

Making Waves

Inspiring Stories on Water Management by **Tata Companies**



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FOREWORD

Water is fundamental to life, human dignity and business. Having too little or too much, or water that's too polluted or too expensive can and does have an impact on society, economy and an organisation's bottom line.

Businesses, including the Tata group of companies, are becoming aware of the risks that water – stress and scarcity poses to their operational continuance and growth. They have consequently started looking at the strategic importance of water security for their operations and investments. The present compendium is a collection of case studies from the Tata group on water management encompassing practices relating to water conservation, recycling of grey water, rainwater harvesting and watershed management. It is of immense value in today's scenario where we are fast running out of ground water both in India and around the world underlining the fact that the time to act is now. At Tata's, as in everything else, we are committed to being ahead of the curve on environmental, social and governance issues.

I hope you find this compendium compiled by the Tata Sustainability Group (TSG) to be of value.

Siddharth Sharma
Tata Sustainability Group

Water – Global Scenario and What it Means for Business

Emerging global water scarcity

For nearly all human purposes, we need freshwater as it occurs on land. Salt water from the oceans is not useful for drinking, washing, cooking, irrigation or most applications in the industry. Salt water can be desalinated but that is a costly and energy intensive exercise, feasible only for a limited number of uses. The criticality of water to human existence accordingly stands undiminished irrespective of the inexorable march of technology in other areas.

As per the latest UN 'Water Development Report', more than a quarter of humanity lives in areas of severe water scarcity, 73% of which are in Asia. Economic growth, population shifts and climate change are expected to exacerbate shortages and lead to degradation of global water supplies and ecosystems over the next thirty years. Water – stress and scarcity is the new reality of our times, even though the relative levels may vary across the developing and the developed nations of the world.

With almost 17% of the world's population (1.3 billion) and only about 4% of its water resources, India today finds itself unable to serve most of the water needs of its growing population. As per the latest report from NITI Aayog, a government think tank, at least 21 cities including Delhi and Bengaluru will run out of groundwater by 2020. It further says that 40% of Indians will have no access to drinking water by 2030 and that India will lose 6% of its GDP by 2050 owing to this crisis.

Looking ahead at a world with greater water stress, it is quite probable that there will be increasing price instability, especially in agricultural and energy markets as demand for water-dependent commodities outstrips production. The associated political, social and economic risks will be most pronounced for countries that are net importers of food.

What does it mean for businesses?

Businesses are operating in an increasingly uncertain and complex world with water scarcity adding another risk to it. According to the World Economic Forum, water crises have been among the top five global risks in terms of impact in each of the last four years. This is evident from high-profile cases such as those experienced by the Coca-Cola Company in the state of Kerala, India; Nestlé Water bottling plant in Sacramento, US; SABMiller's breweries in Tanzania and South Africa.

The first challenge for any business is to understand its own exposure to water-related risks. Water scarcity provides business opportunities for some whereas it may threaten the operations or supply chains of others. Companies in sectors such as agriculture and beverages may face physical risk in securing reliable source of water. Power generation also requires water use, not only for hydroelectric but also for coal. According to The Economist, demand for electricity from industry is expected to increase 400% by 2050 resulting in an increased requirement of water. This, coupled with the

fact that government may prioritise water availability for domestic or agricultural sectors over the requirements of industry, shall pose a double risk to businesses. At the same time, the investor community shall also be looking very closely at the ability of businesses to manage water risks. Efficient water management and utilisation shall thus be a key metric for continued sustainability of business operations.

Tata Group's water management approach

A structured approach to water management began within Tata group in 2012 when four companies viz, Tata Steel, Tata Chemicals, Tata Motors and Tata Power partnered with International Financial Corporation (IFC) and Water Footprint Network (WFN) to apply the Water Footprint Assessment (WFA) framework to develop water sustainability strategies. WFA is an approach that allows companies to identify and manage water-related business risks, understand and mitigate their adverse impacts on ecosystems and communities and contribute to more sustainable management of shared freshwater resources. This framework has since been applied to other water intensive Tata companies such as Tata Metaliks Limited, Mount Everest Mineral Water Ltd., Rallis India Ltd. and Tata Sponge Iron Ltd., among others. A reduction of 25-30% in fresh water consumption of companies has been observed by recycling more water.

The Tata Trusts through their Water Mission have started working at village and habitation level to enable better access to pure water to over 6 million people in 7,000 villages across 12 states within the next three years. Tata Trusts are not only using the traditional strengths of community mobilisation and capacity building but also the power of innovative approaches and technological solutions to deliver on a scale never attempted before.

Water, as we know, is a critical life resource. Its management has become ever more complex due to a multitude of issues such as decreasing per capita availability, increasingly erratic and iniquitous temporal and spatial distribution, low reliance on traditional methods of groundwater recharge and storage, etc. Given that businesses depend significantly on this increasingly scarce resource and that most of the times they compete with the community when it comes to equitable access to water, it becomes imperative that we manage it in an integrated manner.

This compendium has collated stories of successful management of various issues related to water by Tata companies over the last few years. The objective is to inspire companies across sectors and geographies to devise more innovative approaches to conserving and augmenting this special resource also known as the 'elixir of life' 💧



The Worth of Water: Ensuring water security for operations

TATA MOTORS, DHARWAD

Context

Dharwad Plant has faced a water constrained scenario right from its inception. Tata Motors commenced manufacturing at Dharwad Works, a greenfield site in 2012. In spite of the commitment from the Government of Karnataka to supply piped water, the Karnataka Industrial Area Development Board (KIADB) was unable to do so, due to water shortage at the river source itself. Hence, KIADB permitted extraction of groundwater through bore wells within the plant premises to meet the immediate water requirements.

Planning for water sustainability at Greenfield stage

Dharwad Plant was planned in line with the IGBC Green Factory Building guidelines. With a view to sustainably manage available water resources, an artificial lake was excavated at the north-west corner of the Plant premises in the direction of surface and ground water flow as per the local topography. The storm water network across the Plant was designed to deliver the run-off from the built-up and paved areas to reach the lake. The lake spread over 5 acres with holding capacity of 0.7 lakh cubic meters (m³), was primarily aimed at recharging ground water with the harvested rainwater. In successive monsoons, since 2012 the lake had surplus water, which could be easily tapped for use. A Water Treatment Plant, which was already set-up to treat bore well water was located adjacent to the lake enabling easy tapping of the impounded rainwater. This harvested rainwater provided a timely in-house water source when the quality and yield of groundwater was an issue. **The success of Lake-1 in harnessing rainwater inside the Plant premises became a blueprint for a successful water security plan for Dharwad Plant.**



Aerial View of Lake-1

The success of Lake-1

in harnessing rainwater inside the Plant premises became a blueprint for a successful water security plan for Dharwad Plant.

