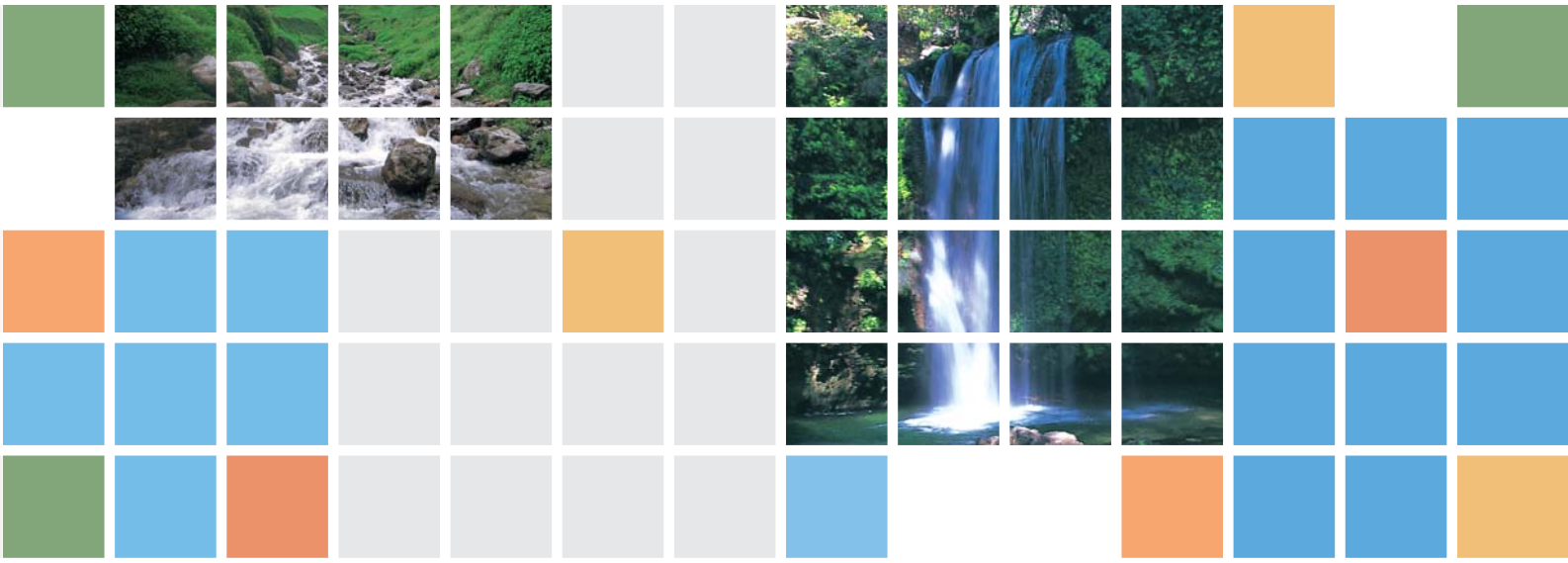
FICCI Water Awards 2012

Supported by HSBC

Recognising excellence in water management and conservation



COMPENDIUM OF ENTRIES

FICCI Water Awards 2012

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COMPENDIUM OF ENTRIES

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August, 2013

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This report is a compendium of entries received as part of FICCI Water Awards 2012. The entries that were shortlisted for presentation to the jury are published in the report.

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Acknowledgements

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Foreword



Water and growth of our civilisation are closely linked. The civilization came up on the banks of rivers, and our existence and progress has been impacted by the availability, use, misuse and governance of water.

Availability of water is and will continue to be a major driving force for meeting the growth imperatives across all sectors – agriculture, industry and domestic. In recent times, we are witnessing growing incidences of conflicts amongst different users and across different regions of our country over sharing of water. It is time that each and every user of water values the need for water conservation and takes steps to prevent its wastage.

FICCI has been working consistently to promote water conservation strategies within its member companies. FICCI launched its Water Mission in 2011 to increase awareness on water conservation and develop a long term programme focusing on water efficiency. Through research, advocacy, awareness creation and best practices sharing, the Mission is working to make industry more responsive in managing our scarce water resources.

Under the auspices of the Water Mission, FICCI, in association with HSBC, instituted the Water Awards in 2012. An annual feature, the awards recognize efforts by Indian industry in areas of water efficiency, management and its conservation.

The entries received across the three categories – Industrial Water Efficiency, Community Initiatives by Industry and Innovation depict the wide range of initiatives Indian companies are taking to conserve water resources. Initiatives adopted range from rainwater harvesting; wastewater treatment; water audits and technology modification for reduction in freshwater consumption and reuse of wastewater.

The Compendium of Entries is a compilation of best practices prepared from entries that were submitted for the first edition of Water Awards-2012. I congratulate the winners and hope that these case studies will inspire others to come forward and take concrete measures for reducing their water footprint.

Naina Lal Kidwai
President FICCI
Country Head HSBC India and
Director HSBC Asia Pacific



Message



India, with 18% of the world's population has only 4% of the global renewable water resources. The total water resources in the country have been estimated as 1,953 km^3. Of this available water, only 1123 km^3 is available as utilizable water in the form of surface (690 km^3) and groundwater (433km^3). There are wide variations in the availability of water across the country with drier regions having greater fluctuations in rainfall, thus increasing the vulnerability of people to water scarcity. With growing population, climatic and anthropogenic factors impacting water availability and quality, it will be a challenge to preserve our freshwater ecosystems and make water available for future generations.

Recent developments on the policy side indicate right signals emerging from the government towards sustainable water management. The importance given to improving water efficiency across all sectors is the need of the hour and is crucial for reducing the dependence on freshwater sources. FICCI, through its Water Mission, is working with its members in adopting water efficiency measures to reduce industrial water footprint.

We believe that it is the duty of every individual using water to take measures for its conservation. It is with this objective that FICCI, in association with HSBC, instituted an annual Water Awards.

The awards given in the three categories - Industrial Water Efficiency, Community Initiatives by Industry and Innovation recognise the efforts of Indian companies who are working towards reducing their water footprint. We at FICCI will continue to document best practices and build up the knowledge base on industrial water management.

I hope that the Compendium of Entries developed as part of FICCI Water Awards will serve as a valuable resource and would enable sharing of best practices within the industrial sector.

Dr. A Didar Singh
Secretary General
Federation of Indian Chambers of
Commerce & Industry (FICCI)





BACKGROUND

Water has defined the survival and growth of the Indian civilization. The civilization came up on the banks of rivers, and our existence and progress has been impacted by the availability, use, misuse and governance of water. Availability of water is and will continue to be a major driving force for meeting the growth imperatives for the agricultural and industrial sector. For the domestic sector, it would mean fulfilling one of the basic amenities of life.



India's per capita availability of water has declined from 1,820 m^3 in 2001 to 1,545 m^3 in 2011. Trends indicate that India will move into the category of a water-stressed state by 2050. A study by the Water Resources Group has predicted that in 2030, the gap between demand and availability in India will be 50 per cent, with the demand touching 1,498 billion m^3 and availability at a mere 744 billion m^3. It also states a 58 per cent rise in demand from 2005 baseline in 2030, with demand almost doubling in all three sectors – agriculture, domestic and industry.

The crisis in water management, in addition to the declining water availability, is also due to the lack of awareness on the need to conserve water. Water, and more specifically groundwater, is generally viewed as an open access resource, where there are no incentives to conserve the resource. Disposal of untreated municipal and industrial wastes, over-exploitation of groundwater resources, wasteful practices of water utilisation and absence of incentives are some of the major reasons for the current state of inefficient management of our water resources.

There is now a growing realisation of the need to save water resources for our survival and growth. In recent years, efforts have been undertaken to promote water conservation amongst the various users. As a result of this, one comes across initiatives undertaken by institutions in the government, non-government and industrial sectors. Individuals have also championed the cause of water conservation through their personal commitment.

These initiatives have contributed towards developing models of efficient management of water resources and promoting a culture of water conservation. The challenge however remains in identifying such efforts, which we are bound to find across various sectors in the country, and disseminating them for wider replication and increasing awareness.

Documentation of the approaches followed, technological innovation and user involvement will help in replication of the measures which are until now isolated as one off example.





Water Awards

FICCI in association with HSBC, has launched an annual Water Awards. These awards are initiated with the following objectives :

- Recognising efforts and leadership in the area of water efficiency and conservation; and
- Developing a knowledge base on sustainable water management practices adopted by different stakeholders and disseminating best practices for encouraging their adoption.

Categories

These awards are given in the following three categories so as to recognise efforts and build up a database of sustainable models across various sectors.

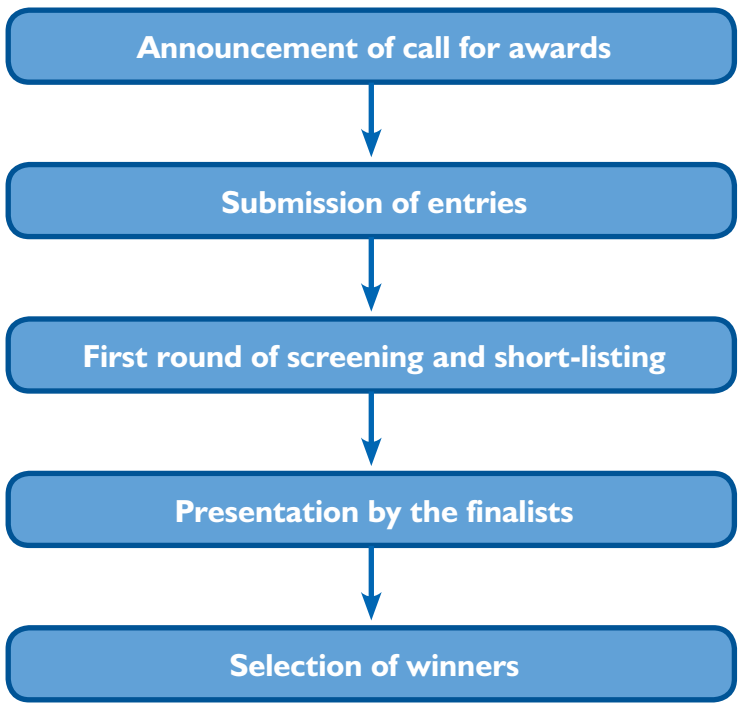
CATEGORIES	AWARDEES
1 Industrial water efficiency	Industrial units belonging to water intensive sectors
2 Community initiatives by industry	Industrial units (CSR departments, civil society organisation involved, if any)
3 Innovation	Product developer/ technology supplier in the area of water purification and treatment

PROCESS

The call for awards was put up through print and online advertisements, and nominations for the different categories were received. A standard template for sending information was developed for every category. An initial screening was done to see if the applications received fulfil the eligibility criteria. This was done on the basis of the narrative submission by the applicants. The finalists were asked to make a presentation to the jury.

A jury comprising eminent professionals working across different verticals in the water sector was set up to scrutinise the qualified nominations and select winners for each of the categories based on the parameters mentioned above.

Three awards were given for the industrial water efficiency and community initiatives by industry category while the jury decided to give two awards in the innovation category.





JURY MEMBERS













Jury



Ajay Popat



Mr. Ajay Popat is Chief Executive Officer of Ion Exchange Waterleau Ltd., also a member of Corporate Management Team in Ion Exchange (India) Ltd. He has more than 30 years of experience in strategy, business and organisation development with leading organizations like Ion Exchange, Pidilite and RPL.

He has been with Ion Exchange (India) Ltd. since 1994 and has spearheaded the company's several initiatives in developing and successfully commercializing proprietary, advanced and sustainable technologies for purification and separation in water, wastewater treatment and more recently in areas of renewable energy in compliance with the legal, environmental, economic and social requirements of the country.

Mr. Popat is active in promoting the cause of water industry through active participation with the Water and Environment Council in CII, FICCI, Bombay Chamber of Commerce, Indian Environmental Association and other Trade Bodies. He has chaired and delivered more than 100 papers on the subject of sustainable environment management practices and is playing an active role to facilitate industry and its associated initiatives to achieve efficiency and excellence in water management practices benefiting all stakeholders.

He is an engineer in Plastics Technology from the Plastic and Rubber Institute, U.K. Mr. Popat pursued his MBA, specializing in Marketing and Strategy with honours from NMIMS Institute. He was also conferred with a fellowship by Indian Plastics Institute in 2007.

Bastiaan Mohrmann



Mr. Bastiaan Mohrmann is Head, Water South Asia at the International Finance Corporation (IFC). He joined IFC in 1992 in Washington, DC, as investment officer. He was active across agribusiness, manufacturing and mining sectors, including a two-year stint in Johannesburg heading new business development in South Africa.

In 2004, Mr. Mohrmann was transferred to IFC advisory services where he developed the supply chain linkages programme, and subsequently headed the IFC SME team. In parallel, he championed the emerging field of water footprint. In January 2011, Mr Bastiaan assumed his current position based in Kolkata.

