence, nature-based solutions appear as a priority in the programme development. Nature-based solutions refers to the sustainable management



which is inspired and supported by nature and are cost-effective, simultaneously providing environmental, social and economic benefits and help build resilience to tackle socio-environmental challenges such as climate change, water security and quality, food security, human health, and disaster risk management.

To use nature-based solutions effectively in a context like Kerala, some key aspects to be considered:

### 1. Green slope stabilisation in hilly areas prone to landslides

Landslides in various parts of Kerala were a major cause of destruction during the floods that took place. The incidents in districts like Wayanad and Idukki wiped out a number of houses and took a large share of the lives lost

in the disaster. Landslides in Kerala are a result of deforestation, erosion, run-off as well as narrowing of buffer zones between slopes and hamlets. Taking this issue into consideration, while engineering-based solutions such as retaining walls are technically and financially unviable, green slope stabilisation using geo-fibre, fast growing and deep root plantation such as vetiver grass, and subsequent propagation of native species of trees is necessary for times to come. These nature-based solutions are not only environmentally very suitable and sustainable, but can also be implemented widely through community participation.

### 2. Stabilisation of embankments to avoid breaches

The torrential rainfall brought along with it a sudden change in the course of water flow, leading to a number of hamlets getting hit during that time due to breaching of low earthen embankments. Taking the case into regard, appropriate pitching of embankment slopes, ensuring that there is no scouring at their bases, and plantation to avoid erosion and disintegration can help strengthen them and avoid such incidences in future. Additionally, there would be added benefits from native and fruit bearing plantations along embankments.





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Mangroves are very effective in mitigating the impact of storm surges and tsunamis, while native fruit-bearing trees are said to form very effective buffer plantations both for coastal as well as inland habitations. This approach has proved to be very effective during the 2004 tsunami and a number of other disasters

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### 3. Flood-resistant water harvesting systems

A major problem during and immediately after the floods has been the contamination of water. All wells in the affected areas are contaminated and while there is water all around, it is not drinkable; making the situation absolutely dire. Adding on to these woes are the ongoing news that one hears on leptospirosis outbreak in the flood-affected areas. In such a situation, the people who have battled one of Kerala's biggest catastrophes

are surviving without proper drinking water and sanitation. Hence, looking back at nature and installing water harvesting, filtration and storage systems both at community and household levels can ensure that during cyclones and heavy rainfall, sufficient amounts of water is collected that can be used in the following days while contaminated sources are cleaned.

### 4. Coastal and inland buffer plantations

No matter how much we progress in the field of technology to initiate disaster mitigation processes which are sustainable and scalable, the actual tricks lie with nature. For example, mangroves are very effective in mitigating the impact of storm surges and tsunamis, while native fruit-bearing trees are said to form very effective buffer plantations both for coastal as well as inland habitations. This approach has proved to be very effective during the 2004 tsunami and a number of other disasters. Community-based approaches to generate and maintain such plantations are proposed as a resilience feature using nature as a tactic.

### 5. Risk sensitive land-use planning

While the above discussed pointers with nature in the background are necessary, a holistic land-use planning approach for towns and villages that

includes risk assessment and informed planning is of prime importance to lower the impact of disasters in the future. Shelter reconstruction, infrastructure development, lifeline buildings like schools etc., can be effective long-term tools for safe development and disaster resilience. With strong panchayats and community engagement potential, Kerala can set a model for such an approach. The interest is also presently very high in local communities of the affected areas to do this.

Natural hazards are beyond our control. There is nothing we can do to stop them from occurring, but we can surely minimise the damage caused by taking appropriate steps before and after the event. Nature can provide cost-effective, no-regret solutions to disasters, complementing conventional engineering measures reducing risks from disasters. However, investment in natural infrastructure is under-explored in policies aimed at reducing risk. It is important for good policy to be developed to increase future readiness, taking into account projections of similar disasters while concurrently upgrading the services and infrastructure to increase the quality of life of every Keralite.

*Anshu Sharma  
is Co-Founder, SEEDS*





# In Sync with Nature

## Woodland's Unswerving Commitment to Sustainable and Eco-Friendly Practices Through Innovation and Technology

Woodland's parent company, Aero Group, is a well-known name in the outdoor shoe industry since the early fifties. Woodland is a leading manufacturer and supplier of apparel and accessories, and is a strong supporter of sustainability in the fashion and apparel world. Founded in Quebec, Canada, it entered the Indian market in 1992, and has become a leading outdoor brand today. The launch of its first hand-stitched leather shoe took the footwear market by storm, cementing the value of Woodland brand in India.



Harkirat Singh

Environmental impacts have always been a major concern for us at Woodland. We strive to continually become more aware of, and be sensitive towards environmental impact of our business practices. We evaluate our processes and continually implement new strategies to improve efficiencies and minimise our ecological footprint.

We design and construct products to perform better and last longer and believe that a high quality product that retains its performance properties and aesthetic appeal for many years is more environmentally responsible than one that must be replaced frequently due to inferior materials or poor workmanship.

As our brand grows, we have become more capable of working towards tangible, positive changes in our environmental practices. We have

already taken strong steps in the right direction and have continued to explore new means to become better stewards. We also encourage our customers to adopt eco-friendly practices. We continuously try to balance the carbon amount that is released from our factories by planting trees and use eco-friendly raw materials and techniques in manufacturing and packaging. We believe in using business to inspire solutions to environmental crisis, and it is with this belief that we strive to discover new ways and also increase awareness for creating sustainable solutions in India.

### PROPLANET

We realise the importance of eco-consciousness and have embraced it as one of our key objectives. In other words, we are *pro planet*, and we constantly work towards

keeping our environment safe.

Proplanet is a community that is committed to make our planet a better place to live in. We wish to share with the community our passion for social causes which defines us as a company. Our ultimate goal is to inspire the next generation and increase their participation in the conservation of nature.

In keeping with our eco-conscious philosophy, we have always tried to make eco-friendly products which are made through processes that cause minimal harm to the environment. We wish to share this philosophy and



involve our customers in exercising the same. In today's world where globalisation and staying connected is crucial, we are working towards creating an interactive platform where we can discuss issues related to nature and the environment around us.

#### Proplanet Initiatives

##### Sustainable and Environment Friendly

We are a strong supporter of sustainability in the fashion and apparel world. We believe that every brand is responsible towards the society it operates in and must give back to the community as it grows and succeeds. We have always looked at different ways in which we can contribute to the society, as building value for our communities is as satiating as generating profit for our shareholders.

We support our mission to stand out as an eco-friendly brand and also realises the importance of eco-consciousness, with an aim to keep the environment clean. Our efforts are in line with inculcating values of eco-friendly conditions amongst the new generation, to save the environment and create awareness among them to conserve nature.

As part of our CSR initiative - Proplanet – we have introduced products made from materials and process that are free from all harmful substances, reflecting the eco-friendly philosophy. In apparel, there are



**As a commitment to sustainability, we have initiated a process under which all our retail stores are steadily converting to carbon-neutral stores. The initiative includes accurate accounting of the carbon footprint of each store in order to attain zero carbon emissions from stores spread across the country**



organic cotton t-shirts which are made of pure cotton and are free from all toxins and pesticides. The brand's pure green t-shirts are made from recycled plastic bottles that are sterilised and processed into fibre strands knitted together to create a fabric that is 100 percent recycled.

In footwear category, the leather used for making shoes is mostly vegetable-tanned, using harmless natural chemicals, and comes from the company's tanneries in several countries. Leather outsourced from other tanneries is also vegetable-tanned. We have installed technologies which recycle the waste to a large extent. As a result, effluents

(water mixed with used chemicals) from our tannery are passed through a series of pits where the water is treated with chemicals like ferrous sulphate and lime mixed with poly-electrolytes to precipitate and separate the clear water and sludge. The process helps it clean up to 25,000 litres of discharge every eight hours.

In addition, the biodegradable collection of summer sandals and slippers are made from vegetable-tanned leather and recycled rubber with antibacterial lining material to keep the feet dry. They are manufactured with minimal amount of pressure on the environment.

As a commitment to sustainability, we have initiated a process under which all our retail stores are steadily converting to carbon-neutral stores. The initiative includes accurate accounting of the carbon footprint of each store in order to attain zero carbon emissions from stores spread across the country. A German company specialising in eco-friendly architecture and design has been designing these stores where the wooden flooring and cash counters are made of reclaimed lumber while the wall fixtures are made of recycled fibres, and lights are energy efficient. This drive began with the Bangalore store, and has been on since.