Meeting changing requirements

In 2013, the State Level Environment Impact Assessment Authority (SEIAA), Government of Karnataka directed to enhance the rainwater harvesting set-up. KIADB also commenced piped water supply in 2014, but it was insufficient and erratic and completely absent during the summers from March to June.

Currently, Dharwad Plant requires 1.5 lakh m³ annually, which is expected to rise to 3-6 lakh m³ annually in future. On this background of unreliable KIADB water supply and constrained groundwater situation inside the plant premises, it was decided to scale up the "Lake-1 model" and create a much more expansive second Rainwater Harvesting facility to recharge ground water and use surplus water storage for operational water requirements.

Scale-up of Rainwater Harvesting Project

Planning of Lake-2 began with site and contour surveys both within the Plant and immediate area surrounding the Plant. Historical rainfall data (average annual rainfall of 700mm) for the region and calculation of the run off indicated a potential to harvest 3.70 lakh m³ of rainwater. As Lake-1 already had a storage capacity of 0.7 lakh m³ in place, there was still a scope to harvest an additional 3.0 lakh m³ of water every year. Twenty acres of land was identified at the North-East part of the premises taking advantage of the site contours which would enable maximum run-off to be harvested. This part of the premises is at the lowest ground level and had the potential to harvest run off from land beyond Tata Motors boundary as well.

With further detailing of levels and contours at the site, it was planned to create two storage ponds at two different levels. While Pond 1 (Northern) would have a potential storage capacity of 1.2 Lakh m³ water, Pond 2 (Southern) would have a potential storage capacity of 1.8 Lakh m³, achieving 3 lakh m³ of the water harvesting potential. Presently Lake-2 has a storage capacity of 1.2 lakh cum, which can be increased to 3.0 lakh cum by excavation. As in the case of Lake-1, accumulation of surface run off beyond the storage level of the bund will safely overflow into the natural water course.



Aerial View of Lake-2

Challenges

Tata Motors, Dharwad is an IGBC Platinum rated Factory. In line with the principles of sound environmental management, no soil could be brought from outside our premises and neither could excavated soil be dumped outside our premises. The identified project area contained soil having differing properties. For example, the top 500 mm of soil at some locations was black cotton soil and at other locations, it was red soil. The underlying layers also varied from *murrum* soil to shale to weathered shale. The excavated soil was used in accordance with its end use; i.e. inferior soils were used as a lateral support to the bunds, while the superior soils were used for construction of the bund.

1. Ideally, a single bund constructed downstream of the project area would suffice for storing water in a single water body, i.e. the future Lake-2. However, the inlet level of the North-Eastern part beyond our boundary was at a substantially lower level which necessitated the design of 2 ponds to maximise the holding capacity of Lake-2. Accordingly, the holding capacity of Northern Pond-1 was decided based on the run off potential from the North-East side and holding capacity of Southern Pond-2 was decided based on the run off potential from its own Plant premises as well as the storm water outlet from Tata Hitachi Plant towards the South.
2. Storm water run off from the Northern part of the premises was flowing away from the proposed Project area and out of the premises. Diverting this run off water by gravity back to Northern Pond-1 was a challenge, which was achieved by backfilling the entire route to the required slope using inferior soils excavated from Lake-2 area. The slopes of the open channel for diverting this water flow were protected using stone masonry wall and pitching as required.
3. One of the learnings during the execution phase was substantial soil erosion at certain key points of the project site due to nature of water flow. This was resolved by providing stone pitching and concrete lining at the critical areas of the bund.



Removal of top soil not good for construction of lake bunds



Channel to collect water from North Eastern side for Lake-2

Dharwad Plant's

rainwater harvesting and ground water re-charge objectives have been met without changing the natural drainage pattern of the area.

The basic infrastructure of Lake-2 Project was completed in September 2017. Post 2018 monsoon, the new Lake-2 is seen impounding surface water, and is contributing to the sustenance of ground water levels. It is expected that with normal monsoon rainfall occurrence and distribution in coming years, the quantity of water impounded in Lake-2 would further increase to a point where it can be harvested using the jack well and pumping facility.

Impact on water sustainability

Dharwad Plant has improved its water security and sustainability within its boundary by the execution of planned Rainwater Harvesting projects. The rainwater harvesting and ground water re-charge objectives have been met without changing the natural drainage pattern of the area. It is expected that the impact of ground water re-charge would also benefit the agricultural and other users surrounding the Plant. The creation of a surface water body has started to attract birds and other fauna to the area. In the long term, the Lake will stabilise as a wetland habitat which will provide a safe habitat for local biodiversity to thrive.

Most importantly, the creation of in-house water body has created a secure water source and reduced dependency on external water source. Moreover, the authorities can divert available scarce river water resources to agricultural users who do not have any alternative to ground water.

Further, the quality of surface run off water is much better than ground water and has reduced in-house water treatment costs. The major cost savings would accrue from avoidance of water charges payable to KIADB for piped water or to private tanker water suppliers. Tata Motors Dharwad Plant now looks ahead to a water secure future 💧



Rainwater diverted from northern part



Soil erosion

Swachh Tech Jal: Pure and Secure

TATA CHEMICALS

Context

Lack of access to and availability of safe drinking water can be life-threatening due to the impact of water borne diseases. While this is true for both urban and rural areas, but the situation is more acute in rural and tribal areas. Apart from boiling the water, communities residing in rural and tribal areas, do not have a wide array of options that could provide safe drinking water on sustainable basis. Use of water treatment technologies has emerged as an approach that can empower communities to overcome this problem and provide access to safe drinking water.

Tata Chemicals established a section 8 company **Ncourage Social Enterprise Foundation** to promote sustainable community development solutions through social enterprises. The first area of work that Ncourage took up was on safe drinking water. The objective is to reach the 'unreached' population with a low-cost effective water solution. Multiple approaches were being worked upon and one such approach includes providing clean water to small clusters and schools through community systems.

Ncourage Social Enterprise Foundation introduced a water treatment system Tata Swachh Tech Jal which can work on gravity feed and is capable of providing quality water adhering to international standards. It is a community-based water purification intervention for providing clean,

safe and affordable drinking water. It works on Ultrafiltration technology which exerts the purification action by occlusion using anti-bio fouling ultra-hollow fibers (UHF) which can work on minimal gravitational pressure. The UHF cartridge complies with international NSF norms and occludes 99.9999% bacteria, 99.99% virus & 99.9% cysts from input water, thus rendering the output completely safe for drinking. In addition to the UHF cartridge which takes care of microbial pathogens, the sediment and activated carbon cartridges also take care of the visible and organoleptic impurities respectively and provide output water quality as specified by IS10500:2012. With easy installation and negligible maintenance cost, Tata Swachh offers safe drinking water to masses with one of the lowest per liter purification cost, thus making it the most affordable water purification system.



TATA
swachh
Non-Electric Purifiers

Ncourage Social Enterprise Foundation

introduced a water treatment system Tata Swach Tech Jal which can work on gravity feed and is capable of providing quality water adhering to international standards.