Prior to IFC, Mr. Bastiaan Mohrmann worked for the European Commission in Brussels and HVA from the Netherlands.

He has an MSc from Wageningen University, the Netherlands, in Agricultural Engineering, specialized in irrigation, hydrology and management science, and an MBA from INSEAD, France.



Jury



Indira Khurana



Dr. Indira Khurana is currently working on assignments relating to drought, drinking water, sanitation and rural livelihoods. She has over 18 years of working experience in social development centre and has worked for Centre for Science and Environment, Oxfam South Asia, Aga Khan Foundation, Centre for Bamboo Resource and Technology, Water and Sanitation Management Organisation and WaterAid.

Her expertise includes providing strategic direction, knowledge creation, management and dissemination, policy research and analysis in natural resource management particularly water and sanitation, biodiversity and rural livelihoods.

Dr Khurana is a PhD in biochemistry and has authored a number of papers, books, reports and newsletters. She has made several presentations and chaired sessions in conferences and workshops in India and elsewhere. She has also been involved in several government committees.

M A Patil



Mr. M A Patil is Director, Resource Conservation and Management Group of FICCI.

He has more than 22 years of experience of providing consultancy services across various industry sectors in the area of cleaner production/ waste minimization demonstration, design of APCD systems, developing EMS, water management, evolving national environmental standards and guidelines, technology assessment, evolving emission factors, control of fugitive emissions in cement, rice mills, stone crushers, induction melting, sponge iron, sugar industries-baggasse fired boilers, flour and dal mills, secondary lead and zinc smelting industries etc.

He holds a mechanical engineering degree from Shivaji University and is a certified Energy Auditor.



Jury

M. Gopalakrishnan



Er. M. Gopalakrishnan is Secretary General Hon. of the International Commission on Irrigation and Drainage (ICID). He is involved in national and global community on water and has held leadership positions in the water sector such as President of the Indian Water Resources Society and one of the Governors of the World Water Council. He is currently the President of New Delhi Associate Centre of World Water Council.

Er. M. Gopalakrishnan possesses thorough knowledge of Indian water related institutions and has actively contributed to the sector for over 49 years, as of now. He is active and is still associated in many Panels of Experts of various Power Utilities / Corporations dealing with Hydro and Dams in India as well as Nepal. His sensitiveness for environmental concerns are apparent in his being a member of the IUCN regional Advisory Committees on Ecosystem for Life, a programme that looks into joint welfare of Indo Bangladesh water for environmental interests.

Manoj K. M. Chaturvedi



Dr. Manoj K. M. Chaturvedi is Deputy General Manager-CSR-UN Water Mandate of Hindustan Construction Company Ltd. (HCC), Mumbai. He looks after various water initiatives and allied activities across the HCC. Prior to the current assignment at HCC, Dr. Chaturvedi, was associated with GE (Power and Water), where he was responsible for providing technical solutions to Reliance Refinery at Jamnagar in the areas of monitoring and management of RIL - DTA effluent treatment plant.

He has been a member of several professional bodies including International Organization for Biotechnology and Bioengineering (IOBB) Australia, and Eco-Ethics International Union, Germany; Working group for development of India Water Tool, World Business Council for Sustainable Development (WBCSD); Water Action Hub (WAH) and Collective Engagement Working Group (CEWG), Private Sector Advisory Group (PSAG) of United Nations' The CEO Water Mandate.

With a Doctorate (Ph.D.) in Environmental Science and Engineering from Indian Institute of Technology - Bombay (IITB), Dr. Chaturvedi has more than a decade of experience, in India and abroad, in full range of environmental monitoring including water quality, air quality, soils and plant parameters; design, monitoring and assessment of wastewater treatment plants; implementation of environmental management plans on real life projects, site inspection and surveillance audits. He has managed several projects funded by International Agencies including European Union, World Bank, and SIDA as well as State and Central Government Agencies of India (in capacity of Sr. Project Fellow at IIT Bombay and IIEM, Navi Mumbai). He has also assisted Ministries of Urban Development (MoUD) and Environment & Forests (MoEF), Govt of India, in execution of JNNURM projects in the city of Nashik on behalf of GTZ-ASEM as an environmental consultant.



D.R. Prasada Raju



Dr. D.R. Prasada Raju is Scientist-G/ Adviser and Head, Department of Science and Technology, Government of India. He has worked with Department of Science and Technology for the last 24 years. Earlier, he has worked with National Small Industries Corp Ltd. and NTPC Ltd.

He spent about 4.5 years on sabbatical with an NGO, Byrraju Foundation, where he conceptualized and successfully implemented the programme Safe Water for Everyone using Effective Technology (SWEET), providing access to potable drinking water on sustainable basis to millions of people in about 200 villages. He was conferred Japanese Award (2nd Prize) for Most Innovative Development Project by Global Development Network, Best Practices to Improve the Living Environment' by Dubai Municipality and UN-HABITAT, Best Water NGO - Water Quality' in India for three successive years (2006, 2007 and 2008) by Water Digest and UNESCO.

He holds a doctoral degree in mechanical engineering and had undergone a year's training in Environmental Engineering at University of Newcastle, UK. He was honoured with Andhra Pradesh Scientist Award by Govt. of Andhra Pradesh, Best Engineer/Scientist Award by the Organizers of 95th Indian Science Congress, and Distinguished Alumnus Award by Andhra University, for his valuable contributions. He has published over 25 papers in journals and proceedings of conferences.

Sameer Vyas



Mr. Sameer Vyas is Managing Director, IL&FS Water Ltd. (IWL). He started his career in the Indian Administrative Service (1977), and was assigned to various positions of office in the State of Tamil Nadu as well as Government of India. His assignments included Director in the Department of Economic Affairs, Government of India, Private Secretary to the Finance Minister of India and Advisor to the Executive Director, World Bank. He was also the Managing Director of New Tirupur Area Development Corporation, located in south India. He held that position from July 2001 till September 2007.

Mr. Vyas completed his Masters in English Literature from St Stephen's college, Delhi University. Subsequently in 1987, he completed his Masters in Public Administration from the University of Delaware, USA. In 1998, he attended the George Mason University USA, and completed his third masters' degree in Inter Disciplinary Studies on Urban Infrastructure.



Jury

Sejal Worah



Dr. Sejal Worah works with WWF India as Director of Programmes where she manages a multidisciplinary team of experts based throughout the country working on a wide range of issues including climate change and energy, biodiversity and forest conservation, river basin and water policy, wetland management, sustainable livelihood development and promoting sustainable business practices.

Dr. Sejal Worah has worked in the field of environment and development for over 20 years. Her research included local resource use and agricultural practices to develop integrated social and resource management systems. She has also worked on a range of other issues related to local institution building, participatory resource management, conflict management and negotiation and has conducted extensive training on this. Dr. Worah has wide-ranging international experience and she has worked in over 15 countries in the Asia Pacific region and East Africa.



FICCI

WATER AWARDS WINNERS 2012

Category: Industrial Water Efficiency



1st Prize – Essar Steel India Limited, Hazira



2nd Prize – ITC Limited, Bengaluru



3rd Prize – Sterlite Copper, Tuticorin



3rd Prize - Chemplast Sanmar Limited, Mettur

Category: Community Initiatives by Industry



1st Prize - Hindustan Unilever Limited



2nd Prize – Tata Chemicals Limited



3rd Prize - Bajaj Hindusthan Limited

Category – Innovation



1st Prize – HSIL Limited



2nd Prize – Tata Chemicals Limited



Category INNOVATION

Tata Swach Nanotech Water Purifier

Company: Tata Chemicals Limited

Tata Swach is an offline household water purification system which uses natural materials and cutting edge nanotechnology. The vision for Tata Swach is to reduce incidences of water borne diseases by making safe drinking water accessible to people who lack access to it.



Tata Swach

The heart of the Tata Swach Nanotech Water Purifier is the Tata Swach Bulb around which 14 patents have been filed so far. The bulb has the following unique characteristics:

- It uses a natural material rice-husk ash as the main ingredient in the purification bed;
- It uses the power of nanotechnology to deliver the purification performance;
- It can be used in homes without availability of running water and electricity;
- It is portable and convenient to use. The bulb can be fitted even into an existing storage vessel or ceramic pots widely used in rural India; and
- It provides bacteria and virus-free water as per international standards, viz US EPA.

TATA SWACH

By adjusting the direction of flow and the flow rate of impure water through the bulb, the surface areas of contact as well as the duration of the contact time of water with the bed are both modulated to deliver purification performance as per target standards. Additionally like an electric bulb, it fuses after its power expires and prevents water from passing once its purifying capacity is exhausted.

A unique feature in the Tata Swach bulb is the Tata Swach Fuse. With use, the purification power of the admixture gets depleted and after around 3,000 litres, it gets completely exhausted, rendering the bulb ineffective. However, impure (bacteria laden) water and pure water may both appear clear and almost similar to the naked eye. It is thus important that the user is made aware when the purification capacity of the admixture gets exhausted so as to ensure that the user replaces the bulb in time and thereby protects oneself against drinking impure water. To achieve this, the team devised a unique fuse which is an auto-shut-off technique. By the use of a dissolving tablet based mechanism, it actually stops the water flow when its purifying capacity gets exhausted. In addition to auto-shut mechanism, the fuse also has a dual mechanism wherein it can indicate the remaining life and consumed life of the bulb, thereby giving the user enough warning and lead-time for new procurement.

The Tata Swach Lock: The Tata Swach Lock is an additional feature which ensures that the user always gets an original Tata Swach Bulb and is hence protected from counterfeits which might have a negative impact on his / her family's health directly.

Tata Swach purifies water without the use of any harmful chemicals. By making safe water available at just 12 paisa per litre, Tata Swach makes safe drinking water affordable to many (a bottle of packaged drinking water costs Rs 12, boiling using LPG costs Rs 0.30 per litre). With 3,000 litres purification capacity, Tata Swach costs just about Rs 1 per day for a family of five. Moreover, Tata Swach does not require electricity or gas to purify water and works only on gravity.

Launched in December 2009, Tata Swach has reached out to a million households across 25 States/ Union Territories. Consumer feedback suggests Tata Swach has been adopted mostly by non-users, those who could not afford the expensive water purifiers available in the markets. Today, Tata Swach is available across 22 states through more than 8,000 retail outlets. It is also being made available through the Indian Post Office Networks and NGO's to expand its reach in rural India. Recently, provision for buying Tata Swach online has been made available.

With the introduction of the Tata Swach at an MRP of Rs. 999 and Tata Swach Smart introduced at Rs. 749, there has been a complete shift in the marketplace. A new price segment / category has emerged with other players introducing versions of their product at around the same price. However, in spite of others attempting a similar MRP, the per litre purification cost of 12 paisa for Tata Swach remains the lowest and till date unmatchable.

Tata Swach has won many international awards, namely the Wall Street Journal – Asian Innovation Award –Gold 2010; Design of Decade Award – Gold by Industrial Design Society of America – US – 2010, IF Award – Germany – 2010, ICIS Innovation Award – UK 2010.

Contact person:
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Head -Water Purifier Business
Tata Chemicals Limited
Email: snandy@tatachemicals.com

Vitros Micro Slide Technology

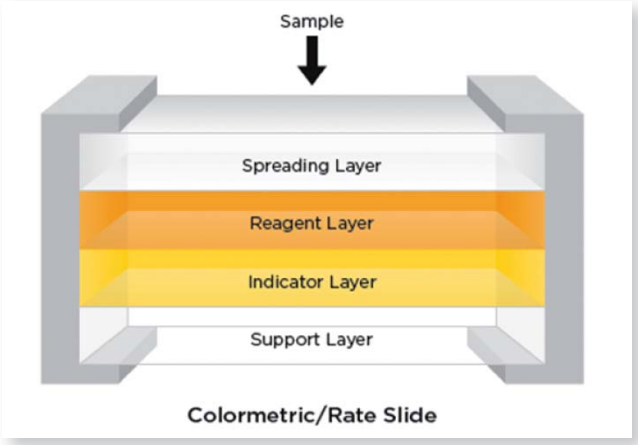
Company: Ortho Clinical Diagnostics, a Johnson & Johnson Company

Clinical laboratory testing plays a vital role in the detection, diagnosis and monitoring of diseases before they put lives at risk. The tests focus on the molecular and cellular elements of blood and other body fluids for the diagnosis and management of illness. Correct diagnosis is crucial in helping healthcare practitioners diagnose medical conditions early, enabling them to make better-informed treatment decisions.

MicroSlide Technology is the heart of VITROS® chemistry analyzers and was invented and brought to market in the late 1970s. In microfilm, multilayered reagents are contained on a clear polyester support base cut to the size of a postage stamp. When plasma, serum, urine or cerebrospinal fluid comes in contact with these dry chemical layers, a spectral reaction occurs which can be measured by the analyzer.