In addition to reducing the retail carbon footprint, we intend to encourage customers to use green products across all categories by



providing incentives for every carbon credit earned by the customer. The campaign was introduced to encourage customers to pledge their emission reductions for every solar water heater they use. Upon pledging, each customer using a solar geyser was gratified with Woodland e-vouchers, which they claimed after authentication. It was initiated to propagate the message of adopting an eco-friendly lifestyle to the masses.

#### **Use of Eco-Friendly Raw Materials, Packaging and Processes**

We always use environment-friendly products like organic cotton, recycled rubber, etc. to manufacture our products along with designing and constructing products to perform better and last longer. Every product's hangtags, as well as our business cards, are printed on certified 100 percent post-consumer recycled paper. To reduce the total amount of paper used in the marketing materials of our brand, and the energy consumed to make and recycle them, we have consciously made a decision to move towards more electronic billing, publishing and

communication.

We recognise the importance of sustainable development and we also encourage our customers to adopt eco-friendly practices. We continuously try to balance the carbon amount that is released by planting trees and using eco-friendly raw materials and techniques in manufacturing and packaging.

#### **Initiatives undertaken in association with environmentally-conscious NGOs and partners to promote eco-friendly initiatives in the community:**

- Supporting local communities in the areas of the brand's operations
- Communicating, educating and motivating them to seize the opportunities to reduce environmental opportunities: We engage in multiple initiatives and campaigns right from in-store experiential activities to online campaigns, associations with like-minded organisations, educational institutes and NGOs for tree plantation with schools, bicycle rides with local

communities, encouraging people with discount/gift as an acknowledgment to increase the use of solar products.

- Continuously improving the manufacturing process to reduce our water consumption and preserve natural resources: We undertake multiple educational campaigns and innovative ideas to promote an eco-friendly world. We partnered with Asia's largest musical festival - Sunburn - for 'Leave No Trace' campaign, to spread awareness on preserving eco balance. The campaign ensured to spread the message of a pollution-free environment and the Proplaneters ensured that all waste items were collected and transported for recycling processes, leaving no trace behind. We aim to spread awareness and contribute to the society through as many mediums as possible. We are very happy and proud to help the society in as many ways as possible. We created an installation from reused material and collected vast amount of plastic in the form of plastic bottles. The same plastic was used for our eco-friendly collection of t-shirts.
- Reducing energy consumption and GHG emissions for manufacturing and transport: Striving to optimise modes of transport used towards low carbon-emitting options, each Woodland factory is monitored for water resource to ensure that any preventive action to protect the source is put in place.
- As a team, we also encourage a work culture that looks after eco-consciousness and ensure employee participation in eco-friendly activities.

#### **Association with UNICEF**

We have been associated with UNICEF since 2011 with an aim to raise resources for improving access to



basic sanitation, drinking water and hygiene for school-going children in India. The main aim for this partnership with UNICEF is to contribute on programmes related to Water, Sanitation and Hygiene (WASH) reaching out to 115 million school-going children in India. This is aimed to ensure that every school in India has well-maintained water, sanitation and hygiene facilities. The partnership complements national priorities set out in the mission and contributes to achieving the national goal.

This partnership has benefitted 682,000 boys and girls in over 6200 schools by providing them access to quality water and safe sanitation, improved hand-washing infrastructure and ensuring regular hand-washing practices by all the school children before their mid-day meals.

#### **Association with WWF**

We have supported the WWF India Conservation initiative previously as well where funds were raised to donate solar lanterns to over 120 household in three villages in Central India's Satpuda Maikal landscape. Patwahi, Chiklabadi and Bangla Dadar are some of the small villages situated in the most remote parts of two wildlife corridors providing passage for wildlife to move between Kanha and Pench Tiger Reserve and Kanha and Achanakmar Tiger Reserve in Madhya Pradesh.

To increase awareness about renewable energy, we demonstrated the concept of generating renewable energy by individuals through pedalling stationary cycles where the bicycle's rear wheel is attached to a dynamo which generates electrical charge when the cyclist pedals. The charged energy is stored in the battery box. This generated electrical

charge by natural human cycling is used to light up Woodland stores. More than 18,000 people joined this initiative and pledged to support the same.

Earth Hour is the largest grassroots movement started by WWF with the mission to unite people to protect the planet. This movement that has spread to 172 countries across the globe has achieved massive environmental impact, including legislation changes by harnessing the power of the crowd. As nature lovers, we at Woodland understand that protecting the environment is the primary need of the hour; which is why it took up the cause to bring about a change. Among the many environment projects we are associated with, Lights4Stripes is one of the most important and recent ones.

Understanding the challenges that the people of the Sundarbans are facing, we partnered with WWF India to support their Earth Hour crowd funding project - Light4strips. The areas were massively underdeveloped and exposed to numerous hazards ranging from snake bites to tiger attacks. This project was launched in an effort to improve the conditions and to protect the people and tiger at the Sundarbans. The aim was to provide solar streetlights to villages located near wildlife reserves. From the collected funds, 33 streetlights were installed at the borders of Sajnekhali Wildlife Sanctuary, Sundarbans Tiger Reserve, which impacted the area that has a population of approximately 13,000 people. This initiative also replaced 24 older installations in the same line which were converted into solar streetlights.

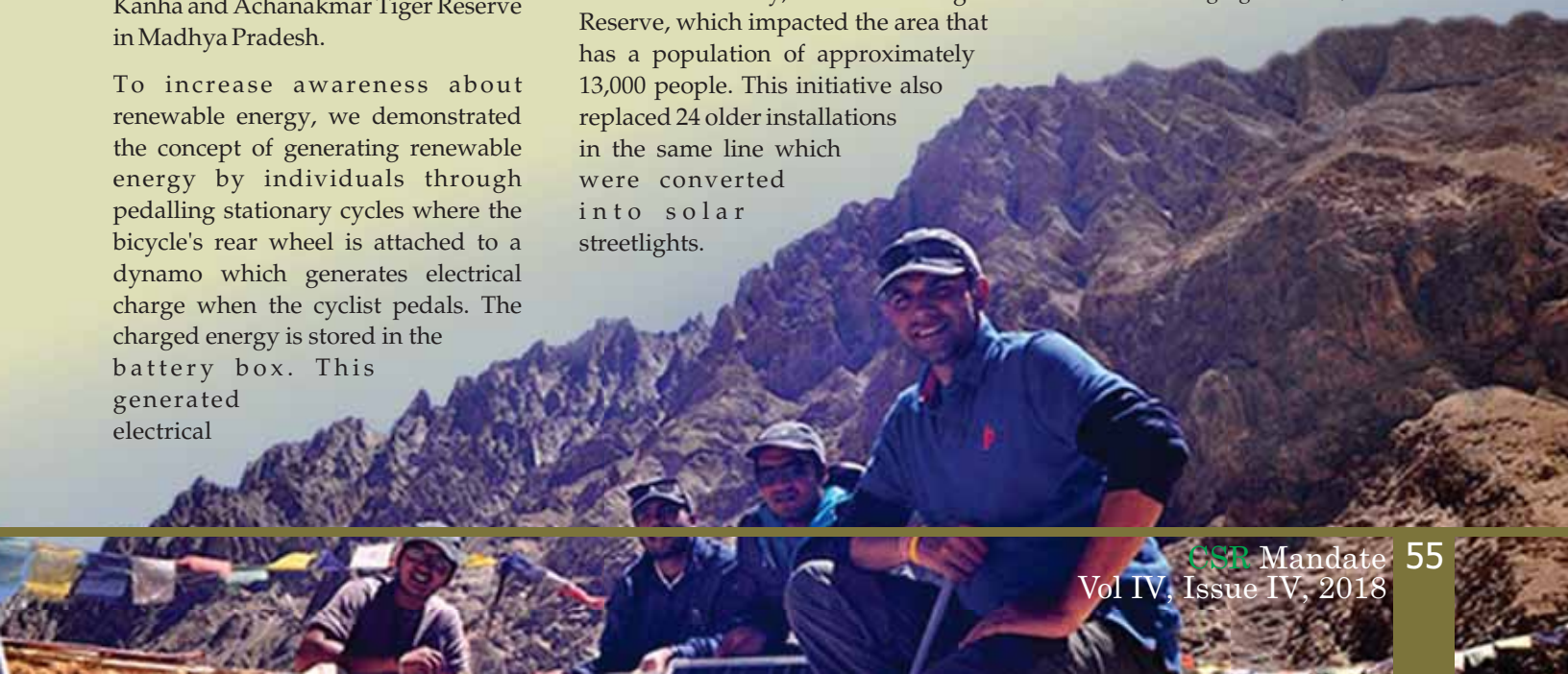
#### **Association with GHE**

As a brand, we believe in the philosophy of sustainable mountain development and ecology preservation of higher altitude areas. This incited the brand for a partnership with Global Himalayan Expedition (GHE), an initiative focussed towards providing clean energy and education access to remote Himalayan communities.