Challenges

As the availability and awareness of truly effective non-electric water purification device is very limited, Ncourage Team in collaboration with Tata Trust and its associated organisations took on the responsibility of overcoming some of the key challenges while implementing the project:

- 1) **Product Accessibility:** As the locations of the community, cluster and villages covered under this project were largely remote and inaccessible, with lack of proper road and regular transport (the situation gets more acute during monsoon) it was often difficult to make the product reach these villages. In addition, the project implementation schedules often went haywire for non-availability of simple hardware like nuts and bolts.
- 2) **Educating Users:** Making the community aware about the impact of unsafe drinking water, the benefits of the Tata Swach Tech Jal product and to build a level of trust, so that the community does away with boiling of the water (which if not done properly can be ineffective) and opt for Tata Swach Tech Jal water.
- 3) **Cost of Maintenance:** This was the biggest challenge that was overcome through proper planning and communication with the local representatives of the communities. A few people from the community were made responsible and trained to operate the system. Also, a monthly minuscule contribution from the villagers was agreed upon, so that the cost of maintenance of the purifier could be sustained.

The Impact

Ncourage Social Enterprise Foundation in collaboration with Tata Trust partners have started installing Tata Swach Tech Jal community purifiers in the states of Odisha, Assam, Manipur and Uttar Pradesh.

In the fiscal year 2018-19, they have installed 87 Tata Swach Tech Jal Units in identified rural catchments impacting more than 87 villages, 16,000 plus households, 1,00,000+ beneficiaries to whom more than 70 million litres (2 litres of water per day for 365 days) of safe drinking water was made available through the Tata Swach Tech Jal units 💧



Project Jalodari: Washing Away Water Woes

TATA GLOBAL BEVERAGES

Context

Tata Global Beverages Limited (TGBL) recognises that the right to water is a universal basic human right. It is increasingly clear the lack of access to clean water in many parts of the world causes great suffering in humanitarian, social, environmental and economic terms, and seriously undermines development goals. As leaders in sustainable natural beverages business, we have the responsibility to make water management a strategic priority, and to promote water for life and water for livelihood in all the geographies that we are present. TGBL water strategy is aspirational and includes focus on direct operations, supply chain and watershed sustainability, and public policy.

TGBLs' Project Jalodari aims to create sustainable water sources, raise awareness and build capacities on water and sanitation in the communities in which it operates. It is a multi-sectoral intervention that integrates livelihood generation with water and food security, sustainable agriculture, sustainable forestry and renewable energy for the developmental of the community. The project focuses on the following aspects:

1. **Direct Operations:** Raise awareness and build capacities on water management in the organisation and the communities, and invest resources in new water efficient technologies to achieve these goals
2. **Supply chain and watershed sustainability:** Build capacities in supply chain to analyse and respond to watershed risks. TGBL will encourage its suppliers to conduct water footprint assessment and impacts, improve their water conservation, water quality monitoring, waste water treatment, and recycling practices.
3. **Collective action:** Collaborate with Tata companies and build closer ties with civil society organisations, NGOs at the local levels for water management. The project will support research and development, innovations including technologies that reduce water footprint, and provide water security in the farms, factories logistics and for consumers.
4. **Public Policy:** Play a leadership role in advocating for water sustainability in global and local policy discussions. Partner with governments, businesses, NGOs and other stakeholders to advance water management knowledge, tools and technologies.
5. **Community Action:** Through Project Jalodari, it intends to work with communities and encourage local government and NGOs towards sustainable water management in an integrated manner with livelihood creation, women empowerment, support for education for the communities.

TGBLs' Project Jalodari

aims to create sustainable water sources, raise awareness and build capacities on water and sanitation in the communities in which it operates.

Initial Results

Direct Operation: The project has established rainwater harvesting structures in TGBL's 11 packeting centers in India. During FY19, TGBL estimates that the packeting centers consumed about 40,000 m³ of water and recharged over 80,000 m³ of water as shown in the table.

JALODARI-FY19													
Sr. No	Description	BNGP	SAMP	HYD	INDP	AUR	PUL	KEL	NON	DMD	KOL	SON	Total
1	Total roof area (sq.m)	5276	16719	12077	4287	8260	3600	6660	328	2462	4995	2286	66950
2	Roof area connected with RWH/GWR (sq.m)	5276	16719	12077	4287	8260	3600	6660	328	2462	4995	1143	65807
3	% of Roof area covered	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	50%	98%
4	Rainfall as per metrology dept. (mm)	949	683	383	691	1966	4486	1820	1693	4260	2020	1934	20886
5	Rainwater sent into the recharging system (KL)	4506	10277	4162	2665	14615	14536	10911	499	9440	9081	1990	82682
6	Water consumption (KL)	938	7521	5309	2500	3014	3997	2657	2385	3468	4736	4014	40540
7	% of plants covered	100%											

Watershed Management: TGBL is partnering with Tata Trust to develop an integrated project for Paonta Sahib region in Himachal Pradesh to augment natural resources of the region by involving village community and other stakeholders. Himmotthan (an associate organisation of Tata Trusts) is also supporting water security and various potable water solutions in Uttarakhand and Himachal Pradesh under the Tata Water Mission (TWM). The potential project impacts will include:

Social impacts such as capacity building of village and cluster level institutions of Self Help Groups (SHGs), Water Committee and Farmers' Federation; women in the selected villages will become members of local SHGs. Linking these groups to various activities will hone their skills and prospects; improved sanitation facilities and training on sanitation practices in communities and schools.

Ecological impacts such as construction of water conservation structures will result in the protection of soil and water loss which will improve the status of groundwater; application of appropriate farm practices and organic manure will improve the nutrient status of soil. It will also improve the water quality of the regional aquifer; vegetative plantation and conservation of forests will also result in ecological security of the villages. Development of fodder plots in the villages will reduce the pressure upon the forests. Use of alternate energy units like biogas plants will also result in ecological security of the area.

Economic impacts such as cash incomes will come through sales of vegetables, milk, fruits and other secondary products (pickle, jam, etc.). This will result in an increase in the average annual household cash incomes; 80 percent, or more, of all women in the selected villages, will become members of local SHGs. Linking these groups with banks to access credit for productive purposes will ensure credit availability to women which can be used in income generation activities; improved farming practices will result in increased agricultural productivity and food security. Water use efficiency will also be increased through adoption of improved agricultural practices like the system of crop intensification. These will finally result in increased food availability and nutritional security for all households in the selected villages; several good practices, successful micro-enterprise models and examples of achieving livelihood and food security will emerge from the programme.