MicroSlides have many unique features that reduce or eliminate substances that may interfere with the chemical reaction of interest. Layered dry-slide technology enables separate reaction domains such that each step can be optimized to provide excellent assay performance. Excellent precision and accuracy are achieved through designs that combine multiple discrete layers of spreading, masking, scavenger, and other reagent layers, that together improve the quality of results. Dry-slide methods use traditional, well-accepted analytical principals and are traceable to accepted reference methods, so that results are consistent over time and across the world. The unique layered design of this MicroSlide makes this possible.

MicroSlide Technology offers great advantages over traditional liquid chemistry. It needs no water, drains or plumbing; thus eliminating traditional concerns with water based systems (water usage, microbial growth, water-based contaminant transport), needs no reagent preparation; decreases reagent waste; minimizes the impact of common interferences on test results; and maintains stable calibration until a change of lot number.



VITROS® MicroSlides do not require any MSDS (material safety data sheets). MicroSlide cartridges can be loaded onto all VITROS® Clinical Chemistry Systems and are interchangeable between systems.

In a few years MicroSlide technology has been well accepted in the laboratory market place and now production is in billions per year.

The procedure for performing clinical chemistry tests using MicroSlide Technology is much simpler than that needed for traditional liquid chemistry:

- The sample is placed on the system. There is no need to check for clots or bubbles.
- The MicroSlide, containing all the reagents necessary to perform the test, is moved to the metering area.
- The sample is aspirated into a Versa Tip and dispensed into the slide.

	Dry Chemistry Analyzers	Wet Chemistry Analyzers
Water conservation	No requirement of water	Water consumption in wet chemistry platforms can vary from 3 L/ hr to 60 L/ hr, with majority of analyzers consuming more than 20 L/ hr. Water recovery of water treatment plants typically is 20-40 per cent. This means to generate 30 litres of pure water, 70 litres of feed water is required for a plant working at 30 per cent water recovery. **Hence water consumption is not only that which is consumed by the analyzer but also that which is required to generate the purified water.**
Cost saving	Since there is no water requirement, it eliminates needs for managing and maintaining water treatment plants. No requirement of water, plumbing, drains etc.	Special water treatment plants need to be maintained and monitored to ensure result integrity.
Water related concerns on water storage and transport	Eliminates traditional concerns surrounding water-based systems, including standing water, potential microbial growth, and water-based contaminant transport.	Potential opportunities for traditional concerns surrounding water-based systems, including standing water, potential microbial growth, and water-based contaminant transport.
Water related concerns on test result	No water required, hence minimizes the impact of interferants from water. Patented Microslide technology gives excellent accuracy and precision by reducing effects of interfering substances like hemolysis, icterus, lipemia etc	Water is an important ingredient hence quality of water has implications on test results.
Environment friendly	VITROS® is water free and hence no sewage generated to our environment	Liquid waste is generated and needs to be processed as per the regulatory guidelines
Exposure to chemical hazards	Since the reagents are in dry form, under normal conditions of use, these products do not expose the user to chemical hazard. This in addition to eliminating sewage related concerns allows for enhanced safety for the user. VITROS® reagents are thus exempt from requirement of MSDS (Material Safety Data Sheet).	Reagents of Wet Chemistry are not exempt from requirement of MSDS
Risk management	Continues to operate in emergency situations when the water supply is interrupted	Cannot run without water supply

- The slide (which contains the necessary reagents and acts as the reaction vessel) is incubated for maximum of 7.5 minutes.
- The reaction is read, and the result is obtained.

The only supplies needed for the MicroSlide chemistry tests are the slides itself, a Versa tip to deliver patient sample to the slide, ERF (Electrolyte Reference Fluid) when performing electrolyte analysis, and/or IWF (Immuno Wash Fluid) when utilizing immune-rate slides. All of the VITROS® Clinical Chemistry Systems can accommodate MicroSlides with multiple lot numbers on-board. The system uses the oldest lot first, switches to the new lot when the older lot is depleted, restores the proper calibration, and lets the operator know that QC needs to be performed on the new lot. This ensures smooth, continuous operation with minimal input needed from the laboratory staff.

Indian Diagnostic Industry is expected to grow at the rate of 15 – 20 per cent. This means that there will be more analyzer placements and will result in increasing water consumption every year. VITROS® analyzers from Ortho Clinical Diagnostics do not need water and are a big step towards supporting the cause of water conservation.

Contact person:
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Country Director
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A Johnson & Johnson Company
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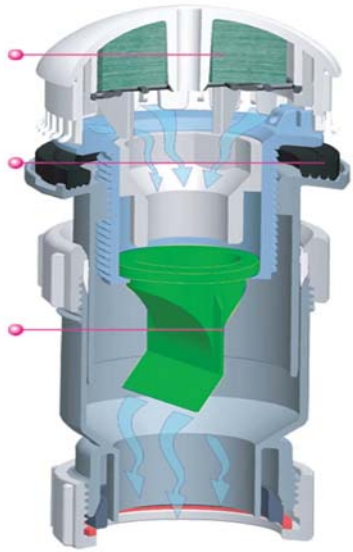
Aqua free 'Waterless' Urinal

Company: HSIL Limited, (formerly known as Hindustan Sanitary Ware and Industries Ltd)

HSIL Limited started commercial production of Vitreous China Sanitary ware in the year 1962. HSIL joined hands with Bureau of Indian Standard (BIS) [at that time known as Indian Standard Institution (ISI)] to develop standards for Vitreous China Sanitary ware as well as norms on water flushing. HSIL was the first licensee of ISI and a water consumption norm of 12.5 litres per flush was agreed upon.

Realizing that this consumption was very high and there was a need to reduce the levels of water used in flushing, HSIL undertook research. It gradually succeeded in designing closets which can flush using 10 litres of water. HSIL continued its efforts in designing water closets which can flush with lower quantity of water and in late 1980's came with a design 'Constellation' and subsequently 'Super Constellation' which reduced the water intake to 5 and 3.5 litres per flush respectively.

Similarly urinals created over time have reduced water requirement for flushing from 1.5 litres to approx. 750 ml (based on use of sensors and water jet flushes systems). HSIL worked on the creation of an innovative product called 'AQUA Free Waterless Urinal' where there is no requirement of water. This concept is based on the fact that water is not required to transport water liquids (urine). However, the absence of freshwater in flushing the urine will cause reaction and produce ammonium oxide which creates the bad odour.



Inside view of the cartridge



Aqua free urinal

HSIL started work on developing a cartridge for the waterless urinal in 2008 and the product was launched in the market in April 2009. This product was developed keeping in mind its usage in large commercial establishments like malls, railway stations, airports and other places which have large footfalls and frequent/ regular use of the wash rooms with high degree of hygiene requirement.

The cartridge is placed inside the urinal. When urine passes through the aqua free cartridge the friendly bacteria present in the cartridge helps breakdown the uric salts which prevents bad odour. The hygiene seal drains off the excess fluid and cuts the smell by sealing the outlet. This cartridge does not use liquid cartridge thereby preventing the need to change the liquid frequently. There is no water flushing, no chance of lime scale to build up and flooding. Therefore maintenance is considerably low, ultimately leading to a fresher washroom experience.

Unique features of Aqua free 'waterless' urinal

Description	General Urinal	Aqua free Urinal
Construction	Most urinals need water inlet connection, either attached through flow control valves or through sensor attachment.	Simple ceramic sanitary ware piece is required.
Chances of defects	With multiple pipeline and fitments, chances of clogging, loose connections and leakage of water exist over a period of time.	No pipeline or sensor required hence no leakages.
Flushing mechanism	Special sensors along with control valves may be needed with dependence on power source for regular operation.	No mechanism of trigger through sensor required whatsoever.
Hygiene	Until regular flushing is done the product may develop bad odour. Inadequate flushing leads to the growth of bacteria/ E coli fungus.	It has a unique germi coating which is a special nano-coat incorporated into the glaze and stabilised at 1200 Degree C. The product is termed as germi clean. The Nano Coat ions slowly leach out and prevent the growth of bacteria on the surface.
Fittings/ Fixtures	All sensor based urinals require sensor eye fitments, incoming water supply, outgoing pipeline fitments and regular plumbing upkeep. This is in addition to overhead tanks for water supply.	Outlet connected to the floor and product is mounted on Z type brackets in the wall. No overhead tanks or fittings required.
Water usage	Most urinals require about 1.5 liters for proper flushing and at least 750 ml in special jet urinals with sensors.	No requirement of water for flushing.
Maintenance	Regular plumbing and cleaning required for all fittings, water supply pipelines and other accessories like sensors, which includes input power source and charge of batteries.	Can be wiped clean with a sponge daily. The cartridge that is fitted on to the outlet lasts for 13,000 – 14,000 usages and needs to be changed when the count is reached. The cartridge is easily removed and refitted within a span of few minutes.

Most commercial establishments witness adequate foot falls wherein urinals are used anywhere between 20-30 times per hour. Assuming a conservative estimate of usage around 20 per hour, the figure for usage in a day comes to 360 (considering the establishment is open for 12 hours).

The corresponding water savings in a normal urinal come to 360 litres per day which is 1,31,400 litres per year. This calculation takes into account that each urinal uses 1 litre of water per flush. In case the volume of water use is more, the savings will be correspondingly higher.

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Nano One Piece European Water Closet

Company: HSIL Limited, (formerly known as Hindustan Sanitary ware and Industries Ltd)

Most general closets require 6 litres of water full per flush for removing solid wastes. HSIL, in 2008 started developing a closet which requires far less water for complete flushing. This product named as 'European Water Closet (EWC) Nano' was commercially launched in 2010. In the period of two years (2010-12) 330 units have been sold.

EWC Nano with its innovative technology and unique hydro-dynamic design, flushes using 1.5 litres, thus creating water saving to the tune of 75 per cent. In most of the European Water Closets, the cistern and closet are built separately and then fitted during installation. EWC Nano is inbuilt in the casting process ensuring minimum leakage. The EWC Nano has a unique trap way which ensures that with the release of small quantity of water (around 1.5 litres) the entire waste is pushed out with enough purging force. The water release mechanism is triggered through a unique foot pedal ensuring hygiene.



Unique features of Nano One Piece European Water Closet

Traits	General Closets (Coupled Closets)	NANO One Piece EWC
Construction	Two piece cistern and closet are manufactured separately and coupled with fitments	Integral one piece made directly in manufacturing during body casting
Chances of defects	Possibility of leakage from joints/rubber parts used in coupling	No possibility of any leakage defects
Flushing mechanism	Generally set up in the cistern and connected to the closet	Unique mechanism of internal water release
Trapway design	Generally S Trap and P Trap designs which are visible in the body of closet and loop pathway.	Revolutionary new design trapway which is based on modern hydrodynamics
Flushing trigger	Trigger is at the top of cistern through dual push button knob mechanism	Innovative foot pedal mechanism
Hygiene	Any such mechanism needs to be operated by hand or use of fingers. Need to wash/ clean the hands and fingers	Foot pedal is pressed for 6 seconds and no use of hands or fingers needed. No need to wash the hands.
Water usage	Most closets use 6 litres or more	Innovatively designed for a full flush clearance of all solid waste with 1.5 litres

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Community
Initiatives

Community Initiatives by Industry

Bajaj Hindusthan Ltd.

Initiative: Developing water centric livelihood through community participation; augmenting water resources for diversification and strengthening of the local farming system.

Location: Wardha district, Maharashtra

Background

Wardha is one of the farmer distressed districts of Vidarbha region of Maharashtra. Despite receiving an average rainfall of 1,060 mm the district experiences severe water shortages. The topography is almost flat (2-3 per cent slope). Majority of the agriculture land is rain fed and area under irrigation is less than 7 per cent. Water shortages which occur immediately after the monsoon have impacted agricultural production. The region had numerous streams which have now become seasonal. Most of these streams that drained the countryside once are today hidden in agricultural land. It is during heavy showers, that they reappear, rendering vast expanses of land submerged beneath them. The natural drainages are now being plugged with soil and other physical debris and leave no outlet. Water takes long to drain out, thereby destroying standing crops. The top soil is washed out from one land and is deposited elsewhere, thus reducing the fertility of soil and resulting in poor agriculture yield. Traditional cropping pattern, excessive expenditure on chemical fertilizers, pesticides, less knowhow on marketing of agriculture products, borrowing money with high interest rate for agriculture operations and to fulfil social occasions etc. are the major constraints being faced by the rural community.