Annually, GHE unites willing adventurers to go out in the Himalayan wilderness and create a tangible difference to the communities there. We have helped and supported their vision of providing experiential education and sustainable rural livelihood through setting up of solar homestays and advocating use of adventure gear as means of safety and livelihood for local people.

Woodland will maintain an unwavering commitment to innovation, sustainable business practices and keep its tradition of promoting outdoor and adventure sports worldwide while reinforcing the Woodland brand mantra, *Explore More*. The goal is to substantially reduce the amount of materials used over time and the energy consumed to manufacture and distribute those materials and products. ■

**Harkirat Singh**  
*is Managing Director, Woodland*



## Tech Disruption Comes to Global Sanitation

### Deploying New Sanitation Technologies That are Affordable, Safe and Sustainable



Jim Larson



Emily Serazin



Chris Holmes



Wendy Woods

To help save millions of people from early death and disease, forward-thinking companies could soon be turning a low-tech problem into the next tech-powered disruption - an approach that makes it possible for businesses to do well while doing good. This potential double win exists thanks to a piece of technology that rarely comes to mind when thinking of new business opportunities and global markets: the humble toilet.

While the toilet has been around for centuries in one form or another, people in many parts of the world still live without this basic technology, using poorly constructed latrines, buckets, or nothing at all, defecating and urinating out in the open. Some 61 percent of the world's citizens - 4.5 billion people - lack safely managed sanitation, and of these, 2.3 billion still do not have basic services, according to UNICEF. Inadequate sanitation spreads illness, increases risk of diarrhoeal disease, and kills more children than measles, malaria, HIV, and AIDS combined. What's more, developing countries are not the only ones in need. Aging water and sanitation infrastructure and budget constraints in developed

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**Many of the new sanitation technologies have emerged from the Reinvent the Toilet Challenge, which funded innovators developing alternative sanitation technologies. Technologies under development for the reinvented toilet include dry combustion, wet oxidation, and electrochemical processing**  
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countries are increasing pressure on governments to find new solutions. Making matters worse, supplies of clean water are becoming scarcer around the world, and new water and sanitation infrastructure construction cannot keep pace with population growth, particularly in developing countries.

The good news is that a new suite of technologies could improve sanitation and provide viable alternatives to traditional toilets, septic tanks, and sewerage systems. New ways to remove pathogens from human waste - including wet oxidation, dry combustion, and electrochemical processing - are being developed, making sanitation sustainable, safe, accessible, and affordable. The effort to



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Many of the systems are being designed to operate off the grid, without connections to water and sewer systems or electrical lines. This means that sanitation solutions could be installed in parts of the world lacking access to power supplies and other infrastructure

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unlock the potential of these solutions is in its earliest stages, and many technologies are still under development. But combined with a wave of policy priorities, significant potential revenue streams exist for companies - from global multinationals to local sanitation firms

- in a market estimated to be worth around \$6 billion annually by 2030. Those that use their existing businesses to address this market will help improve human health and save lives, thus creating a total societal impact that greatly enhances their long-term financial performance.

#### Tech Disruption Comes to Sanitation

Many of the new sanitation technologies have emerged from the Reinvent the Toilet Challenge, an initiative launched in 2011 by the Bill & Melinda Gates Foundation, which funded innovators developing alternative sanitation technologies. Technologies under development for the reinvented toilet include dry combustion (which converts human waste to a charcoal briquette type of fuel instead of flushing it away with water), wet oxidation (in which materials suspended in water are broken down using oxygen), and electrochemical processing (which uses metal oxides).

These emerging technologies remove the pathogens that can cause disease

from human waste, eliminate safety concerns for service providers handling the waste processing, and promote environmental sustainability. The absence of faecal sludge transportation also reduces the risk of pollution and disease.

Many of the systems are being designed to operate off the grid, without connections to water and sewer systems or electrical lines. This means that sanitation solutions could be installed in parts of the world lacking access to power supplies and other infrastructure. With modular, portable, easy-to-install formats, they could allow for increases in use as populations expand and make it possible to extend safe sanitation to remote locations where sewage systems or septic tanks might not be feasible.

The technologies under development could also help conserve valuable resources. They have low electricity and water requirements, minimising their environmental footprint through reduced energy and water use. They also offer the possibility of recovering valuable energy, clean water, and nutrients from waste processing.

The new technologies could cost less to construct, install, and maintain than septic tanks and sewage systems. Reduced pit emptying and the absence of piped collection and faecal sludge transportation would make maintenance and operation cheaper. And with the potential for local companies to provide post installation and maintenance services, these solutions could offer both low lifecycle costs and sustainable business models.

The combination of low cost, high safety levels, flexibility, and low environmental risk means that reinvented-toilet technologies could play a critical role in accelerating progress toward meeting the UN Sustainable Development Goals (SDGs): Goal 6 aims to make sustainable management of water and sanitation available to all, and to end



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Across the world, recognition of the need to address the sanitation challenge is rising. In the process, favourable policies are emerging. The SDGs provide an overarching global agenda. Meanwhile, countries are individually setting policy priorities and making significant investment decisions. Three key markets - China, India, and the US - illustrate the potential opportunity

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open defaecation, by 2030.

What's more, by providing privacy, accessibility, and a clean, safe product that eliminates odours and waste, reinvented-toilet technologies could enhance human dignity in communities around the world.

#### The Size of the Prize

The new sanitation technologies can be deployed in both developing and developed countries, and the size of the opportunity varies depending on the setting. In developed countries that are building on current sanitation infrastructure, a potential market exists of about \$1.7 billion annually. Meanwhile, emerging economies with high needs, market readiness, and national policies prioritising improvements in sanitation offer a \$3.2 billion opportunity, even taking into account lower price points. (See the exhibit)

Markets also vary in terms of relative ease of entry and the pace at which governments are implementing improvements and looking for solutions providers to step in.

In many developing countries, lack of access to sewerage is likely to persist through 2030, prompting demand for sanitation solutions.

In some nations such as countries in Africa, the high demand and potential development impact of new sanitation technologies correlate with greater time and effort needed to unlock their markets. This underlines the urgency of finding ways to accelerate entry into these markets.

While demand is significant in developing countries, opportunities are opening up even in developed countries, given that existing sewer systems are often more than a century old. In the US, the cost of meeting current and future demand for wastewater treatment plants is estimated to be at least \$271 billion, according to the American Society of Civil Engineers. When deployed at scale, standalone, closed-loop reinvented toilets could help reduce wastewater treatment infrastructure costs.

In Europe, large swaths of the population are underserved by sanitation systems. In Poland, for example, an estimated 3.2 million households in poor, rural areas lack sewers. Of these, about 2.8 million are in small villages whose municipalities are not required to provide sewerage, leaving households to rely on septic tanks - which pose the risk of

degradation and soil and groundwater pollution. Another 400,000 are in midsize towns whose municipalities are exempt from having to provide sewerage.

#### Demand Meets a Favourable Policy Environment

Across the world, recognition of the need to address the sanitation challenge is rising. In the process, favourable policies are emerging. The SDGs provide an overarching global agenda. Meanwhile, countries are individually setting policy priorities and making significant investment decisions. Three key markets - China, India, and the US - illustrate the potential opportunity. And while the challenges they face vary, all three are prioritising both high-visibility sites and areas of high need:

**China:** With a vast population, China represents a large portion of the market prize. For the government, high-visibility sites include toilets at tourist attractions. Rural communities, meanwhile, constitute the area of highest need, since many have no piped access. Ambitious sanitation goals include universal sewage coverage. However, obstacles such as challenging land access, geological conditions, and the need to protect natural resources mean that, in many places, piped sewage treatment facilities would be inappropriate or unfeasible. Reinvented-toilet





technologies could fill the gaps, particularly as China is seeking commercial builders that meet environmental sustainability standards and certifications.