In summary, the programme has the potential to substantially increase the human, social, natural, physical and financial capital in each participating village. It will go a long way towards removing economic and resource poverty in the selected villages 💧

Water Wise: Circular Water Management

TATA PROJECTS

Context

Tata Projects is into engineering, procurement and construction services of urban, industrial infrastructure and utility projects. It provides end-to-end solutions to set up power generation plants, power transmission & distribution systems, fully integrated rail & metro systems, commercial buildings & airports, chemical process plants, water and wastewater management solutions, complete mining and metal purification systems. As part of its water resource management, it has started measuring its water footprint and managing the footprint using the 3R principles – Reduce, Reuse and Recycle – across its project sites and labour colonies. This has been largely facilitated because of the installation of water meters at all potential consuming points such as batching plants, wet mix plants, DBM Plant and the labour colonies. This case study identifies a few water saving initiatives across Tata Project sites.

Dravyavati River Project, Jaipur

Dravyavati River flows through the Jaipur city, north to south over a length of 47.5 km, collecting storm and waste water. Most of the Jaipur city's population stays within the 10 km periphery of Dravyavati River. Along the length of the river, five Sewage Treatment Plants (STPs) have been developed that will collectively treat 170 million litres per day of sewage and ensure the continuous flow of clean water into the river. The challenge was the transportation of water for curing purpose for a 47.5 km stretch within the constraint of project timeline. Rajasthan being a desert area, water scarcity was the biggest constraint. The project used curing compound for successful completion of the mega project while tackling the water issue.

Curing is essential for the hydration of cement in concrete making. Concrete curing compound helps to prevent the loss of moisture content from the concrete by forming a membrane when applied to fresh concrete. TPL has saved water of about 5.16 lakh cubic meter by applying curing compound in this project.

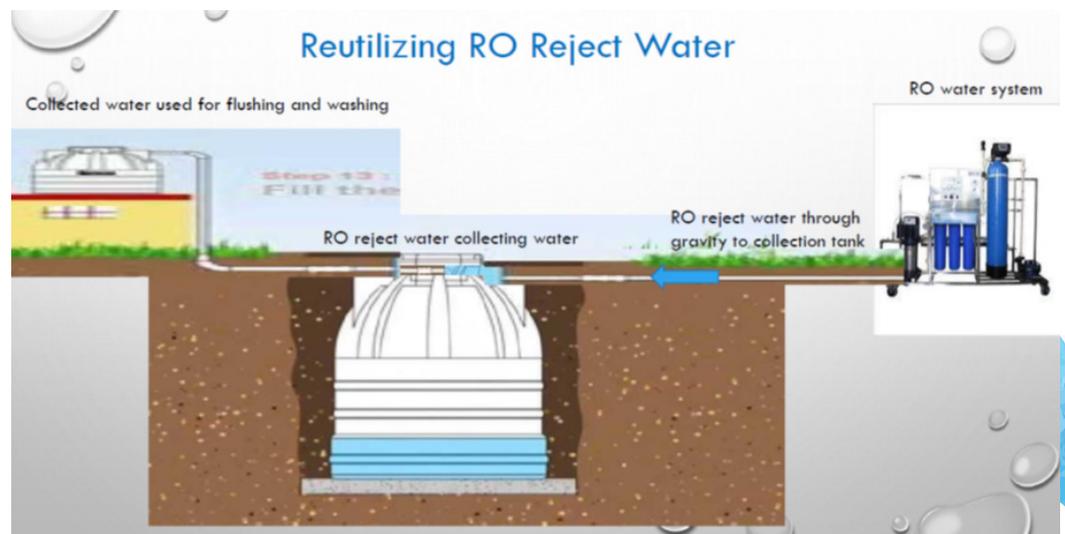
NTPC Project, Krishnapattnam

In industrial settings, Reverse Osmosis (RO) is used to remove total dissolved salts (TDS) from industrial wastewater. While RO is an effective method for handling wastewater, the issue lies in disposal of reject water which is generally around 20-50% of the RO feed water volume.



Rainwater diverted from northern part

This problem is further accentuated while disposing high salinity RO reject water which is prohibitive to a local sewer facility. Hauling the wastewater to a treatment facility can also be prohibitively expensive. The challenge is to reuse the reject water without violating any statutory norms.



Tata Projects circumnavigated this challenge by installing two collection tanks to store the RO reject at the site which is recycled for toilet purposes and dust suppression in the plant and in the nearby village areas. This has led to a monthly saving of 240 m³ fresh water and 1000 units of energy saving at the project site along with community engagement.

TRIL IT Park and M3M Latitude, Gurugram

To take care of the huge amount of water consumed and waste water generated at the temporary labour colonies of the project sites, Projects has started recycling of waste water by setting up sewage treatment plants across labour colonies. A Moving Bed Biofilm Reactor (MBBR) waste water treatment process is installed at TRIL Gurgaon and M3M latitude sites which is quite compact in design. The concept underlining the MBBR is to provide a continuously operating bio-film reactor, which is non-cloggable. This is achieved by growing the bio-film on small carrier elements that move along with the wastewater in the reactor. The air stream constantly keeps the bio media in suspension and at the same time provides the required oxygen to the biomass. The system uses specially designed bio media, which provides a large surface area for biological growth. The treated waste water has been used for washing vehicles, cleaning garages and gardening leading to a reduction of 30-50% fresh water.

In summary, we recognise that each project site will have its own challenges and will require new ways of managing water risks from design to execution stage. However, the common thread is circular water management. For effective circular water management, an understanding of local water situation, cooperation among all key actors and appropriate resource allocations are key 💧

Liquid Assets: Rainwater Harvesting

TATA CONSULTANCY SERVICES

Context:

Water resource management is a part of the operational risk assessment and infrastructure planning process at Tata Consulting Services (TCS). TCS at an organisational level has set a **target of achieving water neutrality across its operations by 2020** and several actions are put in place to achieve this target such as designing water efficient campuses and facilities, providing treatment plants and ensuring 100% recycling and reuse of the treated water to ensure zero discharge facilities and augmenting supply through rainwater harvesting.

Rainwater harvesting and storage are important mechanisms for adapting to the erratic rainfall because of climate change. Rainwater harvesting lakes perform significant environmental, social and economic functions ranging from being a source of drinking water, recharging groundwater, acting as sponges to control flooding, supporting biodiversity and providing livelihoods in the form of fisheries, etc. Besides this, it also improves the quality of groundwater, raises the water table in wells/bore-wells and prevents choking of drains. Energy to pump groundwater is also saved as the water table rises.

The Initiative:

Rainwater harvesting Lakes @ TCS is the success story of innovative approach towards water management and stewardship in water scarce cities of Chennai and Hyderabad. The rainwater harvesting lake @ Synergy Park is the natural depression in lowland area of Synergy Park at Hyderabad where all rainwater drains are connected. An artificial constructed waterbody is created at Siruseri, Chennai.



A view of rainwater harvesting lake at Synergy Park, Hyderabad and Siruseri, Chennai



A view of algal growth in lake and introduced ducks. The presence of ducklings ensures the successful reproduction of ducks in lake.