Since over a decade after introduction of hybrid and BT cotton seeds, traditional cropping patterns have changed. Farmers have moved from growing the usual sorghum (jowar) and pearl millet (bajra) to mono-cropping cotton and soybean, which has resulted in an overdependence on these crops, as their main source of income. This, in turn, has led to a severe reduction in agricultural diversification practices. The Kharif season is the main growing season, and very few households grow a second crop during the Rabi season — usually wheat and Chickpea. Anticipating an increase in the cotton crop yield and better market prices due to wide adoption of new varieties, farmers have been misguided by agricultural input dealers into using high and non recommended doses of pesticides and fertilizers; this has led to a considerable increase in farmers' expenses.



Most of the poor farmers don't have easy access to markets, nor do they have warehousing facilities to store their produce for an extended period of time. Therefore, they often resort to distress selling at prevailing market rates and are not able to take advantage of time-sensitive increase in market prices. A lack of institutional credit and the consequent high dependence on, and indebtedness to, local moneylenders, who often give loans at very high interest rates, is yet another issue. Farmers avail of loans for purchasing agricultural inputs as well as for social reasons. Over time, this traps them in a vicious circle of indebtedness, which they are unable to escape, especially when their crops fail.

Unfair trade practices are also widely prevalent. Middlemen and local traders who directly purchase agricultural produces from farmers often deceive the farmers and deprive them of fair market prices, falsely charging that the produce is of substandard quality. Farmers' agriculture productivity and income are low, and they face food insecurity, partly as a result of inefficient use of water, depleted soil fertility and indiscriminate use of fertilizers and hybrid seeds.

Project interventions and impacts

This project focuses on the upliftment of tribal families by providing livelihood options. Soil and water conservation was undertaken in a holistic manner following a Ridge to Valley approach for developing the treatment plan.



The following activities were undertaken:

Reviving of the Rivers/ Streams: 11 rivers/ streams of 33 km length have been revived in 20 villages. The construction of 31 check dams and 110 Boribund (temporary seasonal check-dams constructed to harvest rainwater) in 35 villages have been carried out across the widened cross section of the rivers/ streams. 5,441 acres of land have been saved from water logging and flooding due to erratic rainfall. 3,009 acres of land have benefited with assured irrigation due to construction of check dams. Water table has increased in the surrounding areas by 6 to 8 ft. Efforts taken for harvesting water has increased yield per acre vis-a-vis income of farming community. 62 per cent increase in yield was recorded in cotton, 26 per cent in soybean, 29 per cent in pigeonpea, 33 per cent in wheat and 20 per cent in gram respectively. Average annual income per acre has increased to Rs. 23,000, which was Rs. 13,000 per acre prior to the project.

Diversifying mono cropping: The project has promoted the cultivation of vegetables, not only because they are important as a regular source of income for small and marginal farmers, but also because they help in fulfilling the nutritional needs of the families. In order to facilitate a change from the predominant cropping pattern of cultivating cotton and soybean, new varieties of wheat, gram, cauliflower, fenugreek (methi), spinach (palak), beans, brinjal, onion and okra (ladies fingers) have been promoted and technical guidance were given to farmers. This has led to increase in cropping intensity, which resulted in enhancement of income of farmers by 20 per cent.

Promotion of less water intensive horticulture crops: Horticulture has been initiated in 22 villages of Seloo and Deoli blocks. In addition to this, Wadi project (promoting horticulture fruit plants in one acre of land for each farmer with irrigation facility) in collaboration with NABARD is augmenting agro based livelihoods of 2,700 tribal families in Aarvi, Seloo and Karanja blocks of Wardha district. It focuses on the development of small fruit orchards (WADI), agriculture improvement through inter cropping and restoration of denuded land through soil and moisture conservation measures.

Improved water management practices: To increase the irrigation potential of the farmers, group wells and lift irrigation schemes were launched under which 55 group wells and 16 lift irrigation structures were installed in 25 villages covering 850 acres of land benefitting 222 farmers. 530 drip and 598 sprinklers were also installed to achieve better irrigation efficiency.

Project sustainability

The project is implemented with the local community and in association with various organisations. Bajaj Hindusthan Ltd. (BHL) and NABARD are jointly undertaking a Wadi project for promoting horticulture and soil and water conservation measures in 41 villages in three blocks. The total cost of the project is estimated to be Rs. 1178.57 lakh and is being shared by NABARD (62.50 per cent), Bajaj Hindusthan (26.80 per cent) and remaining 10.70% by the community. In 2011-12, NABARD formally collaborated with BHL under the Watershed Development Fund (WDF). Each partner undertook to share 50 per cent of the project cost for implementing the Watershed Development Project in nine villages of Andori, Watkeda Cluster in Deoli Block.

The programme was designed after analyzing the problems at source and assessing the needs of the farmers with the help of tools like participatory rural appraisal (PRA), group discussions, and village meetings. The village level organization called Village Development Committee (VDC) and User's Groups (UGs) were formed as part of the process. User's groups are in charge of operation and maintenance of the assets created. The VDC and the UGs formed are responsible for representing the community perspective, building consensus and collecting the community contribution and managing the resources thus created. Capacity building was an integral part of the project. Village volunteers were selected and trained by expert professors. A cadre of 45 village volunteers was formed which played the key role in social mobilization and supervision of sites in the villages.

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Hindustan Unilever Limited

Initiative: Water Harvesting - the revival of traditional tank cascade systems

Location: Gundar Basin, Madurai district, Tamil Nadu

Background

Gundar is one of the driest river basins originating in the rain shadow region of Western Ghats in Madurai district. It flows through 5 districts of Tamil Nadu. Nearly 5 lakh families live in this basin. Among them, 70 per cent depend on agricultural and allied activities. The total area of the basin spreads across 5,660 sq. km comprising 2,276 tanks and 43 anaicuts. Out of which 43,900 ha land are irrigated by 511 Public Work Department (PWD) tanks and 27,600 ha land are irrigated by 1,765 minor irrigation tanks under the control of Panchayat. Nearly 14,388 ha land are irrigated by the anaicuts.

Tanks are common property resources owned by the state. Farmers have the right to use water for irrigation and maintain the tank themselves for all repairs and maintenances during the crop period. The development of cascade has been neglected in the last few decades. Moreover, the government programmes focus on big sized tanks in the cascades that have over 40 ha of irrigated area while the tanks which are having less than 40 ha ayacut are not considered for tank development projects. Even these programmes are done through middlemen/ contractors without any consultation and participation of farmers resulting in meagre or no benefits to the communities.

Crop failures are common in tank cascade areas due to the deficit of irrigation water from the proposed tanks. The reasons for water deficit are improper storage of rainfall in tanks, inadequate storage capacity of the tanks due to siltation and encroachment, reduction of water supply from the catchment due to improper choked feeder channels, leaky wash and surplus weirs, lack of traditional water management practices and low awareness about improved water management practices amongst the farmers.

Analyzing these conditions, Hindustan Unilever Limited (HUL) started a Public Private Partnership project by collaborating with the National Bank for Agriculture and Rural Development (NABARD) and DHAN Foundation as the implementing NGO Partner. The project was named as Tank Cascades Development



for Livelihood Security .The main objectives of the programme were:

- To build the social capital of farmers, landless and women as Vayalagam (tank farmer group, whose field get directly benefitted from repairing the tank structures) to rehabilitate and sustain tank irrigation management through grassroots action.
- To conserve and develop 13 identified tank cascades in Gundar Basin based on the requirement and need of the primary stakeholders.
- To set up endowment and improve agricultural productivity in the project area through partnership with NABARD, banks and government departments.

Right from the commencement of the project, joint team of HUL and DHAN Foundation took efforts to promote the tank associations. Baseline data was collected for the villages surrounding the tanks and Participatory Rural Appraisal (PRA) processes were conducted in this period. Women participation in the PRA process was ensured upto 25 per cent. Resource mapping, Venn diagram, Timeline analysis, Seasonality mapping are the tools used in the PRA process.

Project intervention and impacts

Project Deliverables	Impact Measured
250 tank associations and 13 tank cascade associations will be formed and made functioning, representing 10,000 farm families	140 Tank associations - Vayalagams have been formed; with membership from 8,000 farm families
250 tanks are conserved and developed along with their supply and feeder channels so that they become dependable to the benefit of farm lands in normal years	75 tank works have been completed and 38 tank works under progress
Approximately 11.34 million cubic meter of rainwater would be harvested By deepening of tanks – 1.88 million cubic meter By jungle clearance – 0.34 million cubic meter Arresting leakages – 1.02 million cubic meter Through new farm ponds – 1.40 million cubic meter Improved irrigation practices – 6.70 million cubic meter	Conservation of 3 billion litres of water
1,100 families owning 840 wells benefiting from groundwater in addition to the tank water	350 wells owned by different families in the 4 districts have reached out to 700 families
Inland fishery introduced as an alternate livelihood with equity principle	50 tanks have been leased out to 500 farmers; Augmented per household income by Rs 4,000 - Rs 5,000
Entitlement for employment security to 15,000 landless families.	1,500 families taking land on lease from command area farmer
Livestock based livelihood during off season	300 shepherd families have stopped migration
20 per cent of the fallow brought under plough	4 per cent of the current fallow brought under plough

The socio-economic and environmental impacts of the project have been the increase in tree cover resulting in migration of birds. In addition, fisheries development has enhanced the income of farmers. Water conservation in the tanks has contributed to the recharge of groundwater, enabling drinking water security. The availability of water for irrigation increased the fertility of dry-lands which resulted in 2 assured crops a year. Ground water level also improved, which minimizes the usage of electricity to pump water. The healthy tank system improved the cultural life of the village.

Project sustainability

The community has been involved right from the stage of conceptualisation to project implementation. The members of the tank association/ Vayalagam include tank command area farmers, landless labourers who depend on the tank system, goat and livestock rearers who are using the tank complex for their cattle, well owners, people who use tank/ pond for domestic/ drinking purpose, pot makers, washer men, well wishers of water resources and traditional water managers.

An important feature of this project is that local associations of farmers and landless families (many of them women), who have contributed 10 per cent of the cost; implement the project for each tank. The funds disbursed by HUL are transferred by DHAN foundation to the accounts opened by each of these Vayalagams. Vayalagams have one member from each beneficiary household, who are involved with the day-to-day functioning of the Vayalagam.



Appaswamy, farmer in Madurai district says he has been able to take up one acre of his wasteland into paddy cultivation

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Hindustan Zinc Limited

Initiative: Water conservation and enhanced productivity through micro irrigation system

Location: Bhilwara district, Rajasthan

Background

Bhilwara district of Rajasthan has an average rainfall of 600-700 mm. The combination of small farms, erratic rainfall and poor yields resulted in poverty in the area. Adding to this, declining groundwater levels contributed further to food insecurity and poverty for the local farmers. Farmers were not able to yield even two crops in one year and they had to migrate to other areas for livelihood. Seeing the condition of farmers and dependency on agriculture, Hindustan Zinc Limited (HZL) in collaboration with BAIF Development and Research Foundation and Krishi Vigyan Kendra (KVK) introduced micro irrigation programme in 2010 under the project, Integrated Agriculture and Watershed Development Programme. The major focus of the programme was:

- To ensure the judicious use of water,
- To equip the farmers with modern agriculture practices,
- To enhance crop productivity using micro irrigation system, and
- To make farmers self dependent in agricultural activities.

The planned outputs of the programme were:

- To enhance the output of the crop by 15 per cent,
- To bring barren land under irrigation,
- To enhance the livelihood opportunities for the farmers and reduce migration, and
- To preserve water in the order of 10 per cent compared to normal irrigation system.





Project intervention and impacts

The project started with the baseline survey in the targeted villages with the help of BAIF-RRIDMA (Rajasthan Rural Institute of Development Management). Door-to-door survey and focused group discussions were conducted to understand the farmer's requirement and problems. The project was then implanted in collaboration with District Agriculture department and BAIF-RRIDMA. HZL in collaboration with Krishi Vigyan Kendras (KVK) and BAIF installed drip irrigation systems in the land of 421 farmers. Total land brought under irrigation was 360 hectare. Funding for drip irrigation system was mobilized from the government at subsidy of 90 per cent, HZL contributed 5 per cent and remaining 5 per cent was shared by farmers.

Due to this initiative, farmers are able to grow fruits and cash crops in their farm land. Crop production has increased drastically Share of barren land has decreased. Migration for employment has also reduced. This initiative helped in judicious use of water. Implementation of the activity helped in the enhancement of vegetation coverage. Because of less extraction of water, groundwater level has increased and villagers are able to get sufficient water throughout the year.

The following benefits have occurred from the intervention:

- Close to 65 per cent of target farmers are now cultivating 2-3 crops in a year,
- The annual income of 250 farmers has risen up to Rs 96,000 per annum through cash crop and vegetable cultivation,
- Construction of 23 water tanks, 45 water channels, 25 irrigation wells, 05 check dams, 25 rainwater harvesting structures have resulted in conservation of freshwater and groundwater recharge,
- Installation of drip irrigation and sprinkler systems in 750 farmers' lands has increased crop production.
- A canal of 3 km length has been constructed for bringing rainwater into ponds for recharging of well.