**India:** The ambitious Swachh Bharat (Clean India) campaign includes the goal of ending open defecation and building 75 million toilets by 2019. India is prioritizing high-visibility sites (public and community toilets) and high-need areas (slum redevelopments and affordable housing) and is seeking premium or mid-segment apartment developers as suppliers. In 2015, the World Bank approved a \$1.5 billion loan to support the rural component of the Swachh Bharat mission; the Indian government has so far allocated \$1 billion to the project. While traditional sanitation infrastructure will be used to help meet the country's 2019 goal, the low-cost, modular formats, and potential for installation in off-grid and rural areas, make reinvented-toilet technologies particularly compelling in India.

**The US:** Here, the challenge is to upgrade deteriorating infrastructure and overburdened systems. In Pittsburgh, for example, leaking pipes and breaches of environmental standards are creating an urgent need to invest in water and sanitation

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**In a water-scarce area of Bolivia that lacked sanitation facilities, dry toilets were not installed because communities wanted flush toilets. To mitigate the risks, companies need to build aspirations and promote the benefits of the new technologies through community education**

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infrastructure. But with the outlay for repair estimated at more than \$2.5 billion, reinvented-toilet solutions are becoming an attractive alternative. The environmental agenda is also driving demand. In San Francisco, for example, state and local policies encourage green practices that promote water conservation. For instance, one new ordinance, prompted by the 2016 drought, requires provision of onsite nonpotable water reuse systems for new buildings with more than 250,000 square feet in gross floor area, paving

the way for technologies that provide alternatives to water-flush toilets.

For China, India, and the US, the principal push is to construct or upgrade sewerage infrastructure. However, given the scale of demand and the challenges of installing traditional sanitation services in many places, technologies with modular, low-cost, low-energy formats and low water use will be an important part of the toolkit.

#### **Cultivating Early Adopters**

For companies wanting to seize this new opportunity, the challenge will be to find the most effective means of entering the market. And as with any new product or service, early adopters can be critical. Early adopters build momentum for demand by acting as champions, trend setters, and opinion leaders. They can demonstrate proof of concept and provide feedback on early models or pilots that inform the design of products and services.

Companies can roll out new sanitation technologies to meet increased demand created by conflict, health crises, or natural disasters, such as the rapid expansion of refugee camps, the Ebola outbreak in West Africa, and the decimation of infrastructure in Puerto Rico in the wake of Hurricane Maria. In these situations, providing



education and raising awareness can persuade consumers to switch to new products or services.

Crossover strategies are another approach. Applications for the military or for remote tourism sites can be developed before being launched for mainstream uses. Few examples have yet to emerge in sanitation, but such strategies have been used to resolve water scarcity issues. In drought-ridden Israel, for instance, the Israeli company - Watergen-developed technology that produces drinking water from the humid air. The Israeli Defense Forces, which wanted to reduce the need to carry water in the field, was the company's first target customer. Since then, the company has expanded into smaller-scale civilian products. Its markets include Hyderabad, India, where Watergen is working with Tata Projects to address India's drinking-water challenge.

Targeting early adopters means being willing to take on the risk of investing before demand has materialised. But cultural barriers can hamper adoption even when demand is high. For

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**Global sanitation illustrates how companies can use their core business activities to create positive social impact. In the case of the reinvented toilet, providing the technologies that improve global health allows companies across the value chain to tap into a valuable revenue stream**

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example, in a water-scarce area of Bolivia that lacked sanitation facilities, dry toilets were not installed because communities wanted flush toilets. To mitigate the risks, companies need to build aspirations and promote the benefits of the new technologies through community education. In the early stages, they can also work in several locations to spread investment

risk and capture demand at sufficient volume before moving into more mainstream markets.

### **Tapping into an Established Ecosystem**

The reinvented toilet is a new concept, and engaging with local players will not always be easy. This is the case in some African countries, where challenging dynamics make unlocking the revenue potential tougher. In Nigeria, for example, only one-third of the population has access to basic sanitation, and this percentage is shrinking because services cannot keep up with the expanding population. Yet the perceived low quality of local manufacturing, high importing costs, and risks such as corruption create barriers to entry.

However, even in tough markets, the fact that the sanitation sector is well established creates opportunities for partnership with commercial players. And given that improving sanitation has become a focus for the development community, partnering with local non-profits and international agencies can build trust among users of the new systems. Companies can follow a number of strategies to ease market entry:

Providers of reinvented toilets can work across the value chain with toilet and septic tank manufacturers, plumbing suppliers, contractors, and architects. Even rural markets in some countries, such as China, have established distribution and sales channels and after-market support for the sale of white goods and similar products.

Existing commercial enterprises can become partners with companies rolling out reinvented-toilet solutions. For example, in Kenya, slow government progress on sanitation has encouraged a number of entrepreneurs to address sanitation. Partnering with one of these enterprises offers accelerated market entry.







**The Boston Consulting Group (BCG) is a global management consulting firm and the world's leading advisor on business strategy.**

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**Chris Holmes** is a Senior Advisor in the firm's Boston office. He has held a wide range of leadership positions in the environmental-protection, health, humanitarian-assistance, and international economic-development sectors. He has served at the US Agency for International Development as its global water coordinator, deputy assistant administrator for water, and acting deputy assistant administrator for natural resource management.

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To increase adoption, companies can work with communities to help educate local populations about proper sanitary practices. For example, WaterHealth International, a US-based social business that provides safe drinking water to urban and rural areas, implements a comprehensive health and hygiene program to encourage behavioural change. Among other things, the programme allows women to view samples of untreated water under a microscope to recognise bacteria and understand how it could harm them and their families.

International agencies can become champions of, and credible partners for, new sanitation products and services. In the water sector, for example, WaterHealth's partnership with the US Agency for International Development has helped the company build credibility and recognition for its products and services while substantially expanding access to safe water. And the United Nations High Commissioner for Refugees could use reinvented toilet technologies to meet sanitation needs and mitigate health risks, such as cholera outbreaks, in its projects supporting Zaatar, an established refugee camp in Jordan, and the Rohingya refugee camp in Bangladesh, which has a population of more than 1 million.

### **Reaping Social and Financial Returns**

Global sanitation illustrates how companies can use their core business activities to create positive social impact. In the case of the reinvented toilet, providing the technologies that improve global health allows companies across the value chain to tap into a valuable revenue stream. BCG research on total societal impact has found that companies taking this approach tend to outperform others in their sector. For example, in the consumer goods sector, BCG found that top performers on key societal impact topics enjoyed an 11 percent valuation premium and those focussed specifically on conserving water had a 5.5 percentage point gross margin premium when compared with median performers.

Opportunities in the sanitation sector could be similar. If companies can harness early adopters, tap into established ecosystems, and do so while the policy environment is favourable to large-scale investments, the rewards look extremely attractive. The opportunities may not last forever. The ability to address an urgent human need and create a new revenue stream should provide a compelling argument for any company to develop plans and start putting them into action without delay. ■

## Leveraging Technological Innovations to Improve Community Health Indicators

### SATO's Sustainable Affordable and Quality Toilet Products a Boon to Underserved Communities



The impact of the sanitation crisis can be felt throughout the world, crippling opportunities for growth and development. According to the WHO, 2.1 billion people lack access to safe drinking water, 4.5 billion people lack access to safe sanitation services and 480,000 children under five die every year from diarrhoeal diseases. One of the foremost challenges India faces is its ability to provide access to safe sanitation. As per UNICEF India, around 564 million people (which is nearly half the population of India), defaecate in the open. There is an urgent need to transform the existing sanitation systems using innovative technological solutions. The progress in technological developments, new business models and policies will help us understand alternative sanitation solutions which can address various contexts such as low income availability, water scarcity, and non-sewered geographies.



Daigo Ishiyama





feature a carefully tailored technology that addresses some of the unique design challenges hindering sustainable use of toilets in India. The range of products includes SATO Toilet Pans, SATO Toilet Stools, SATO Connection Systems, SATO Conventional Toilet Pans and SATO Toilet Systems.

With the introduction of a low-cost and smart range of products under the SATO brand, we have been a first mover in the off-grid sanitation space among multi-national corporations and have taken down the barriers of affordability and quality. With a dedicated business unit, providing innovative technological solutions at the grassroots, SATO products, that feature a carefully tailored design, address some of the unique design challenges hindering sustainable use of toilets in India.

All our SATO products come with low water-consumption features that require 80 percent less water per flush as compared to conventional P-Trap toilets. After each use, users pour in less than one litre of water to flush away waste, after which an airtight, counter-weighted trap door quickly seals to block away smell and passage of disease-carrying insects, to make for a safe and pleasant toilet experience. SATO has designed each product to suit the needs and preferences of users in different regions.