Details of Rainwater Harvesting Lakes @ TCS

Sr. No.	Name of facility	Location	Area of Campus (acre)	Area (Sq. mts)	Depth (ft.)	Capacity (KL)
1	Synergy Park	Hyderabad	50	7215	20.0	25000
2	Siruseri	Chennai	70	6660	14.5	24000

Challenges

Water Conservation has been a part of the design of TCS campuses hence major challenges were a discussion with the planner and architect for the incorporation of various water conservation features at the design stage. While operation and maintenance of initiatives are ensured through the administration team, water quality tests frequency and methods are defined to ensure the appropriate water quality of lakes.

The major environmental challenge was development of algal growth and aquatic weeds in general and high temperature and low water level during summer. To overcome this challenge, environmentally sustainable methodology of '**biological controls**' i.e. purposeful introduction of fishes and ducks was done in lakes. This has worked well and helped in establishing a biologically diversified aquatic ecosystem and its natural maintenance. Over the years, it has resulted in attracting large number of migratory birds at Hyderabad during winter. Initially, two pairs of ducks were introduced during 2009 there are now more than 30 ducks in the lake.

The Impact

The development of rainwater harvesting lakes resulted in various environmental benefits such as positive microclimate effect, fulfilling non-drinking domestic water demand, irrigation water demand for maintaining landscape, recreational areas for associates, etc. Besides this, it is an important source of increasing biodiversity and a paradise for residential and migratory birds. A total of 43 bird species were recorded within and the surrounding area of the lake. The common aquatic birds and some migratory birds were observed in Hyderabad lake. Thus, by providing rainwater harvesting lakes, TCS played a vital role in conserving natural water resources, reducing water demand for non-drinking purposes, recreational use, irrigation, enhancing biodiversity as well as increasing social benefits to the surrounding community 💧

Water Water Everywhere: Watershed Sustainability for Business and Community

TATA COFFEE

Context

Water is becoming increasingly scarce in the world, and Karnataka, India, is no exception. Currently, more than half of the state's cultivated area comes under critical to an over-exploited category of groundwater exploitation. The density of groundwater structures in state has become 10.63 units per 100 ha, which is three times more than what was in early 80s (Suresh Kumar, 2016).

In recent years, the coffee-growing regions of Karnataka viz., Kodagu, Hassan and Chickmagalur districts have been experiencing low and erratic rainfall. Further, the groundwater in the bore-wells of these districts has been dipping at a faster rate affecting many village households who are directly depending on groundwater for domestic and agricultural needs (CGW, 2016). Thus, water scarcity has been emerging in these districts at a regional scale and improving access to water resources for human and livestock use is the top priority of the authorities.

Tata Coffee Limited in association with an NGO, Water Literacy Foundation initiated restoration of hydrological balance of ecosystems in these districts which ensured water security for all stakeholders including communities. By studying the past rainfall pattern, soil characteristics, infiltration rate, slope of the area, **lake in lake model** was opted to improve the groundwater table.

Lake-in-Lake model

The key principles behind lake-in-lake recharge model are: Soil acts as largest reservoir of water if treated in right way, recharge shaft and structure is based on bottom top approach in which the water in all four layers of earth are charged and used, model is designed for one good season of rain and it is cost-effective solution and in terms of maintenance system, it is very low and easily replicable/scalable model.



A lake in-lake is a small earthen pond that is dug out on the surface and lined with a bund on all four sides to retain water for a longer duration. This facilitates percolation and replenishment of ground water by capturing run off.

Tata Coffee implemented the Lake-in-Lake initiative in six villages which faced severe water shortages and were also close to its coffee estates. To know the extent of water scarcity and domestic water use pattern, the baseline survey was carried out in these six villages (Table1). The survey indicated that water shortage in the villages is a recurring problem especially during summer over 3-5 months. The survey also indicated that ground water table was declining and most of the existing lakes have been encroached upon or were poorly maintained. Since desilting lakes would have been expensive, the lake-in-lake model was adopted to recharge groundwater.

The Impact

The holistic solution was implemented under public and private partnership with total investment of INR 2 Cr. In the last two years' total 20 lakes were surveyed, with five lakes completely rejuvenated leading to harvesting of minimum 1.92 million cubic meter run off. Close to 12,000 people have benefitted so far and roughly INR 1.28 Cr per year benefits have been observed by the Panchayats by avoiding purchase of water. In addition, farmers are indulging into double cropping because of availability of water.

In future, clean potable water supply will be a binding constraint to the authorities due to competing uses and users, depletion of groundwater, increasing population and emerging climate change impacting on water resources. In this regard, the concerned institutions need to sensitise the public by discouraging over-exploitation of groundwater and profligate pumping of water. Capacity building of different stakeholders addressing water literacy programmes/including wise sustainable use of water is crucial. People should be aware of the true value of water and hence, the demand management needs to be introduced by capacity building, regulation and pricing.

Table 1: Estimation of potable water supply, demand and the gap for the targeted village households

Name of the Village	No. of families	Total Population	Total Water Requirement/ demand* (liters/day)	Current water supplied per household (liters/day)	Average Water Supply Rate (lpcd)	Estimated Water Availability ** (liters/day)	Water Shortage (liters/day)
Ammathi	700	2,800	1,54,000	42.9	10.71	30,000	124000 (80.5)
Kadlur	421	2,002	1,10,110	86.6	18.2	36,444	73666 (66.9)
Mylimoney	257	1,627	89,485	166.4	26.2	42,752	46733 (52.2)
Nokya 2	450	2,486	1,36,730	111.1	20.11	49994	86736 (63.4)
Badaga	335.5	1342	73810	56.1	Oct-15	18,810	55000 (74.5)
Hundi	450.5	1814	99770	66.1	Oct-15	29,770	70000 (70.2)

Project Jal-Dhan: Watershed Management for Livelihoods

RALLIS

Context

For Rallis India which is in the business of comprehensive crop care solutions, water has been one of the key material issues. It has developed its water stewardship strategy which includes water management within its organisational boundary as well as working with the community for watershed sustainability.

Project Jal-Dhan

The **Jal-Dhan** project aims at increasing livelihood by increasing agriculture productivity of small and marginal farmers through watershed interventions, women empowerment and skill development.

Nearly three years back Rallis India decided to pilot its watershed project in the region adjacent to its plant at Lote (in the Konkan belt) which had a unique problem of being blessed with heavy rainfall

every monsoon yet faced water scarcity during summers due to its hilly terrain and lack of proper storage structure for rainwater. The project included interventions such as construction of temporary and permanent structures like loose boulder, diversion dam, check dam and afforestation with the help of Rallis employee volunteers and villagers through 'Shram daan' i.e. providing one's service for the community work.