Project sustainability

Empowering farmers for taking ownership is a major tool for sustainability of any project. HZL adopted the same mantra for sustainability. Before implementing the project, a group of maximum 15 farmers, was formed in all the villages. A federation was established having three office bearers for taking decisions and 11 other executive members. Capacity building trainings and exposure visits were conducted to make farmers become aware of the modern practices. Village Development Committees (VDC) were formed in the villages where water tanks and wells were constructed. Training was provided to VDC and ultimately VDC has been made responsible for social development in the villages.

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Standard Chartered Bank

Initiative: Water, Sanitation, Hygiene and Education (WASHE) programme

Location: Municipal Schools of Delhi and Mumbai

Background

A large number of India's adolescent school girls have no access to proper sanitation, causing many to fall ill or miss school for extended periods of time, or drop out altogether. Only 42 per cent girls reach class eight (Indian Child, Ministry of Human Resource Development, 2002). This leads to these girls missing out on many opportunities for their growth and development. Adolescent girl, often miss school during their periods, because of a lack of proper sanitation.

Standard Chartered Bank realized the need of intervention and assistance in the field of water and sanitation especially for the girl child in India and initiated WASHE (Water, Sanitation, Hygiene Education) programme. It aimed to provide easy access to safe water and improved toilet facilities as well as hygiene, sanitation and menstrual health education to the girl child in municipal schools in two cities in India, to start with.

The WASHE programme started in March 2010. The programme started with identifying needy schools, constructing new toilets/ remodelling existing toilets and conceptualising and creating study aides/ materials like brochures, puzzles etc. to teach the students about water and sanitation. The second phase started with collaboration with NGO partners who were working in the field of water and sanitation. The NGO partners and the bank staff volunteers then educated the students about good water and sanitation practices, generating awareness. Over a period of 6 months, the programme reached out to over 20,000 girls across 8 schools. The staff volunteers spent time in the schools, teaching students various extra-curricular skills like personality development, computer literacy skills, grooming, financial literacy, art, drama and english conversational to aid in the holistic development of the students. WASHE programme is on-going and is not subject to timelines.



Project intervention and impacts

WASHE aimed to improve accessibility to clean drinking water and clean and safe sanitation facilities for the girl child in municipal schools. In doing so, the programme has facilitated several environmental benefits to the communities. Construction or remodeling of the existing toilet infrastructure to improved, clean and fully functional toilet facilities in the municipal schools was the very first step done under WASHE. Force lift pumps were installed to raise water to an overhead tank for providing water to the toilets and hand washing units. The toilets were constructed to provide girls with enough privacy and comfort so that they do not feel shy to use them. Hand-washing basins were also installed in the schools to promote clean hygiene habits among the students.

These were supplemented with the awareness sessions that encouraged the students to keep their hands clean and sanitize their hands. Aquaguards were fitted in all schools to purify the water that is channeled through the basins. Through WASHE, the programme has increased the availability and accessibility



of pure, filtered drinking water in these schools. As part of the programme, a composting/vermi-composting unit has been set up to safely dispose organic waste matter. Installation of sanitary napkin disposers in the schools and teaching girls how to use them correctly, WASHE facilitated good waste management practices in the schools as well. Thus, WASHE has created awareness among school children and through them to the community at large to keep surroundings clean and healthy apart from proving good drinking water and sanitation facilities to over 20,000 girl children in 8 different schools in Delhi and Mumbai.

By giving access to clean facilities, proper sanitation and pure water to drink in the schools, WASHE has reduced the risk of infectious and water-borne diseases like diarrhea, typhoid, dysentery, gastroenteritis, hepatitis A, intestinal worms, and malaria which resulted from the poor status of Water, Sanitation and Hygiene practices. Through awareness programmes, WASHE has spread awareness among the students about good water and sanitation practices. This included messages on hand-washing, proper and improper uses of water, conservation of water, good hygiene habits, waste management and so on. The students then brought back these messages to their families and larger communities and through WASHE, help in improving the awareness level, health and hygiene of community at large.

Project sustainability

WASHE was financed by the Bank as one of its community investment initiatives in order to promote clean sanitation, hygiene and water practices throughout the communities. The hygiene and sanitation education programme that is part of WASHE is simple and basic. A group of students were chosen to form a WASHE parliament and once the toilets were constructed/ refurbished and the sanitary napkin dispensers/ disposers and aquaguards had been fitted, the WASHE Parliament ensured that the machines are used correctly and the facilities were utilised in the right means. It leads to no cost and was adopted into the school's day-to-day schedule.

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Tata Chemicals Limited

Initiative: Integrated water management programme

Location: Okhamandal Taluka of Gujarat

Background

Okhamandal Taluka located on the western tip of Saurashtra peninsula in Jamnagar district of Gujarat, is one of the drought prone areas with the average rainfall of only 10-12 inches. The area is surrounded by seawater from three sides which results in salinity of groundwater. The soil stratum is impervious in nature due to which the rainwater percolation becomes difficult. The non availability of quality water is one of the biggest concerns of this region. Before the intervention of the project, the source of drinking water was available in 9 out of the 42 villages and that too during the rainy season i.e. four to five months. The percentage of irrigated land was around 2%. Only one crop per year was harvested, even that was not guaranteed as they were completely dependent on rains.

All of the above factors lead Tata Chemicals Limited (TCL) to implement integrated water management programme in the Dwarka Taluka of Gujarat. The objective of the programme was to provide adequate, assured and good quality water. All the projects under integrated water management programme target water for agriculture, animal husbandry, drinking and household use. The planned outcomes of the programme were:

- To increase the percentage of the irrigated land for cultivation by developing complete watershed of the area from ridge to valley and by reducing salinity ingress,
- To increase the agriculture income of the farmer by guaranteeing at least one crop a year,
- Water conservation by adopting water saving technologies like drip irrigation, sprinklers, and
- To increase the availability of safe drinking water by promoting roof rainwater harvesting structures and by providing drinking water infrastructure.



Project intervention and impacts

The programme which started with 5 villages has now spread across 80 villages so far. The programme involved partners in all stages of the community development. TCL through Tata Chemicals Society for Rural Development (TCSRD) has been facilitating the integrated watershed development programme for District Rural Development Authority (DRDA) in Dwarka, Khambaliya and Kalyanpur talukas of Jamnagar district and drinking water security and safe sanitation project for Coastal Area Development Programme (CADP), Water and Sanitation Management Organisation (WASMO) and some portions for the Okhamandal Samridh Gram Pariyojna (OSGP) at the district level. The salinity ingress project is carried under the OSGP in 18 villages of Okhamandal district. Roof rainwater harvesting scheme (RRWHS) with 7,000 litres capacity is supported by OSGP.

Description	Physical achievement	Economic gain/ year (approx.)
Construction, repair and strengthening of medium water harvesting structures (check dams, ponds, diversion channels)	234 structures in 36 villages. Avg. no. of beneficiary per structure is 15-20 @ 1- 2 million cubic feet/ structure. Therefore, 249 million cubic feet approx. water storage capacity has been created. Mayasar dam of 16 million cubic feet for drinking water for Dwarka town	At the rate of Rs.12,000 per beneficiary, the avg. net gain in the region is 225 lakhs/ year
Construction of farm ponds and farm bunds	2,165 farm ponds/ bunds in 16 villages	At the rate of Rs.9,000 to 15,000 per beneficiary, the avg. net gain is 30 –35 lakhs/ year
Recharge of groundwater through wells	463 wells in 19 villages (majority in Gadhechi village - 135 wells)	At the rate of Rs. 6,000 per beneficiary, the avg. net gain is 23-30 lakhs/year
Roof rainwater harvesting.	1,702 Roof rainwater harvesting constructed benefitting 1,702 households	Saving of time for other productive work and availability of water through the year.
Plantation	8,000 saplings	10 schools involved in the plantation drive
Biodiversity plantation	80 acres covered	Helped in environment conservation
Water saving techniques like drip and sprinkler irrigation	270 beneficiaries from 25 villages adopted this technique. 1,345 hectare covered under the programme year	270 sprinkler and drip set installed on farmer's fields
Drinking water infrastructure	25 villages were covered under the programme. It has benefitted 5,592 households. 9 Reverse Osmosis (RO) plants (capacity- 2000 lt/hr) were installed at Bhimbarana village and 3 RO plants (capacity 250 lt/hr) were installed at Lalpur and Samlasar villages and 6 RO plants were installed at primary schools in 6 villages of Okhamandal	Safe drinking water helped in preventing the common waterborne diseases.Women now have more time with them as they don't have to go out of their house to fetch water. They utilise their time in learning new skills. This has helped them to become independent both socially and economically.

Project sustainability

In the designing phase itself, TCSRD ensures that the community members become the real managers and owners and work towards their own development and that of the society at large. It ensures this by establishment and participation of Community based Organization (CBOs) in almost all its programmes.

The process started through awareness building activities followed by formation of village level watershed committees and drinking water committees (Pani Samities), user groups, Self Help Group (SHG) etc involving women and people from the marginalised sections. Village action plans were made with community participation by following participatory appraisals approach. Technical and economic feasibility of the projects were assessed and shared with the community. The contribution structure was chalked out involving all parties involved in the development process. Every structure built and every activity undertaken was selected, implemented by village watershed committees, pani samities and user groups etc. The management and ownership of all structures rested with the community. This resulted in a system of ownership, responsibility and creation of a participatory approach. Usage and payment for water were decided by them and money was collected for maintenance of water structures. Around 70-80 per cent of the cost of these structures was borne by the users themselves. The villages where the programme was initially implemented have now become the role model for the new villages. This has lead to a continuous process of sharing and learning within the targeted villages.



Recently 'lokarpan' - handing over ceremony to the community was done for the drinking water projects. Out of the 27 villages of Okhamandal and Kalyanpur taluka where the Coastal Area Development Programme (CADP) was implemented in partnership of WASMO, TCSRD has so far handed over the project to the village level pani samities in 20 villages. In the watershed development programme, operation and maintenance has been handed over to the village level committees and user groups in all the 17 villages where the project was implemented in partnership with DRDA.

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Industrial Water Efficiency

Arvind Limited

Location: Khatrej, Kalol district, Gandhinagar

Production capacity of the plant: 40,000 MT per annum of fabrics

Maximum water demand of the plant and consumption pattern

The maximum water demand of the plant is 12,000 m^3/ day. The industrial water consumption for the year 2011-12 was 51,36,450 m^3 out of which 39,93,000 m^3 was used for industrial processes and 11,43,450 m^3 for drinking and service water. The source of water is recycled water for industrial processes and groundwater for drinking purpose.

Water conservation measures

Recycled water is used in industrial processes thereby reducing the requirement of fresh water. Fresh water is used only for drinking and service water. There is a generation of 1,600 m^3/ day sewage from 5,000 numbers of Arvind and smart value homes LLP township project with TATA housing near Arvind Santej plant. This sewage will be treated with membrane bound reactor (MBR) technology and used to produce DM water against raw water presently used in Arvind. This will reduce raw water extraction from ground to 1,500 m^3/ day against 3,100 m^3/ day.



Rainwater harvesting



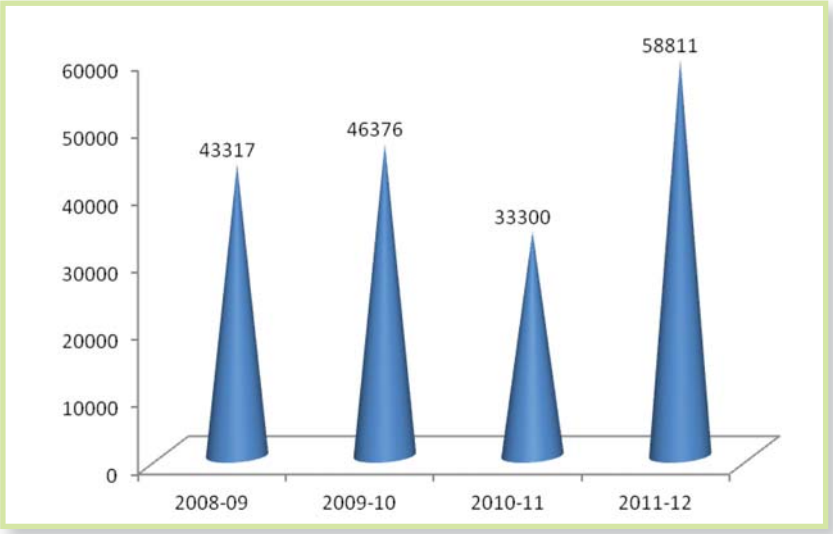
Rainwater harvesting

Wastewater generation and treatment

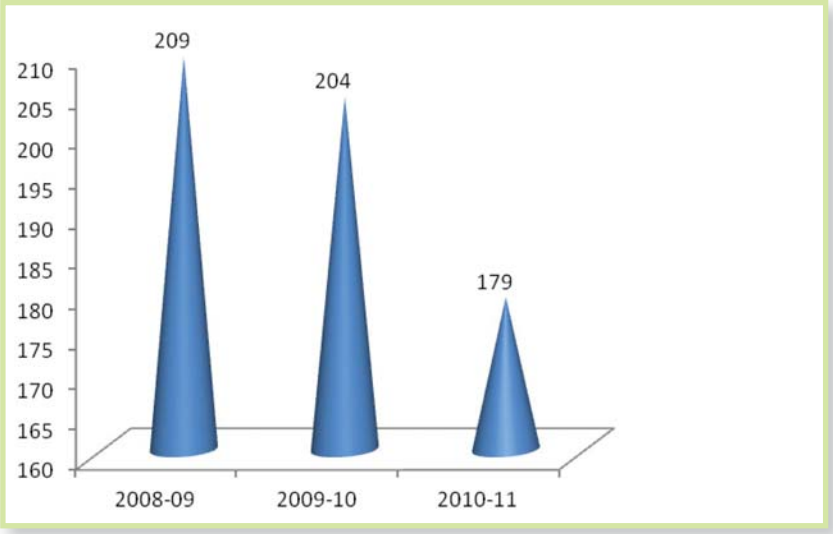
Total wastewater (effluent) generated during the year 2011-12 was 41,09,160 m^3 all of which was treated and 100 per cent of the treated water was recycled back into the industrial processes maintaining zero discharge. The effluent is first treated in effluent treatment plant (ETP). The treated effluent is then passed through Reverse Osmosis (RO) plant and then through the thermal desalination plant to produce soft water which is used in industrial processes.