Since our products have been designed keeping user preferences in mind, they are affordable, safe for children, easy to clean and install. Furthermore, one of the new

Statistics showcase a grim reality posed by a lack of affordable and safe sanitation. In 2014, the Modi Government sought to rectify the situation by launching the world's largest sanitation drive called the Swachh Bharat Mission (SBM). Through this flagship initiative, the Government expanded the coverage area of sanitation services across India, with an aim to make India 100 percent open defaecation free (ODF) by October 2019. The progress has been remarkable, and as a result, UNICEF estimates a family in an ODF (open defecation free) village in India can now save Rs.50,000 on account of avoided medical costs, time saving and value of life, annually. SBM has been in alignment with the United Nation's SDG 6 (Sustainable Development Goal 6), which aims to 'ensure availability and sustainable management of water and sanitation for all' by 2030.

With around 1/5 of the world's population living in areas of water scarcity – often coinciding with areas that also suffer poor sanitation coverage – we need a technology that is appropriate for such deplorable circumstances. Therefore, there is an opportunity to develop sanitation solutions that meet the specific needs of the underserved communities.

Globally, we see sanitation systems evolve in different ways. Not all toilets are seated, flush toilets or pans. Toilets are being reinvented to be waterless, chemical-less, with a provision to recover waste or 'toilet resource', and are often not connected to centralised, sewer waste treatment systems. With the introduction of a low-cost and smart product (such as SATO), we at LIXIL, has addressed the barriers of affordability and quality. With a dedicated business unit, providing innovative technological solutions at the grassroots, our SATO products





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In the coming years, there will be a dire need to develop user-friendly products, with advanced technological innovations, and to revamp existing designs for the rural and urban communities. These innovations will need to have a user-friendly interface, designed to address the specific market and environmental needs

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generations of SATO products uses an innovative V-trap system connecting twin pits in a V configuration. This design makes switching between the two pits as simple as a flick of a stick and eliminates clogging.

In order to address the behavioural change aspects, we are experimenting with multiple community engagement activities like the training of women masons, collaborating with community leaders, among others. In

March this year, in partnership with Samarthan, a leading non-profit organisation (NGO), we organised a skill-enhancement training workshop for 150 women masons in Ashta village of Sehore district in Bhopal, Madhya Pradesh. Such activities are aimed at increasing the demand for toilets and creating a community that understands the correct process of installation of toilets so that technical failures do not result in creating mistrust among people.

The Dr. Mashelkar Committee on Sanitation, instituted by the Government of India, recommended our innovative technology as a water-saving technology. Hence, we have been recognised as a harbinger of change in the field of Indian rural sanitation. In fact, the designs of SATO solutions are so effective and earth-and-life-saving, they have been recognised by the global design community at the highest standards, recently being awarded Good Design Award 2018, and Red Dot Award 2018: Honourable Mention for SATO 923W model. These add to the long list of design awards we have received since the inception of the programme in 2012.

In the coming years, there will be a dire need to develop user-friendly products, with advanced technological innovations, and to revamp existing designs for the rural and urban communities. These innovations will need to have a user-friendly interface, designed to address the specific market and environmental needs. The crisis of lack of universal access to sanitation is a complex issue and can only be tackled with all sectors of the society working together to drive positive change. Recognising the magnitude of this challenge and its effect on people's lives, we at LIXIL aim to improve access to sanitation and hygiene for 100 million people by 2020 through our innovative product lines, leading to improved community health outcomes. ■

*Daigo Ishiyama is Director of Marketing and Technology for the SATO business unit at LIXIL. Based in New Jersey, USA, he brings the latest knowledge and thinking regarding toilet systems, product development and manufacturing techniques to innovate effective, affordable, aspirational products for the SATO business, which aims to address the sanitation needs of BoP population around the world.*



## 'Hope' to Manual Scavenging

### Sulabh's Latest Sewer Machine a Blessing in Disguise

Thousands of Safai Karamcharis are engaged in handling human waste manually, clearing choked drains with minimum equipment, and gathering human waste from railway platforms. Banks do not give them loans. Insurance companies do not give them insurance covers. Nearly a century after Mahatma Gandhi called for the abolition of manual scavenging, the degrading practice continues as generation after generation are forced to do the same work. The practice of manually cleaning drains has been prohibited in India through the Employment of Manual Scavengers and Construction of Dry Latrines (Prohibition) Act of 1993. In the past three years alone, over 1300 deaths of manual scavengers in sewer lines have been recorded. Mechanised solutions to replace the requirement of manually cleaning the sewers may just be the way forward to put an end to this menial profession.



Ajay Kumar

Manual scavenging is a matter of grave concern for all of us. Sulabh International made a decision that the 2018 commemoration of World Toilet Day (November 19) will be unlike any other. The theme chosen for this momentous occasion was: "Safety Measures for Cleaning Sewers to Prevent Deaths of Sewer Workers". For a viable solution to emerge, we invited various experts on sanitation to share their expertise on this significant subject. They deliberated and gave constructive suggestions on how to prevent deaths while cleaning sewers, safety measures to be taken, and equipment required while undertaking such a hazardous job.

This day also marked the launch of India's first all-in-one sewer cleaning machine – 'Hope'. This machine indeed comes as a ray of hope for

sanitation workers and is a step in the right direction to put an end to the hazardous practice of manual scavenging. The machine will provide

services to clean manholes, thereby helping in reducing human casualties inside manholes.





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The truck chassis mounted **Kamjet-GR** Jetting cum Grab and Rodding Unit, is capable of de-choking and de-silting civil/industrial drains and sewer lines by using the principle of hydrodynamic cleaning by injecting high pressure water into the lines through a suitably dimensioned sewer jetting hose and special cleaning nozzles

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“We often hear the tragic news about sewer workers losing their lives while working inside the sewer. With the machine, workers won't have to enter the sewers, risking their life and dignity and violating the Manual

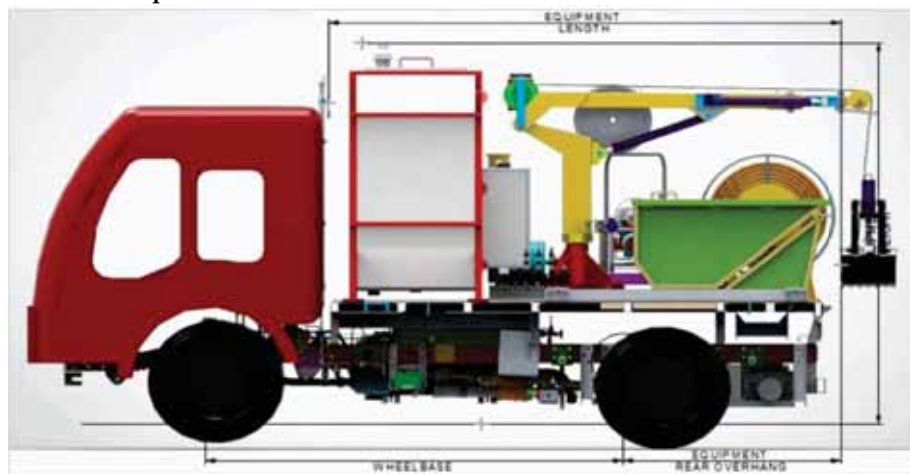
Scavenging Act, but even if the need arises for them to enter the sewer, then we are fully equipped with a gas detecting machine, protective gears and uniform to protect them from harmful gases,” says Dr. Bindeshwar Pathak, Founder - Sulabh International.

Dr. Pathak confirmed that the new machine is ideal for periodic mechanical de-silting of manholes and flushing out sewer lines using the powerful jetting pump, capable of

producing 150 bar operating pressure and a flow of 150 litres per minute. It is also capable of de-choking sewer lines using specially-designed flexible chromium-vanadium steel rods.

The truck chassis mounted **Kamjet-GR** Jetting cum Grab and Rodding Unit, is capable of de-choking and de-silting civil/industrial drains and sewer lines by using the principle of hydrodynamic cleaning by injecting high pressure water into the lines through a suitably dimensioned sewer

#### Technical Specifications:





jetting hose and special cleaning nozzles.

The equipment has a mechanical grab bucket that can go into a manhole and any other chamber located at a depth of up to 20 feet, opening it up and collecting the silt that is typically found in a manhole and then removing it from the sewer network without necessitating human entry. The collected silt and waste is then transported to a designated disposal site and emptied by tipping off the hopper.