A slow but steady beginning in the first year was intensified in the second year as the results were life changing for the community. Older watershed structures were de-silted and revived to increase rainwater harvesting with visible impact seen at Songaon village in terms of an increase in water table and well levels, increased access to potable water, improved seasonal vegetable crops (Rabi crop), overall increase in agricultural production, and the addition of a second crop in the year. With this successful experience, the



The Rallis Jal-Dhan

programme has now covered **31 villages**
from **16 tehsils** and **8 districts**



company decided to expand the watershed initiative into those areas which are drought prone and rainfed especially in Vidharbha and Marathwada which has large population of small and marginal farmers.

The Impact

1. The Rallis Jal-Dhan programme has now covered 31 villages from 16 tehsils and 8 districts. A good monsoon in 2016-17 and 2017-18 complemented the initiatives leading to successive overflows of water structures. So far, the Jal Dhan project has recharged water structures with 1,064 million litres of water, changing the lives of more than 1,11, 600 villagers including more than 36,000 AA (SC/ST) populations. One of the worst affected villages in drought, Sirsala in the Beed district in Maharashtra, had a supply of potable water only once every six weeks. With the Rallis Jal-Dhan intervention they now receive potable water once every week.
2. The Jal Dhan interventions have led to several innovations such as:
 - Use of fertile silt accumulated from desilting for road construction or land filling or creating additional fertile soil.
 - Hydro power generation was possible because of stored water at a height. The power today meets the lighting requirement of the Gauthan village at Lote.

Rallis has received immense appreciation from the community on the Jal-Dhan intervention. The Maharashtra Government has also acknowledged the Rallis initiative and it plans to take this forward through partnership with the government, Tata Trusts and key stakeholders 💧

Making a Collective Splash: Empowering Employees to Manage Water

INDIAN HOTELS

Context

Indian Hotel opened its first hotel – The Taj Mahal Palace in 1903 and since then has grown to operate 178 hotels including 30 under development globally across 12 countries in over 80 locations.

Considering that the hospitality industry has strong commercial and moral reasons for addressing water consumption cost because water accounts for a good part of the utility bill and moral because water is scarce in many geographies. Hence, hotels have the obligation to use it responsibly. IHCL has been working on water security as part of its overall environmental stewardship and has seen a considerable drop in water consumption in its operations globally in the last couple of years.



Taj (The Indian Hotels Co. Ltd.)

deployed a strategy of **educating the staff and encouraging** them to identify best practices for **water saving** that are specifically relevant to their own hotel properties and context.

Empowering the employees

Taj (The Indian Hotels Co. Ltd.) deployed a strategy of **educating the staff and encouraging** them to identify best practices for water saving that are specifically relevant to their own hotel properties and context. Using a **competition format**, teams were asked to implement water-saving initiatives and submit reports to demonstrate real savings. The top 5 hotels with the most effective water savings were invited to share their project methods and outcomes with the rest of the company.

Simultaneously, a set of 73 hotels with the most significant impact to business were identified. These hotels are also part of a third-party assessment and monitoring programme through Earth Check. For the first time, a baseline for water intensity (water consumed per guest night) was set for each of these hotels, based on their performance of the preceding 3 years. Accordingly, targets for reducing water intensity were set for each hotel. Hotels with higher intensities were set with more ambitious targets, with an overall company target of 5% reduction in water intensity.

The contextual assessment and project design were carried out by the corporate sustainability team and deployed across hotels. Within hotels, engineering teams were the key actors, with the GM as the project owner and teams from various other verticals as collaborators. At a company level, the project was anchored by the corporate sustainability team.

Impact

As a result, Taj's overall **water intensity in litres per guest night has reduced by 6%** in 2016-17 compared to the previous year 2015-16. Target-setting initiatives indicated the most effective practices that can be easily implemented to generate water savings. Staff training and equipment maintenance were identified to be the most effective practices. These are actions that can be easily implemented and scaled with limited financial investment. Therefore, an opportunity to scale and replicate was identified 💧



Navigating Water Risks and Value, Beyond Our Boundaries

JAGUAR LAND ROVER

Context

Jaguar Land Rover has applied its business passion *Environmental Innovation*, to support a global strategy that has nearly doubled vehicle production whilst halving operating CO₂ emissions, as well as reducing natural resource consumption through the goal of zero waste. Most recently, the UK manufacturing and product development sites have been certified as Carbon Neutral and all main UK sites send zero waste direct to landfill.

For Jaguar Land Rover more sustainable water management and security of supply is integrated as part of any new infrastructure. Reducing total potable water demand, by focusing on how much water comes into all operations and using it more efficiently, has meant more harvesting, reuse and treatment facilities, benefitting Jaguar Land Rover as well as local communities.

In 2018 global water demand was approximately 1.9 million m³ direct into operations; from mains supply, surface water, bore hole and rainwater harvesting. However, it is *Water per vehicle* that has provided long term incentives for better water management.

In the UK a **30% reduction in operational water use in m³ per vehicle target** has driven process improvements and water storage capacity for harvesting and quality control – at Castle Bromwich, Halewood and Solihull vehicle manufacturing plants. Today this delivers 2.8m³ use per vehicle, for those plants representing 65% of total water demand.

By fiscal year 2020–21 Jaguar Land Rover aims to achieve 2.53m³ per vehicle in the UK and 2m³ per vehicle at its global plants in Brazil, China and Slovakia, reflecting the water efficiency measures built into the newest operations during construction.

Now, Jaguar Land Rover is planning for great water management beyond its operating boundaries, to include the impacts of scarcity in the supply chain and social benefits of a healthy water environment to local communities.

Using data to change minds

Pulling together a global Water Focus Group with the aim of putting one water footprint, on one page, has helped Jaguar Land Rover create a shared sense of purpose – better and more sustainable water management at a consistent, global level. This group has begun to decouple absolute water extraction from vehicle and

Jaguar Land Rover abstract

water from the local river Paraíba do Sol which is treated, used and returned to the river at a better quality than it was abstracted.

engine production, reducing operating water per car by over 20% versus 2007 levels. The team in Slovakia has commissioned a new plant and began vehicle production in 2018. This year the plan is to reduce water per car by over 50% through the application of efficient water controls.

Using the CDP *Water Security* Index as a guide, the Water Focus Group uses competitive insights and assessments of the groups actions to reduce *water per car* demand and improve effluent quality standards; plan and deliver smart metering linked to a web based data dashboard, flow mapping in the supply chain, water quality monitoring and recognising the value of water as a shared community resource, to the River Basin level.

In addition, a small group of Jaguar Land Rover's tier one suppliers submitted their water use data to CDP, so the Water Focus Group can build a wider supply chain picture with the potential for future targets, shared with the supply chain.

*Itatiaia vehicle assembly plant –
Rainwater balancing and
abstraction pond for water reuse*



Linking water to disruption risk and therefore production continuity means the group analyses water use during and outside production hours, targeting sub metering needs to local areas and working with local water providers to gain more infrastructure resilience and transparency of water flow, to and from all Jaguar Land Rover operations.