Rainwater harvesting and use

Two groundwater recharge ponds of 5,700 m^3 and 9,000 m^3 capacity were excavated in 1999-2000 to recharge groundwater.



Rainwater harvested m^3/ annum



Specific water consumption for industry unit
(m^3/unit of production)

Contact person:
Mr. Sandeep R. Patel
Head Environment and Water Treatment, Fire, Safety
Arvind Limited
Email: sandeepr.patel@arvind.in

Bajaj Hindusthan Limited, Distillery Unit

Location: Gola, Uttar Pradesh

Production capacity of the plant: 25,003 kl/ annum

Maximum water demand of the plant and consumption pattern

The maximum water demand of the plant is 1,200 m^3/ day. The industrial water consumption for the year 2011-12 was 3,17,020 m^3 out of which 3,04,210 m^3 was for industrial process and 12,810 m^3 for drinking and service water. The source of water is groundwater.

Water conservation measures

- Spent lees which comes out from the exhaust column of the plant is being collected in a tank and after cooling is being used in process, saving 7,565 m^3 of water annually.
- Spent wash (5-10 per cent) is being recycled in process for molasses dilution saving 10,836 m^3 of water annually.
- Water outlet of CO_2 scrubber and air compressor is recycled to cooling tower saving 10,872 m^3 of water annually.
- Water outlet of vacuum pump is recycled to process saving 18,120 m^3 of water annually.
- Blow down water of cooling tower is being utilized for gardening/ irrigation.

Wastewater generation and treatment

Total wastewater (effluent) generated during the year 2011-12 was 1,84,383 m^3 all of which is treated. Around 17,988 m^3 (10 per cent) spent wash is recycled back to processes. Spent wash is the main effluent from distilleries. About 1,200 m^3/day of spent wash is generated from the distillery at full capacity operation i.e. 100 kl/day of production, 10 per cent of which is recycled for molasses dilution and remaining is first taken into the sedimentation tank to remove the yeast sludge. The spent wash is then pumped into three digesters for its anaerobic treatment. In the first stage, the organic matter gets converted into fatty acids by action of acidogenic bacteria. In the second stage, these fatty acids get converted into methane by methanogenic bacteria. Effluent from Bio-methanation is reduced to 50 per cent volume through multi effect evaporator (MEE). The output of MEE is consumed in bio-composting maintaining zero discharge.

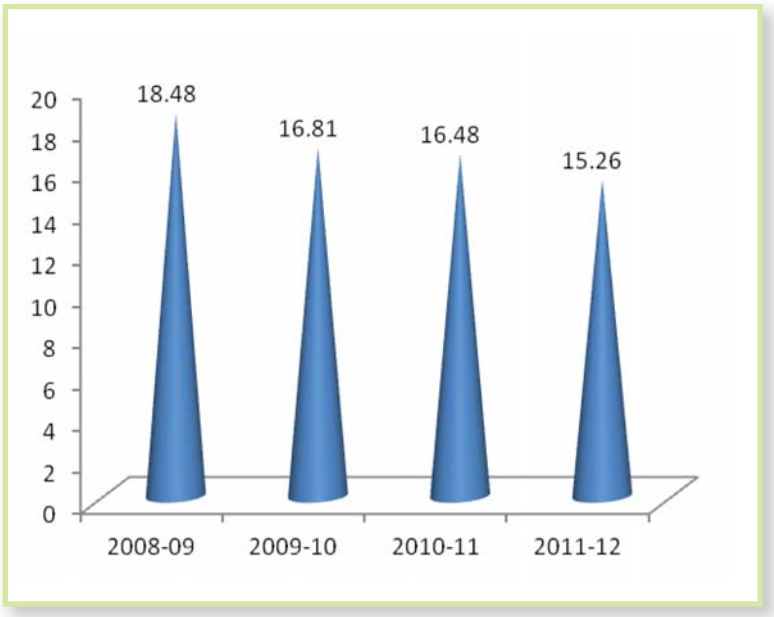


Soak trenches

Rainwater harvesting and use

Rainwater is collected from the plant and all godown roof tops through installed water channels and pipes. 100 per cent of the harvested rainwater is used for groundwater recharge.

Awareness generation and capacity building: In-house awareness training programmes for employees, local community and family members to conserve water and minimize water consumption are conducted on regular intervals.



Specific water consumption for industry unit
(m^3/ unit of production)

Contact person:
Dr. A. V. Singh
President – EHS & Distillery Business
Bajaj Hindusthan Limited
Email: avsingh@bajajhindusthan.com

Chemplast Sanmar Limited

Location: Raman Nagar, Mettur Dam, Salem district, Tamil Nadu

Production capacity of the plant:

Chemicals	Production Capacity (MT) (2011-12)
Refrigerant Gas HCFC 22	1,663.2 MT
PVC including manufacturing of intermediate raw material Vinyl Chloride (VCM)	6,600 MT
Caustic	48,048 MT
Chlorine	42,570 MT
Chloromethane	33,580 MT

Maximum water demand of the plant and consumption pattern

The industrial water consumption for the year 2011-12 was 10,96,096 m^3 for all three plants. Out of which 6,28,978 m^3 was used for industrial process and 4,67,118 m^3 as drinking and service water. The source of water is surface water.

Water conservation measures

- Reuse of polymer effluent to cooling tower, saving 14,600 m^3 of water annually.
- Treated effluent used for dust suppression at coal storage of power plant, saving 5,840 m^3 of water annually.
- Use of dilute acid stream from the incinerator to enrich the salable acid, saving 13,840 m^3 of water annually.
- Use of alkali portion of demineralization (DM) plant regeneration stream for brine preparation, saving 5,185 m^3 of water annually.
- Use of treated sewage water in cooling tower, saving 44,895 m^3 of water annually.
- Reuse of strong base anion (SBA)/ weak base anion (WBA) rinse water to cooling tower, saving 2,800 m^3 of water annually.
- Installation of Air Cooled Condenser (ACC) for cooling tower for coal based power plant, saving 3,000 m^3 of water daily.
- Use of rainwater in plant processes, saving 16,500 m^3 of water annually.

Wastewater generation and treatment

Total waste water (effluent) generated during the year 2011-12 was 370,870 m^3 from all three plants. All of which is treated and treated effluent is recycled back into the industrial processes. ETP treated water is mixed in equalization tanks and further treated by clarifiers, filters, softeners and High Efficiency Reverse Osmosis (HERO) unit. The process is unique in nature as the entire wastewater is converted into the sodium salts through an exhaustive pre-treatment process.

Rainwater harvesting and use

Being a hilly terrain, Mettur is not an ideal place for the effective implementation of rainwater harvesting systems. During the rainy season, after letting out the initial flow of water, the rainwater is being collected in sumps and is being reused in place of raw water. Average quantity of rainwater collected and reused as raw water at Plant - II & III is 16,500 m^3/ year.



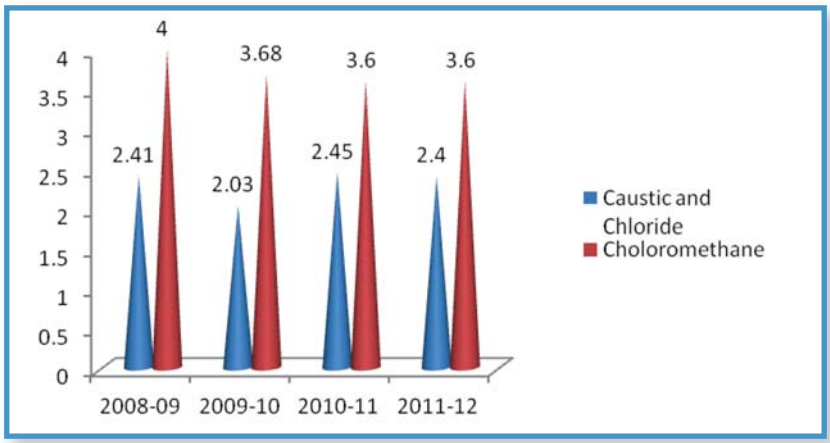
Air cooled condenser

Awareness generation and capacity building

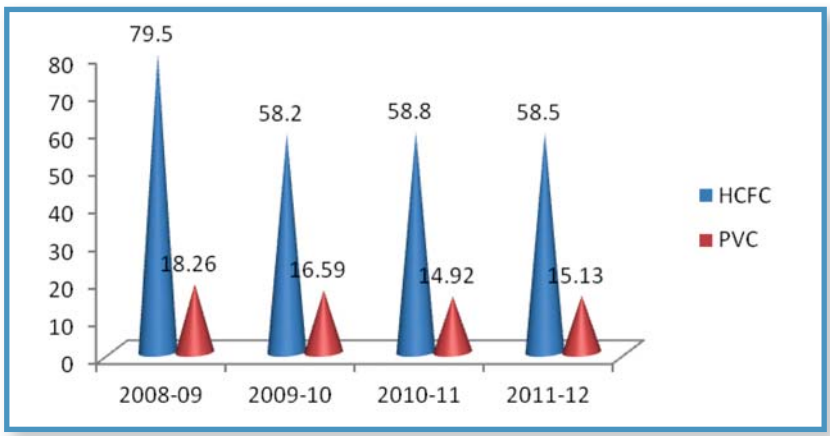
Several training programmes are organized for regular/ contract employees on the environmental practices of Reduce, Recover, Recycle and Reuse of water. Specific water conservation and environmental management programmes on water conservation were successfully carried out in the plants (Example, recycle of polymer effluent to the cooling towers, installation of air cooled condensers in place of cooling towers at captive power plant purely based on the water conservation angle). Water conservation awareness programmes for colony residents of the company are also conducted at regular intervals. Oath on environmental protection including water conservation was taken from all contract employees.



Rainwater harvesting structure



Specific water consumption (m^3 per unit of production)



Specific water consumption (m^3 per unit of production)

Contact Person:
Mr. S. Venkatesan
Chief Executive - Operations
Chemplast Sanmar Limited
Email: sv6@sanmargroup.com

Essar Power Limited

Location: Hazira, Surat district, Gujarat

Production capacity of the plant: 4,511.4 million unit/ annum

Maximum water demand of the plant and consumption pattern

The maximum water demand of the plant is 60.225 lakhs m^3/ year. The industrial water consumption for the year 2011-12 was 29,69,148 m^3 out of which 29,48,379 m^3 were for industrial process and 20,769 m^3 for drinking and service water. The source of water is surface water.

Water conservation measures

- Cooling tower blow down water recovery and reuse as make-up water for steel plant and in township for horticulture, saving 2,90,526 m^3 of water annually.
- Pressure sand filters (PSF) and sand filters (SF) back wash water recovery, saving 2,62,979 m^3 of water annually.
- Swale construction for re-use of plant processes water for plant horticulture, saving 24,129 m^3 of water annually.
- Recycle of clarifiers de-sludge water back to the clarifier inlet through thickener, saving 1,05,408 m^3 of water annually.
- Increasing cooling tower cycle of concentration (COC) Changing stainless steel tubes with Cu-Ni Material of Construction (MOC) in condenser resulted in increase of COC from 3.68 to 5.0, saving a large amount of water.