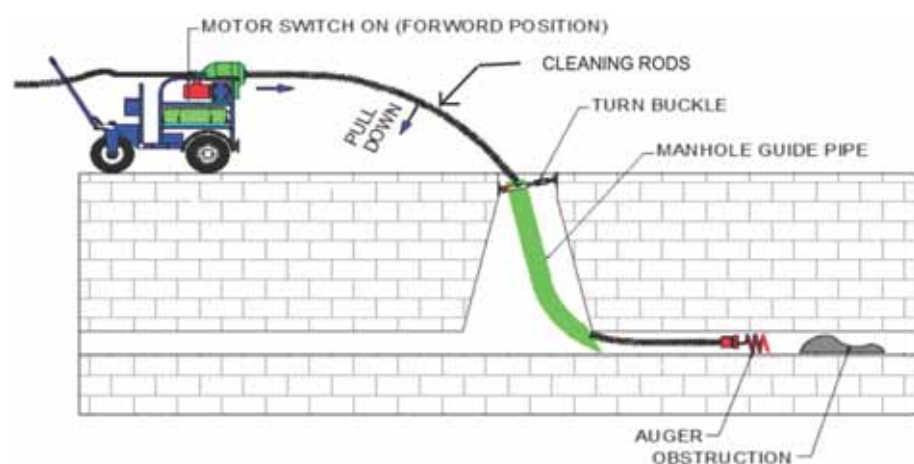
The machine is also equipped with a trolley-mounted rodding machine to remove elements like plastic bags, cottons, grass roots, silt blocks etc. from the sewer line. It is also ideal for cleaning sewer lines and manholes in narrow lanes. It has a rod turner that is designed to go to narrow lanes that are even 3-5 feet wide. It is self-powered through an inbuilt alternator, and can spin a rod that can break almost any kind of stubborn blockages. The machine has the added benefits of the Jetting, Grabbing and Rodding machines.



#### Sulabh Quick View Pipe Inspection Camera:

We have also acquired a quick view pipe inspection camera. This is designed to facilitate rapid inspection of manholes, sewer, tunnels, tanks, mainline and other lateral pipelines facilities. This Quick View Pipe Inspection Camera features an outstanding zoom function (Industrial HD Camera), a scalable carbon fibre rod and a sunlight presentable controller (8.4" monitor). The detection results, including video, image and auto-generated report are sent to the operating panel by wireless communication. The IP68 protection ability enables it to keep working 10 meters under water. The camera sensor features 36\* optical zooming function, capable to capture pipe details from a distance of up to 100m. The camera body tilts automatically up 20° and down 90°.

Sulabh International, which has been at the forefront of liberating scavengers, has once again come up with a need-based innovative technological solution to end the inhuman practice of manual cleaning of sewer and manholes. Sulabh machines would go a long way in



#### Kambore and Rodding System:

Advantages	Benefits
The machine can de-choke, de-silt and flush the sewer lines with minimum amount of water using a flexible hose and high pressure jetting nozzles without human entry in the manholes.	Cleaning and maintenance with ease and dignity, and in compliance with the law.
Grab-and-bucket arrangement also facilitates operator to safely clean choked manholes.	Grab arrangement cleans choked manholes after which machine de-silts, de-choke and flushes the sewer line.
Trolley-mounted rodding drain cleaning machine cleans without using water but using specially designed flexible cables and steel rods.	Cleaning and maintenance with ease and dignity, and in compliance with the law.
The unit contains various types of cutting tools and equipment to remove various kinds of waste materials from the drain line.	Multi-functional machine with ease of operation.



#### What can we do to overcome the degrading practice of manual scavenging?

Carry on the occupation by overcoming the hazards

Use knowledge and specialisation acquired over the years

Use the current techniques prescribed in The Prohibition of Employment as Manual Scavengers and their Rehabilitation Rules, 2013, to overcome the risks

Transform the perception of the occupation and bring about pride and dignity in the activity

Get trained on how to use the latest equipment

#### The Prohibition of Employment as Manual Scavengers and their Rehabilitation Rules, 2013 (CHAPTER-II)

##### Obligations of Employer Towards Employees Engaged in the Cleaning of Sewer or Septic Tank

No person shall be allowed to clean a sewer manually, without protective gear and safety devices under these rules except:-

- (a) for the removal of concrete or FRP (Fibre Reinforced Plastic) or damaged manhole door where mechanical equipments cannot be put into operation.
- (b) for inter-linking the newly laid sewer main with the existing sewer main, in case of sewer of size of more than 300 mm diameter.
- (c) for removal of submersible pump sets fixed at the bottom of the suction wells.
- (d) for the reconstruction of the manhole or rectification of the sewer main.
- (e) Any circumstance, when it is absolutely necessary to have manual sewage cleaning, after the CEO of the local authority has permitted to do so after recording in writing the specific valid reasons for allowing such cleaning.



*Dr. Pathak along with manual scavengers carrying human excreta on their heads for disposal after manually removing the same from the bucket toilets at Arrah, Bihar.*

preventing overflows which are hazardous for health, and at the same time, saving priceless human lives, and also create a new model of social entrepreneurship that will help bring manual scavengers out of this vicious death cycle. ■

*Ajay Kumar is Senior Advisor, Sulabh International Social Service Organisation*



## Going Full Circle: Food *to* Food

### NFL Links Waste Management to Agriculture Growth

For more than four decades, National Fertilizers Limited, has been, and continues to be involved in meaningful welfare-driven initiatives that distinctively impact the quality of life in the society. We are committed to the society by taking responsibility of the impact of our activities on customers, employees, shareholders, communities and the environment in all aspects of our operations. Taking it further, we are consistently striving towards meeting the expectations of rural/underprivileged section of society by focussing primarily on children's education, women empowerment, health and hygiene, rural development, skill development etc. We untiringly work to actively contribute to the social and economic development of the underserved communities, lifting the burden of poverty and help bring in inclusive growth while also being mindful of having a positive the impact on the environment.



Mukta Agarwal

Environmental protection and sustainability plays a major role in our projects. We aim to conserve the natural resources for their efficient and sustainable use. In doing so, we have taken steps in the area of water conservation by renovation and maintenance of old and degraded water bodies, construction of stop dams in the severe water-deficient regions of Central India. We are also adopting a focussed approach for

introduction of non-conventional sources of energy by installing solar water heating systems, solar lights and distribution of solar lanterns in the remote and backward villages where electricity is a major problem. We recently executed several projects to strengthen the Government of India's mission programmes such as Swachhta Mission, and promotion of solar energy.

#### **Development of Physical Infrastructure and Facilities in Villages**

We have been working for rural electrification through non-conventional energy sources. We have installed over 200 solar lights and distributed over 100 solar lanterns in the remote villages of Uttarakhand. These solar lights were installed in the remote villages of Badedda, Auni, Ladadi, Talai, Ghes-Himani, Pinao



and Balaan of Tehri District. Being remotely located, these villages often remained cut off from rest of the country during landslides and other natural calamities. Installation of solar lights on these roads has ensured safe movement of people during night time and infrequent attacks by animals. In seven villages, 573 families benefitted from this CSR initiative.

Over 200 LED solar lights have also been installed in Bathinda (Punjab), Nangal (Punjab), Panipat (Haryana) and Guna (Madhya Pradesh). Recently, the backward districts of Bhadohi (Uttar Pradesh) and Purnea (Bihar) also benefited from installation of solar lights.

To support childcare and mother care,

NFL has constructed six anganwadis in Karmakhedi, Padarkhedi, Kolua, Sada Colony, Awan and Piplya villages in Madhya Pradesh. These centres are able to serve large number of beneficiaries on a daily basis. They provide health and nutrition, education and counselling to lactating mothers and also assist Primary Health Centre staff through immunisation, health check-ups, ante natal check-ups etc.

Our company has also provided two ambulances for Public Health Centres in Seppa, Arunachal Pradesh. Being a hilly region, access to healthcare services is a major challenge for the people here. There was inadequate ambulance service. The ambulances provided by NFL have helped in transporting over 165 patients and pregnant women in the last eleven months.

#### **Development of Physical Infrastructure and Facilities in Institutions**

In 2014, NFL answered the clarion call from the Prime Minister of India for taking up Swachh Bharat Abhiyan. We launched many initiatives for construction and maintenance of toilets in Government schools in many States. Under Swachh Vidhyalaya Abhiyan, we have successfully

completed construction of over 100 toilets in Haryana, Punjab, Himachal Pradesh and Madhya Pradesh. This has ensured safe and definite space for defecation for over 5000 students. NFL has also ensured safe drinking water by constructing water tanks for proper storage of water. We also took innovative steps in sanitation technology by constructing bio-toilets in schools in Panipat, Bathinda, and successfully undertook the project for construction of bio-toilets in government schools in village Diwana and Goyla Khurd, Panipat and also in villages in Bathinda. Bio-toilets are eco-friendly, 100 percent maintenance-free, and elimination of waste is done by biological process.