Reduce, reuse and recycle

This principle isn't just for waste.

Whilst Jaguar Land Rover does not have operations in high water stress areas in terms of flood risk the most recent hot summers and dry winters has raised awareness of potential water issues, this was evident in Brazil where water shortages have impacted water supply and power generation investment at River Basin level.

Jaguar Land Rover manages this in Brazil and in all other manufacturing plants, through investment in attenuation process; managing water runoff using balancing ponds fed by rainwater, which means the development has no greater impact on water runoff than if it was a green field site. As a consequence water can be left to replenish groundwater sources and not cause flooding concern to neighbours through increased development.

The Brazil plant uses electricity generated largely by hydro power. Jaguar Land Rover abstract water from the local river Paraiba du Sol which is treated, used and returned to the river at a better quality than it was abstracted.



Gaydon UK – Newt monitoring as part of biodiversity management for water.

Rainwater harvesting at the UK engine assembly plant at Wolverhampton, vehicle manufacturing in Slovakia and Brazil supplements extraction from mains supply. Today rainwater harvesting represents approximately 5% of the overall 1.9million m³ demand, which will increase as the investment made for Biodiversity and ecology projects begin to mature.

At the Castle Bromwich plant, 50% of total use comes direct from an onsite Borehole, drawn from a sustainably replenished aquifer. This is counted and costed along with mains water, as the total responsible use for the site, rather than a free resource without specific targets.

All of these efficiencies count towards the overall and site level water per car targets.

Beyond our boundaries

Jaguar Land Rover has also considered the value water in CSR projects outside the boundary walls considering how to reduce risk, build resilience to water stress and add value to communities through improved health and wellbeing. In Brazil for example this resulted in a centralised sewage treatment plant for a local village that improves the water infrastructure enabling it to be discharged to river; replacing local septic tanks that allowed discharge to ground close to locations where people are also abstracting water for cooking and drinking purposes.

At Jaguar Land Rover's group Design and Engineering Centre at Gaydon in the UK, infrastructure development has achieved a net gain in terms of biodiversity improvements, which will continue to be managed into the future; including protected species habitat, for example newts and enhanced surface water drainage.



Jaguar Land Rover employee Chris Harris demonstrates the Lifestraw Community water filter.



Data feeds from water filter bar codes taken via smart phones, determine how much clean water is processed, therefore how many children are helped.

Jaguar Land Rover has a track record of delivering environmental and social benefits as part of its global CSR programme.

Since 2013, over 1 million people have access to safe water through investment in the **LifeStraw-carbon-for-water CO₂** offset project in Busia, Kenya; providing offsets for carbon neutrality and safe water investment for communities.

In addition Jaguar Land Rover employees visited the **Water for Schools** project in Bungoma during October 2015 and distributed Lifestraw Community filters to schools across the region. Today over 380,000 children have access to safe water, which means they can remain healthy and continue to go to school.

And in India, Jaguar Land Rover has provided financial support from May 2019, to launch local Water and Sanitation provision in the community around the Pune plant, a CSR project run by Pune colleagues to support the Sustainable Development Goals in their area.

Future focus

Jaguar Land Rover is acting on its Responsible Business agenda. To date, data has focused on water extraction, to drive intensity and absolute volume use efficiencies. Going forward similar maturity is needed for the water quality leaving all its plants and for more transparency in the supply chain.

The biggest challenge will be setting out to balance, *or Replenish*, all the freshwater water Jaguar Land Rover uses in the local water shed or to the River Basin around all global plants, as well as develop targets both within and outside the company's boundaries that encourage all stakeholders to value water beyond just price per m³ alone 💧

Tata Water Mission – Creating a Healthy Future

TATA TRUSTS

Context

Improving access to safe water and environmental sanitation have been key focus areas for Tata Trusts. Given the urgent need for making a significant difference, which calls for a more rigorous and focused intervention, and to create visible, scalable and sustainable impact, the Trusts decided to approach the problem in a mission mode. With a view to consolidate water and sanitation field projects and to scale up the interventions in the sector, in July 2014, the Trusts launched an umbrella initiative – Tata Water Mission (TWM) – which envisioned to create a healthy future for millions of Indians through provision of safe, assured and adequate drinking water, along with improved sanitation and hygiene facilities for the underserved communities. The mission advocates a decentralised, demand-responsive and community-managed approach to achieve the goal and it is also aimed at promoting innovative technological and economically sustainable solutions. Since the launch of the Tata Water Mission; the Trusts have scaled programme implementation of various projects in multiple geographies through an integrated approach, linking it with existing projects.

Regional Initiatives

Direct interventions for providing safe drinking water, water resource management and sanitation initiated across 4,000 villages across 13 districts namely Gujarat, Rajasthan, Jharkhand, Maharashtra, Nagaland, Uttarakhand, Assam, Uttar Pradesh, Andhra Pradesh, Punjab, Telangana, Karnataka and Odisha. Some of the key updates are as follows:

- Safe and assured drinking water systems established in around 1,235 villages/peri-urban areas, catering to over 1.26 million people.
- Improved Individual Household Latrine (IHHL) units set up for more than 110,000 households (600,000 individuals).
- Developing region-specific Behaviour Change Communication (BCC) campaigns and awareness generation interventions for three key behaviours; (i) Sanitation construction and usage; (ii) hand wash during three critical periods (i.e. after defecation, before cooking and taking a meal).
- Based on the theory of evolutionary psychology, a campaign on 'Progressive Nurture' keeping uniform trait of human behaviour as a focal point was developed and implemented. Based on positive outcomes; the campaign is being scaled up in more than 10 states.

The Trusts and Pani Foundation

collaborated and initiated a “Satyamev Jayate Water Cup” with the objective of communicating, imparting knowledge and bringing about a change in the outlook of people at the grassroots level about water conservation and watershed management.



- On personal hygiene level, comprehensive pilots on Menstrual Hygiene Management (MHM) have been undertaken in Uttarakhand and Rajasthan where multiple products have been tested based on technical feasibility, socially and economic acceptability and environmentally sustainability. Based on learnings of these pilots, long-term strategy is being developed for expansion in other geographies.

Joint projects

The Trusts have developed strategic partnerships with the following:

- The Trusts and Pani Foundation collaborated and initiated a “Satyamev Jayate Water Cup” with the objective of communicating, imparting knowledge and bringing about a change in the outlook of people at the grassroots level about water conservation and watershed management. The project was implemented in more than 130 villages across three blocks of Maharashtra and within four months of time, the collective action of communities resulted in construction of water harvesting structures with a capacity to store 168.32 million litre of water with community’s own resources. During the second phase, the project was scaled up to cover more than 1,200 villages across 30 blocks of Maharashtra which helped to create water harvesting structures to store more than 8,000 Crore litre of water which will ensure year-around water availability to rural areas of Maharashtra.