Future plans for water conservation

- Reuse of wastewater from cooling tower blow down water by reverse osmosis.
- Reverse osmosis water to be used as feed water to demineralisation plant.

After reverse osmosis plant is in operation, Essar Power would come close to being a near to Zero Discharge Company.



Swale construction for reuse of plant process wastewater for plant horticulture

Wastewater generation and treatment

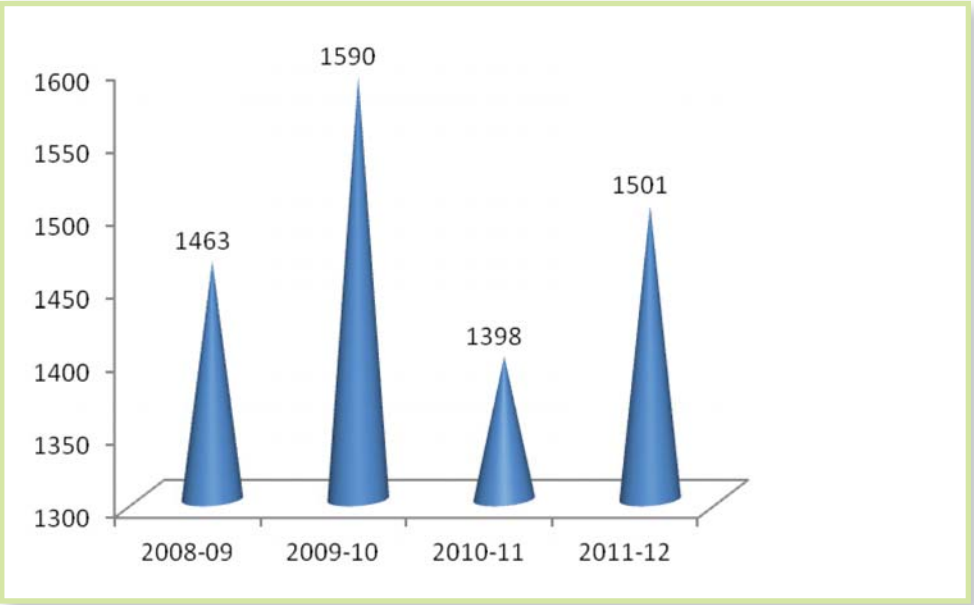
Total wastewater (effluent) generated during the year 2011-12 was 7,76,192 m^3 out of which 1,98,558 m^3 of water is treated in effluent treatment plant (ETP) which is discharged. The remaining 5,77,634 m^3 of wastewater is recycled back into the industrial processes.

Rainwater harvesting and use

There are four catchment areas at Essar Power for rainwater harvesting and 100 per cent of the harvested rainwater is used for groundwater recharge.

Awareness generation and capacity building

Training programmes are conducted for all employees and contract manpower on water conservation and health safety and environment (HSE). Essar Power also organizes water meets on a regular basis inviting water experts from neighbouring industries to share new ideas and participate in water awareness programmes. Every year, a vendor meet is organized for awareness and conveying water conservation and HSE needs among the supply chain.



Specific water consumption for industry unit (m^3/ million unit of production)

Contact person:
Mr. Tushar S Bhatt
Head Power Business - Hazira
Essar Power Limited
Email - tushar.bhatt@essar.com

Essar Steel India Limited

Location: Hazira, Surat district, Gujarat

Production capacity of the plant: 10 MTPA (4.6 MTPA operational + 5.4 MTPA under stabilization)

Maximum water demand of the plant and consumption pattern

The maximum water demand of the plant is 1,41,29,880 m^3/year for 2011-12. The industrial water consumption for the year 2011-12 was 92,07,522 m^3 out of which 84,69,726 m^3 for industrial process and 7,37,796 m^3 for drinking and service water. The source of water is Tapi River and rainwater.

Water conservation measures

- Cascading of primary blow down to secondary system (primary # 3) saving 1, 54,653 m^3 of water annually.
- Raw water pre-treatment system – multimedia filter (MMF) for reusing of dirty backwash water for industrial use, saving 58,812 m^3 of water annually.
- Transferring of de-scaling (direct) water to laminar water system, saving 2, 65,855 m^3 of water annually.
- Electric arc furnace (EAF) 1 and 2 primary blow down water to laminar water system, saving 2, 51,609 m^3 of water annually.
- Condensate recovery – cold rolling mill (CRM) saving 1,27,181 m^3 of water annually.
- Effluent to affluent (Essar Power Ltd. – hot briquette sponge iron plant) saving 20,97,469 m^3 of water annually.
- Converting reinstahl heraeus degasser (RHD) (a steel refinement process) water filter into side stream filter for EAF 4/ Caster 3 secondary system @ 400 m^3/day saving 5,27,600 m^3 of water annually.
- EAF 4 secondary blow down water as a make-up for continuous casting machine (CCM) 3 spray @ 150 m^3/day saving 1,32,750 m^3 of water annually.



Multimedia Filter

- INOX Cooling tower blow down – Oxygen plant one and two @ 250 m^3/day saving 1,58,500 m^3 of water annually.
- Reducing the regeneration frequency of CCM 3 spray/RHD pressure sand filters by changing the quality of water @ 100 m^3/day saving 1,27,875 m^3 of water annually.
- Multimedia filter (MMF) for caster # 3 spray system @ 600 m^3/day saving 4,14,000 m^3 of water annually.
- MMF for caster # 1/2 spray system @ 600 m^3/day saving 4,14,000 m^3 of water annually.
- Usage of rainwater in laminar cooling system as industrial water make up, saving 50,510 m^3 of water annually.

Wastewater generation and treatment

Total wastewater (effluent) generated during the year 2011-12 was 17,38,429 m^3. All the effluent is treated in effluent treatment plant (ETP). Around 10,08,289 m^3 (58 per cent) treated effluent

is recycled back to industrial processes and the remaining 42 per cent i.e. 7,30,140 m^3 of treated water is discharged. The effluent generated on daily basis is treated in Effluent Treatment Plant (ETP).

Rainwater harvesting and use

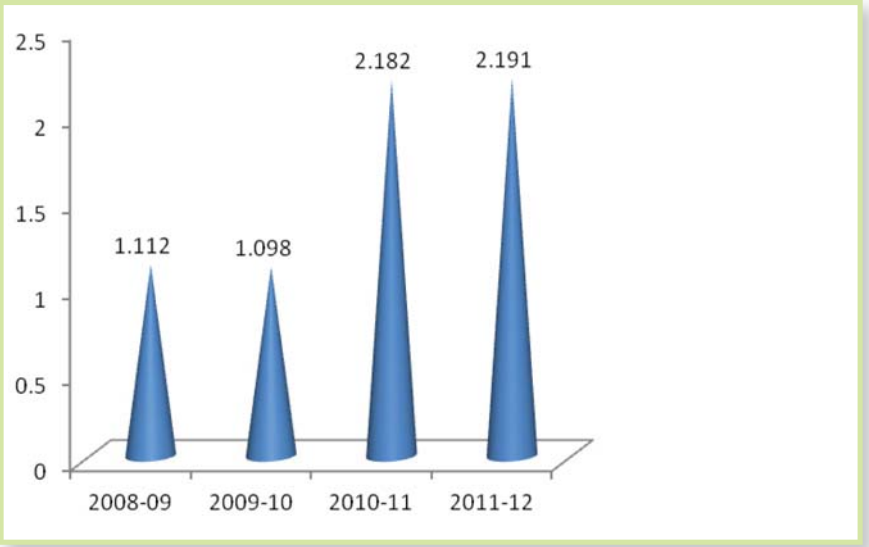
Rainwater harvesting potential of the plant is 2,38,511 m^3/ year. The various measures for rainwater harvesting employed include:

Rainwater harvesting point 1: Cold rolling mill Complex's roof (catchment area 1, 34,550 m^2 water is collected in to a coffee shop reservoir (holding capacity is 37,500 cubic meter) and from there water is being pumped (capacity 240 m^3/hr) to the main reservoir (holding capacity is 3,63,362 m^3) and after that water is treated in pre-treatment plant for downstream usage.

Rainwater harvesting point 2: The rainwater accumulated above the cricket ground (catchment area 1,40,000 m^2) is collected in a pit where a pump (capacity 100 m^3/hr) has been installed which is connected to the main water supplying pipe line (Variav line) to main plant reservoir (holding capacity is 3,63,362 m^3). During rainfall, pumping is started and all accumulated water is transferred for the plant usage after pre-treatment.

Rainwater harvesting point 3: Utilities to oxygen plant road (catchment area 12,000 m^2) water is collected into a pit through rainstorm water drain and water is being pumped to main reservoir (holding capacity is 3,63,362 m^3) and after that water is treated in pre-treatment plant for downstream usage.

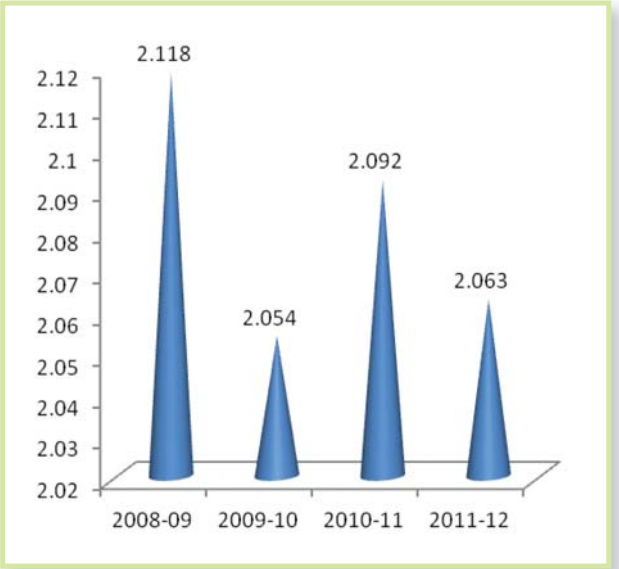
Rainwater harvesting point 4: At the T junction of CRM-CGS-utilities to plant road (catchment area 25,000 m^2) water is collected in to a pit through rainstorm water drain and from there water is being pumped to main reservoir (holding capacity is 3,63,362 m^3) and after that water is treated in pre-treatment plant for downstream usage.



Rainwater collected through rainwater harvesting facilities (lakhs m^3)

Awareness generation and capacity building

Essar Steel has a dedicated water policy which emphasizes on water conservation, awareness and capacity building. A water conservation cell has also been established in the complex. Associates and vendors located in and around the complex and one middle management employee is a part of the cell. They are regularly involved in water conservation, awareness and capacity building through trainings, quizzes, posters, awareness campaigns, street plays, site visits etc.



Specific water consumption
(m^3 per tons of liquid steel)

Contact person:
Mr. S.C. Misra
VP - Utilities & Energy Management
Essar Steel India Limited
Email - subhas.misra@essar.com

ITC Limited

Location: Bangalore, Karnataka

Production capacity of the plant:

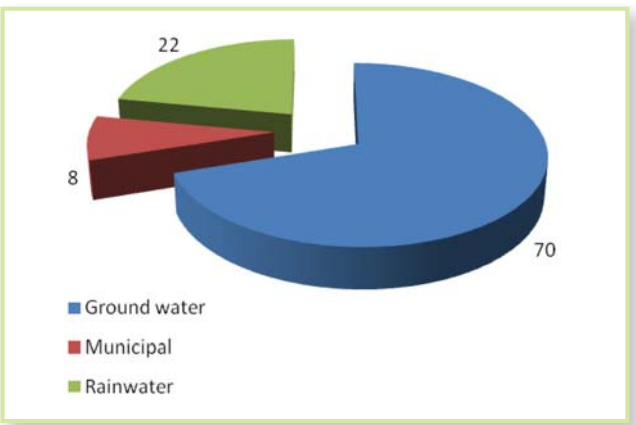
Product	Quantity	Unit
Cigarette	170	millions/day
Cut Tobacco	170	tons/day
Cased Leaf Burley	1,857	tons/annum
Gas and Liquid Treated Tobacco	450	tons/annum

Maximum water demand of the plant and consumption pattern

The maximum water demand of the plant is 288 m^3/ unit. The industrial water consumption for the year 2011-12 was 1,02,936 m^3 out of which 75,105 m^3 for industrial process and 27,831 m^3 for drinking and service water. The source of water is groundwater, rainwater and municipal sewage treated water.