The objective of this CSR intervention is to make toilets available for the benefit of children, thereby qualitatively improving the learning environment.

#### **NFL's flagship CSR Project - Management of Soil Health and Productivity**

Today's biggest challenge to Indian agriculture is increasing productivity while maintaining soil quality. Development of agriculture continues to remain critical for India's economic growth, poverty reduction and ensuring food security as over 58 percent of rural households depend on agriculture as their principal means of livelihood. Despite significant growth in agriculture, its sustainability is threatened by declining soil quality, receding ground water table, inadequate and imbalanced use of fertilisers, increase in cost of production, input use inefficiency and information, knowledge and skill gaps.

We installed the Atomic Absorption Spectrometry (AAS) equipment for free soil testing in Nangal (Punjab). This equipment is essential for micro-nutrient analysis to know the status of trace micro-nutrients in soil like zinc, boron, copper, iron etc. This





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Composting is one of the biological processes for recycling of organic waste and can be defined as a method of biological decomposition, where organic material decomposed to a stage that can be handled, stored and applied to land without any environmental impact

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facility was not available in Punjab and other neighbouring states like Haryana, Rajasthan, Delhi, Himachal Pradesh, Jammu & Kashmir. After the AAS was installed, the Nangal laboratory has started analysing the micro-nutrients for the above States. Over 1200 to 1500 soil samples are analysed with the help of the equipment. It has also contributed to soil analysis, which in turn helps the farmers understand the quality of soil and volume of produce that their land can generate. The AAS equipment is a durable infrastructure and will continue to benefit the Soil Testing Laboratory of NFL for an extended period.

Soil testing has become imperative to provide an accurate assessment of the



soil's fertility status enabling appropriate fertiliser-use recommendations. Balanced fertilisation is normally defined as the timely application of all essential plant nutrients (which include primary, secondary and micronutrients) in optimum quantities and in the right proportion through the prescribed method, suitable for specific soil/crop conditions. Components of balanced fertilisation include judicious use of chemical fertilisers based on deficient soil nutrients as established by soil testing in conjunction with other sources of plant nutrients such as organic manures and bio-fertilisers.

Over 11.6 million hectares of low fertility soils have been affected by imbalanced and excessive use of chemical fertilisers and lack of organic manures. It is estimated that there is a shortfall of six million tonnes of organic manure a year. Maintaining

soil health has become crucial for a sustainable green cover. We are aggressively promoting the use of compost in our adopted villages, and in the process, lending impetus to the Swachh Bharat campaign.

Unlike fertilisers, the use of organic material has not increased much in the last two to three decades. The estimated annual available nutrient (NPK) contribution through organic sources is about five million tonnes, which could increase to 7.75 million tonnes by 2025. Thus, organic manures have a significant role to play in nutrient supply. In addition to improving the soil's physio-chemical properties, the supplementary and complementary use of organic manure also improves the efficiency of mineral fertiliser use.

Composting can be the appropriate solution to contribute towards organic manure demand keeping in view the substantial quantity of farm/cattle waste available at rural areas. Composting is one of the biological processes for recycling of organic waste and can be defined as a method of biological decomposition, where organic material decomposed to a stage that can be handled, stored and applied to land without any environmental impact.

During composting, organic residues are decomposed under controlled conditions (temperature, moisture and



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At NFL, we are promoting City Compost made out of municipality waste as an organic source of nutrient. Conversion of urban waste to city compost is considered an optimum solution to meet the objectives of disposal of waste and providing an organic fertiliser for agriculture in addition to reducing harmful methane emissions

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aeration). In addition, extensive microbiological and chemical transformations are involved in the composting process. Composted organic material can be used as a source of important nutrients for sustainable crop productivity. The composted organic wastes cannot only act as supplement to chemical fertilisers, but may also improve the organic matter status and physico-chemical properties of the soil.

At the present production level, the estimated annual production of crop residues is about 300 million tonnes. As two-thirds of all crop residues are used as animal feed, only one-third is

available for direct recycling (compost making), which can add 2.5 million tonnes/year. Keeping in view the insignificant availability of crop residues for composting purpose, there is an urgent need to think of an alternate available source of compost. Due to increasing urbanisation, a lot of city waste is available to convert it into compost. Urban India is the world's third largest generator of garbage and almost 70-75 percent of which remains untreated. India's 35 largest cities alone can provide 5.7 million tons a year of organic manure if their biodegradable waste is composted and returned to the soil.

While the Government looks for solutions to meet the goal of a Swachh India by 2019, we at NFL, came forward with a solution through our marketing as well as CSR efforts. City Compost produced out of urban waste can fulfill this need and solve problems of man-made barren land and organic nutrient shortages.

At NFL, we are promoting City Compost made out of municipality waste as an organic source of nutrient. Conversion of urban waste to city compost is considered an optimum solution to meet the objectives of disposal of waste and providing an organic fertiliser for agriculture in addition to reducing harmful methane emissions. Use of compost also helps in conserving topsoil and increases its water holding capacity in addition to many more other benefits.

Neem-coated urea has become increasingly popular among the farmers because of its higher yield and anti-pest qualities. In compliance with the government's policy, we are producing this variant of herbalist urea at all our plants.

Soil Health Management through City Compost, is providing a twin solution to problems of solid waste and deterioration of soil health. We started this project in 2016, and after experiencing positive outcomes, we are continuing it in the third year for sustainable results.

City Compost is a good source of carbon and also contains essential plant nutrients, though in small quantities. With Indian soils being critically low in carbon content, application of organic fertilisers is a must for increasing farm productivity and also improving the efficient use of applied fertiliser-nutrients.

In May 2016, we adopted ten villages, five each in Haryana and Madhya Pradesh for the City Compost project under CSR. These villages are in District Nuh (Mewat), Rohtak, Haryana, and in Indore, Dewas and Dhar districts of Madhya Pradesh. Nuh (Mewat) is also an aspirational district and in dire need of development; therefore, the same was selected to undertake the project.

A detailed survey of the villages Tai, Tapkan, Chhapera and Nallad in Nuh (Mewat) revealed that the region lies in the semi-arid zone and is majorly inhabited by Meo Muslims. Water is scarce in the region and consequently rain continues to be the major source of irrigation. Despite harsh climatic conditions, agriculture is the major livelihood option. Furthermore, due to cultural practices, farmers in Nuh use traditional farming techniques. The soil of Nuh (Mewat) is light in texture, particularly sandy, sandy loam and clay loam. The upper hills are mostly barren.

In terms of several vital socio-economic parameters, the Nuh







Organic waste must be treated as a resource with regenerative power. City Composting is helping the Government of India's Swachh Bharat Mission in a big way. NFL's CSR project is closing the loop – urban organic waste being converted to compost and being brought to farms to produce food again. The project has transformed a linear system of food waste to compost to a circular system of food to food

**Manoj Mishra**

Chairman & Managing Director,  
National Fertilizers Limited



(Mewat) district falls way behind other parts of the country, despite being part of prosperous Haryana.

#### **The Challenge: Traditional Mindset**

The major challenge while starting the project was the negative reaction of farmers due to their past experience of inconsistent appearance, bad odour and contamination of inert materials in

the City Compost. Farmers had the impression that City Compost also contains heavy metals (i.e., lead, nickel, cadmium, arsenic etc.); the long-term use of which might create toxicity in crops, cattle and ultimately in humans. The farmers said that there were no immediate visible effects of using City Compost like those seen with application of nitrogenous fertilisers. Since city compost contains very low percentage of available nutrients, visible effects on crops couldn't be seen in short duration. Farmers looked for immediate results as they were ignorant of long-term impacts.

Therefore, the first action taken was to change the rigid mindset of the farmers regarding City Compost, which was done through a series of awareness programmes. During these programmes, the process of waste to compost and benefits of compost was explained in depth by the agricultural scientists and specialists.

Active participation and involvement of farmers was ensured throughout the project. Various training and educational programmes, soil health campaigns, afforestation activities were organised in the villages on a regular basis. To provide free of cost soil testing facility to the farmers, a Mobile Soil Testing Van was stationed in the adopted villages. Crop-wise fertiliser recommendations were given to the farmers in the form of Soil Health Cards and information on use, and benefits of City Compost was also provided in the form of pamphlets etc.