- The Trusts have partnered with Jaldhaara Foundation (promoted by US based philanthropist Ms. Jacqueline Lundquist) to provide safe and improved drinking water to fluoride affected areas of North Karnataka and Bengaluru city. The project aims to demonstrate economically viable venture with a revolving fund (soft loan support) model which would recover capital investment to be plough back to serve additional communities. Further, the Trusts have supported a project to Jaldhaara foundation to install more than 25 water ATM in slum areas of Delhi to provide safe drinking water which covers more than 50,000 households across Delhi city.

Partnership

Over a period of two and half years, the Trusts have successfully built partnerships with like-minded foundations and organisations to create synergy and to achieve scale and mobilised a substantial amount of resources as a co-funding arrangement. Some of the key resource partners are Bill and Melinda Gates Foundation, Arghyam, One Drop Foundation, Hans Foundation, HT Parekh Foundation, etc. The Trusts have built knowledge partnerships with the Toilet Board Coalition (an international organisation working on Smart Sanitation Services), the University of New South Wales, WaterNet International (Netherland based water utility service company), etc. One of the important strategies of the Trusts is to build linkages with the state and central government for mobilisation of resources from mainstream government programmes and influence policies for larger scaling up. In this regard, Memorandum of Understanding (MoU) have been signed with several state governments to ensure scalability of interventions. Whilst the State provides around 70% of the physical infrastructure costs, the Trusts' resources are utilised towards critical gap funding and developing innovative approaches.

Technology Innovations

The Trusts have enhanced its focus on technology innovations within water and sanitation areas; more specifically to address microbiological contaminants (E-coli form, bacteria, virus), chemical contaminants (Fluoride, Arsenic and Salinity) and solid and liquid waste management. The overall focus is on identifying suitable technology for household level solutions as well as community level solutions. At community level the following two promising technologies have been tested and are being considered for scaling up:

- (i) Community-based in-line chlorination system called Pureall (successfully piloted in Uttarakhand and Gujarat);
- (ii) Low-cost, low-energy arsenic and fluoride removal technology developed by Drinkwell Technologies, USA.

At household level, the Trusts have identified and tested various models and scaled up low-cost nano-silver based Tata Swachh (developed by Tata Chemicals Limited) in states of Uttarakhand, Gujarat, Nagaland, Mizoram and Uttar Pradesh. This technology has been implemented through no-subsidy or innovative financial models where community institutions such as Women Federation and Farmer's Producer Company plays a critical role of aggregator and service provider.



Swachh Bharat Mission (Gramin)

To accelerate efforts towards achieving universal sanitation coverage and to focus on sanitation, the Prime Minister of India launched the Swachh Bharat Mission on October 2, 2014. As the Trusts' objectives are aligned to national objectives and with a view to provide facilitation support to states/districts for effective implementation of Swachh Bharat Mission (Gramin), the Trusts have joined hands with the Government of India as a Development Support Partner (DSP). Through this partnership, the Trust would provide improved sanitation services to more than 3.5 million households and 21 million people.

Key areas of support include:

- Developing Social and Behavioural Change Communication (SBCC) material and helping state governments in its rollout. Currently, SBCC material have been developed and rolled out in three states.
- Supporting state governments in developing effective policy frameworks to accelerate the implementation of SBM. Under SBM (G), the Trusts have supported states of Gujarat and Uttarakhand who have been declared Open Defecation Free (ODF) whereas intense support in the state of Andhra Pradesh, Jharkhand, Punjab, Nagaland, Rajasthan and Karnataka is being provided to achieve ODF status.
- Undertaking training and capacity building programmes through Virtual Learning Centres. So far, more than 5,000 people have been trained across states under the SBM who have initiated works on making the districts ODF.

Zilla Swachh Bharat Prerak

Ministry of Drinking Water and Sanitation, in association with the Tata Trusts, in December 2016 launched the Zila Swachh Bharat Prerak (ZSBP) initiative. The initiative aims to place 600 "young professionals", one in each district of the country to give a boost to the Swachh Bharat Mission. The professionals called "Zila Swachh Bharat Preraks (ZSBPs)" are working directly with the District Collector and are providing technical and management support to these districts to make strides towards becoming ODF. So far, more than 400 preraks have been placed across the country covering more than 29 states. These professionals will help achieving ODF districts within a specific time frame by facilitating construction of more than 200 million Individual Household Latrines.

Way Forward

With a view to do value addition for sectoral enhancement and policy influence, the Trusts will continue building on its experiences and put efforts to create a niche area in WASH sector. In this regard, the Trusts have identified critical gaps and emerging areas of interventions to focus on. Some of the key focus areas are as under:

- (i) **Solid & Liquid Waste Management:** Due to a strong push on the sanitation programme in India, sanitation coverage is rapidly growing. However, one of the critical challenges rural areas now face is disposal and treatment of solid and liquid waste. To address this issue with robust economic and institutional model integrated with appropriate technological solutions, the Trusts have initiated a process of developing model villages in select geographies to develop a proof of concept. These projects are being implemented in partnership with the government organisations so that the same can be useful in forming a policy.
- (ii) **Water Security and Springshed Management:** With climate change impact, there have been drastic variations in rainfall pattern observed which poses serious threat to drinking water security. The Trusts have developed few models on water security protocols to ensure drinking water security through springshed management (in hilly region) and integrated water resource management (in plain areas) which will be scaled up.
- (iii) **Technology Advancements:** The Trusts ongoing partnership with MIT, IIT-Bombay and other premier research institutions is being dovetailed for technology advancements to address second generation issues where low-cost and context specific cutting-edge technologies will be identified, tested and scaled up through appropriate financial and institutional models. Following are some of the key areas of focus for technology-based solutions: (i) Selective adsorption of ions-based CDI technology in partnership with University of New South Wales (UNSW); (ii) Household level arsenic purification system; (iii) Aquaback distiller to remove chemical and microbiological contamination; (iv) Intense Pulsed Light to address microbiological contamination.
- (iv) **Behavioural Change Communication (BCC):** To ensure sustainability of systems and institutions, bringing change of community's mindset is a very important element of the Tata Water Mission's strategy. The Trusts have will integrate its BCC component in other large-scale interventions such as Internet Sathi to ensure awareness generation through digital media. This will not only enhance penetration level of behaviour change programmes, but also ensure an informed decision-making process at community and household level to adopt improved hygiene practices.
- (v) **Scaling up:** With increasing experience of the Trusts engagements, it is proposed to expand the Trusts work in other geographies through an integrated approach overlaying with the other livelihood, education, health and nutrition initiatives. Opportunities are explored to enhance current footprints in other geographies such as Telangana, Assam, Maharashtra, Uttar Pradesh, Mizoram, Arunachal Pradesh, etc. 💧

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