Through these educational initiatives, farmers were finally convinced and satisfied and started using City Compost on some crops, especially vegetables, on an experimental basis. The experience and observations of the farmers with the use and advantages of City Compost was suitably captured at various stages of the project, and success stories were documented which highly motivated the farmers.

#### **Positive Outcomes of the Project**

A recommended dose of City Compost @ 2.0 MT/acre was applied in the block demonstration area in addition to the farmer's existing practice. The findings from block demonstration area were compared with the farmer's own practice of fertiliser application where he did not use the City Compost.

On the basis of results obtained from the trials conducted during 2016-17 and 2017-18, City Compost showed a good impact on wheat, mustard, jowar and vegetable crops. 8-12 percent yield increase was observed as compared to the farmer's own practice.

The project is being continued for 2018-19 as a three-year long-term project. After completion of the project, yield data will be analysed further to understand the usefulness of long-term application of City Compost on various crops and propagate/promote the scientific use of city compost as an organic fertiliser/soil conditioner.



## Meeting Farmers' Aspirations

Our intervention in the villages generated a great awareness of compost among the farmers. Farmers were highly convinced and excited with the impact of City Compost on various crops and soil properties. As a result, some progressive farmers of the adopted villages also applied City Compost in some crops, especially vegetables, and got a positive response in terms of yield and quality.

The project's obvious success in terms of acceptability of compost by farmers and its positive outcome in terms of increased farm yield is very encouraging. The project can be replicated anywhere in the country. It can successfully address the twin problem of waste management and insufficient availability of organic fertilisers in India. The need of the hour is to provide easy availability of compost to farmers and information on its usage to make it effective and sustainable.

## Success Story

### A Productive Yield Makes a Happy Farmer

Israil from Tai village in Nuh District is the owner of 10 acres of farm land. He mostly depend on rainfall for farming. He grows wheat and mustard in rabi season and rice in kharif season. The rain shortfall in the last few years has brought down the reduction in crop productivity. But now, Israil happily shares that after the use of City Compost provided by NFL, he has been able to reap better output from wheat despite insufficient rainfall.

Like many other farmers in Nuh (Mewat), Israil has gained from the knowledge given by NFL staff about benefits and usage of City Compost. His apprehensions about the use of compost were well-catered through training programmes organised by NFL. In addition, the benefits of compost were demonstrated through actual usage in block demonstration farms.



Earlier, Israil would use cow dung as manure, but its shortage put him in great difficulty. He is now happily adapting to City Compost after realising its benefits.

In 2017-18, Israil used two tonne per acre City Compost in wheat (WH 711) crop. He experienced a very positive outcome in terms of germination, growth, overall health and quality of his wheat crop. This result came despite lower rainfall. A yield of 23.60 quintal/acre was reaped with the use of City Compost as against the yield of 18.40 quintal/acre without using City Compost. This shows that there was an increase of 22 percent in total production.

Impressed with the results of City Compost, Ismail shares his experience of its benefits with other farmers in the village. Indeed, a happy and contended beneficiary thus becomes a mouthpiece of good work.

### Innovations Adopted During Planning and Execution of the Programme:

1. Long term project was planned keeping in view the fact that effect of organic fertilisers (City Compost) cannot be observed immediately.
2. The concept of *seeing is believing* was adopted by carrying out block demonstrations in the 50 acre area of each village.

3. A two-way approach was followed:  
(i) Changing the rigid mindset of farmers towards City Compost usage  
(ii) Generating awareness regarding use and immense benefits of City Compost on the soil and on crops.

4. Regular participation of farmers was also ensured by organising farmer meetings/training programmes on regular intervals, and by inviting agricultural scientists and specialists.

5. City Compost and technical knowledge was provided to the farmers for three consecutive years, which helped them in adopting the same.

6. Regular follow-up and feedback of the farmers at different stages during the project period was also ensured.

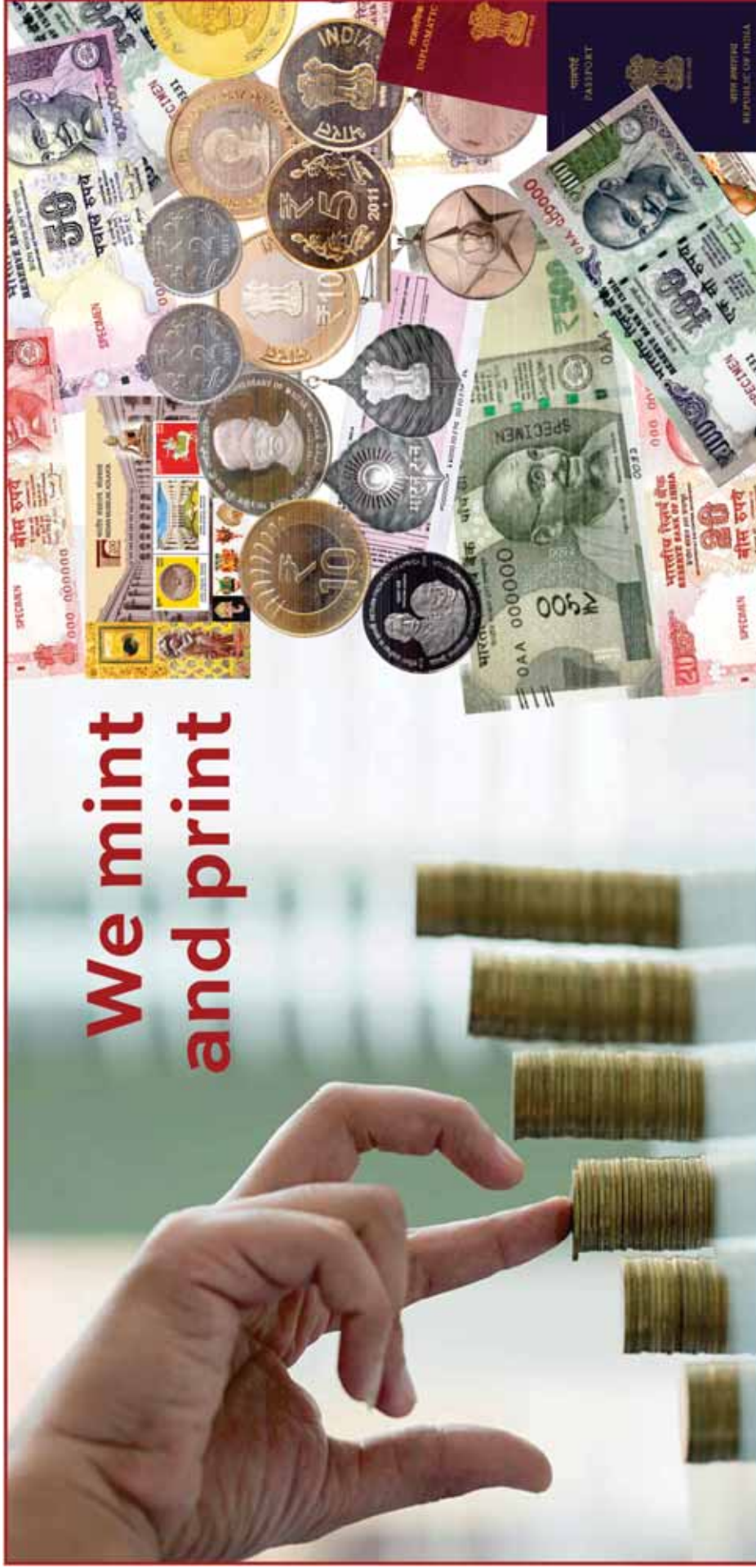
7. Integrated development of adopted villages was also ensured by carrying out other developmental activities like tree plantation, free of cost soil testing, soil health cards, construction of bio-toilets in government schools, awareness campaigns, etc.

National Fertilizers Limited has always recognised the responsibility towards the wider farming communities it operates in, and we have been carrying out various activities to educate and facilitate farmers. We intend to carry out developmental activities under CSR interventions to maintain soil health by soil testing based on a balanced and integrated nutrient management encompassing judicious use of fertilisers in conjugation with organic manures, biofertilisers etc. Adopting the Integrated Plant Nutrient Management (IPNM) for use of valuable city compost along with synthetic fertilisers will generate enormous national savings for the prosperity of India's farmers as well as the cleaning of urban India. ■

*Mukta Agarwal is Manager -  
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