Water conservation measures

- Use of cooling tower blow down water for toilet flushing, saving 300 m^3 of water annually.
- Recycling of water used for online measurement of parameters in reverse osmosis (RO) plant saving 600 m^3 of water annually.
- Usage of flow restrictors in auto taps, saving 24 m^3 of water annually.
- Usage of pressure guns for cleaning applications, saving 240 m^3 of water annually.
- Using foot operated paddles for gum wash and plate wash saving 400 m^3 of water annually.
- Condensate recovery of steam traps at Primary Manufacturing Department (PMD), saving 1200 m^3 of water annually.
- Creating standard operating procedures (SOP's) for cleaning of water coolers, cleaning of gum rollers and food warmers in canteen, saving 156 m^3 of water annually.
- Usage of cooling tower blow down for primary wash of the cooling tower saving 72 m^3 of water annually.
- Using remaining water in the water tank in air washers for cleaning of filter using high pressure pumps instead of draining them, saving 1,152 m^3 of water annually.
- Optimizing blow down total dissolved solids (TDS) set point of boiler, saving 120 m^3 of water annually.
- Urinals with auto flushing system, saving 900 m^3 of water annually.
- Recycling of multi grade filter (MGF) backwash, saving 1,200 m^3 of water annually.
- Maintaining cycle of concentration (COC) in cooling towers by having a system of TDS based blow down, saving 624 m^3 of water annually.
- Air handler unit (AHU) condensate recycling, saving 3,000 m^3 of water annually.
- RO reject connected to all toilets for flushing, saving 9,750 m^3 of water annually.



Water consumption by source

Wastewater generation and treatment

Total wastewater (effluent) generated during the year 2011-12 was 60,469 m^3, all of which is treated in ETP and 100 per cent of the treated water is used for irrigation purpose inside factory maintaining zero discharge. The unit is procuring sewage treated water from Bangalore Water Supply and Sewerage Board (BWSSB). It is further treated in an ultra filtration system followed by RO system. This has reduced dependency on groundwater by 6 per cent of the total water demand.

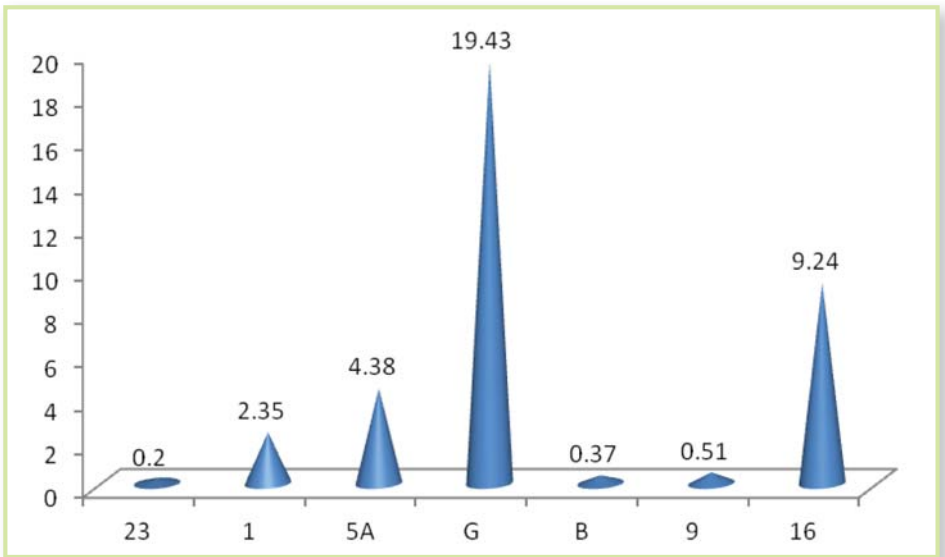
Rainwater harvesting and use

ITC Bangalore factory has three rainwater harvesting ponds which results in 100 per cent tapping of rainwater. It contributes to total water saving of more than 20,000 m^3 every annum. The harvested rainwater is treated in the treatment plant and is used in the factory through a ring main system. The unit has installed 10 recharge wells, one deep injection well which is used for forced injection post treatment in the treatment plant. Based on the report from Dr. Ramadurai from Albien groundwater consultants, the total rainwater harvesting potential is 71,161 m^3 per year.

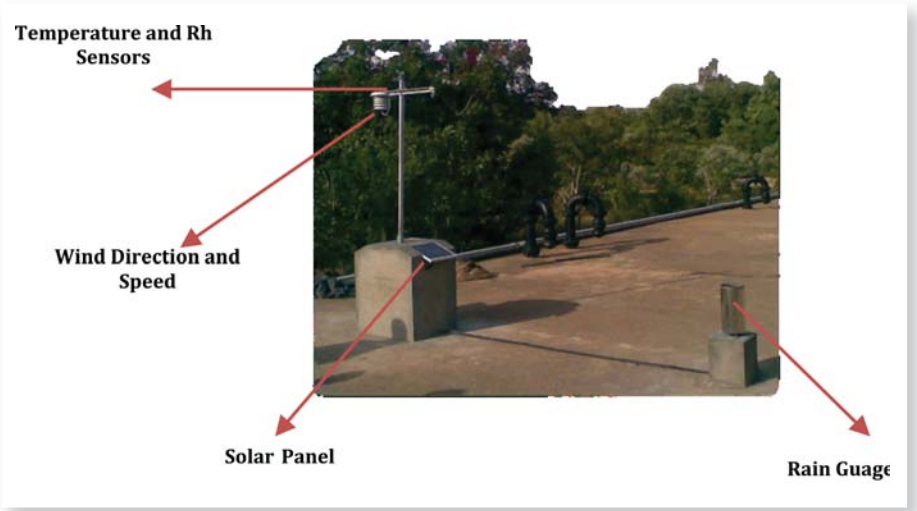
Rainwater harvesting monitoring is being done by ITC Bangalore every two months. The percolation and the forced injection in the borewell 2C have helped the unit to sustain the usage of borewells. There are no significant changes in the quality of groundwater for the past ten years. The percolation and the recharge have helped the unit to sustain the quality of water.

Awareness generation and capacity building

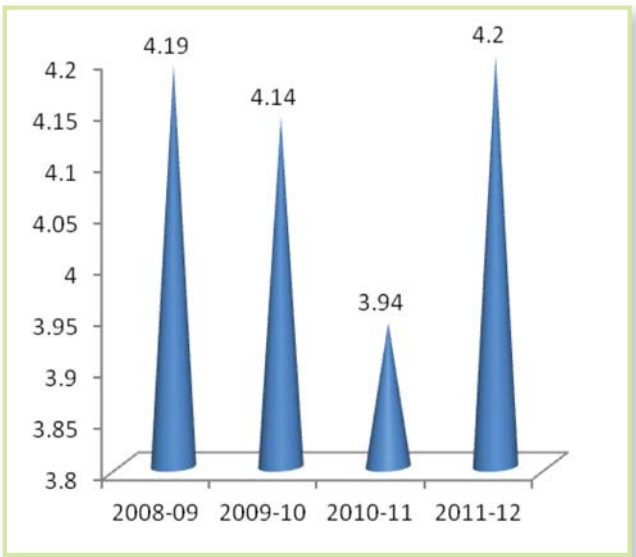
Awareness and capacity building programmes include team formation and targets, trainings and competitions. i3i (innovation to implementation to imitation) competition is arranged annually at the divisional level. Teams selected at the unit level qualify for the All India final and the possible ideas are imitated across the divisions. Internal water audit once every year and external water audit once every five years are conducted. To achieve the objective of becoming water positive, in and around the factory, many watershed development projects have been carried out. ITC has partnered the Indian farmer for close to a century. ITC as a responsible corporate citizen, has taken up social work in the neighbouring villages like water management programmes, launched in villages to improve quality and farm ponds, bore-well and pond recharge etc.



Increase in static level of high yielding borewells post project implementation (meters)



Rainwater harvesting structure



Specific water consumption for industry unit (m^3/million cigarettes)

Contact person:
Mr. Balkrishna Arora
Assistant Manager, Utility
ITC Limited
Email - balkrishna.arora@itc.in

OCL India Limited

Location: Rajgangpur, Sundargarh district, Odisha

Production capacity of the plant: 4 metric tons of cement/annum

Maximum water demand of the plant and consumption pattern

The maximum water demand of the plant is 1,200 m^3/ day. The industrial water consumption for the year 2011-12 was 4,36,910 m^3 out of which 3,13,900 m^3 for industrial process and 1,23,010 m^3 for drinking and service water. The source of water is surface water.

Water conservation measures

- Cement grinding section compressor cooling water system has been made close loop by installing cooling tower, saving 73,000 m^3 of water annually.
- Close circuit and recirculation system has been installed for cement grinding mill cooling water, saving 31,025 m^3 of water annually.
- Installation of cooling tower and recirculation system for cooling water circuit of clinkerisation plant and cement packing plant compressor, saving 69,350 m^3 of water annually.
- Retrofit for "waterless male urinals" installed in 25 units at the plant in 7 administrative offices, saving 980 m^3 of water annually.
- Replacement of 970 numbers of conventional cisterns in toilets of the residential colony with water efficient twin flush, systems, saving 33,990 m^3 of water annually.

Wastewater generation and treatment

Total wastewater (effluent) generated during the year 2011-12 was 2,37,651 m^3 out of which around 90 per cent is treated in effluent treatment plant (ETP) and 100 per cent of the treated water is used in industrial processes, fugitive dust suppression and green development. The domestic sewage generated in the residential colony for year 2011-12 was 216,080 m^3, all of which is treated in sewage treatment plant (STP). 50 per cent of the treated water is used for processes like machinery cooling, sprinkling on roads etc., and the rest is used for green belt development maintaining zero discharge.



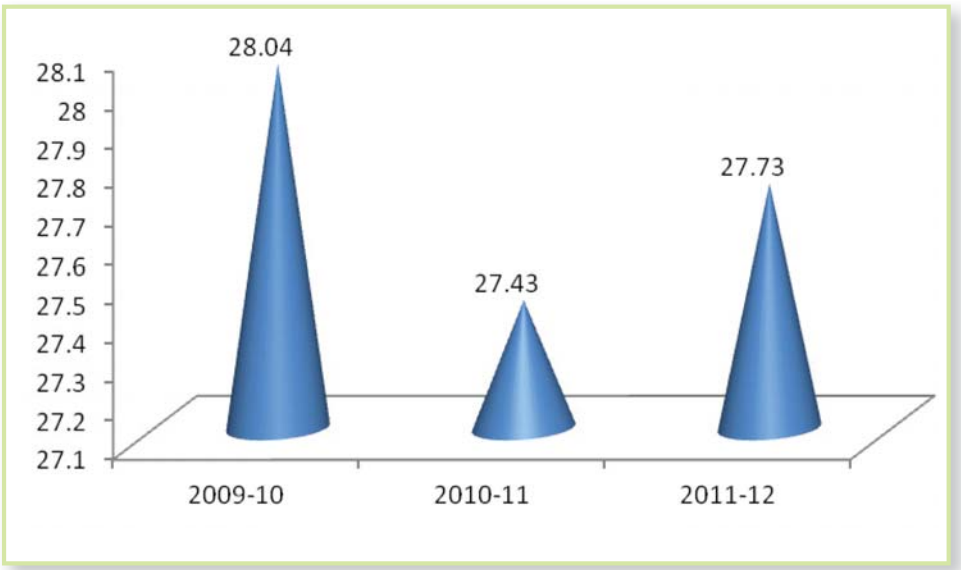
Rooftop rainwater harvesting from RM shed-work in progress

Rainwater harvesting and use

In the year 2011-12, total rainwater harvested was 3,22,540 m^3, out of which 1,51,488 m^3 (47%) was used in various industrial and non-industrial processes reducing source water drawl to that extent. The rest 53% i.e. 1,71,052 m^3 was used for groundwater recharge. Over the last three years there has not been significant reduction of water table of the area.

The various rainwater harvesting measures employed are:

- **Rainwater harvesting near administrative building:** Storm water is harvested through injection bore method. Approximately, 3,000 m^3/annum of water is harvested through this structure annually and total harvested water is used for groundwater recharge.
- **Rooftop rainwater harvesting at OCL colony:** Rooftop water harvesting is also done through injection bore method. Approx. 700 m^3/annum of water is harvested and



Static water table around factory premises (meters)

used for groundwater recharge after filtration through media filter.

- **Rainwater harvesting at Jhagarpur by contour bunds:** This area where our associate R&D unit is located has been found to be most suitable for groundwater recharge. By making low height contour bunds on the boundary line towards the natural slope of the area, entire storm water is harvested through surface distribution technique not allowing flowing out. Approx. 99,000 m^3 of water is harvested and recharged annually.
- **Rainwater harvesting pond at Jhagarpur:** Within the above premises, a rainwater harvesting pond of capacity 6,240 m^3 was constructed in 2009. Besides charging groundwater, it is also used for storing rainwater for use during lean period.
- **Raw water reservoir in the plant:** An open raw water reservoir of capacity 27,000 m^3 has been constructed in the plant. During monsoon, rainwater is collected in this for normal use.
- **Rainwater harvesting at mines:** At our captive lime stone mines at Lanjiberna, rainwater from the surrounding catchment area is collected in the non-working pits. Approx. 200,000 m^3/year of rainwater is being collected, stored and used during summers when the source water gets reduced.

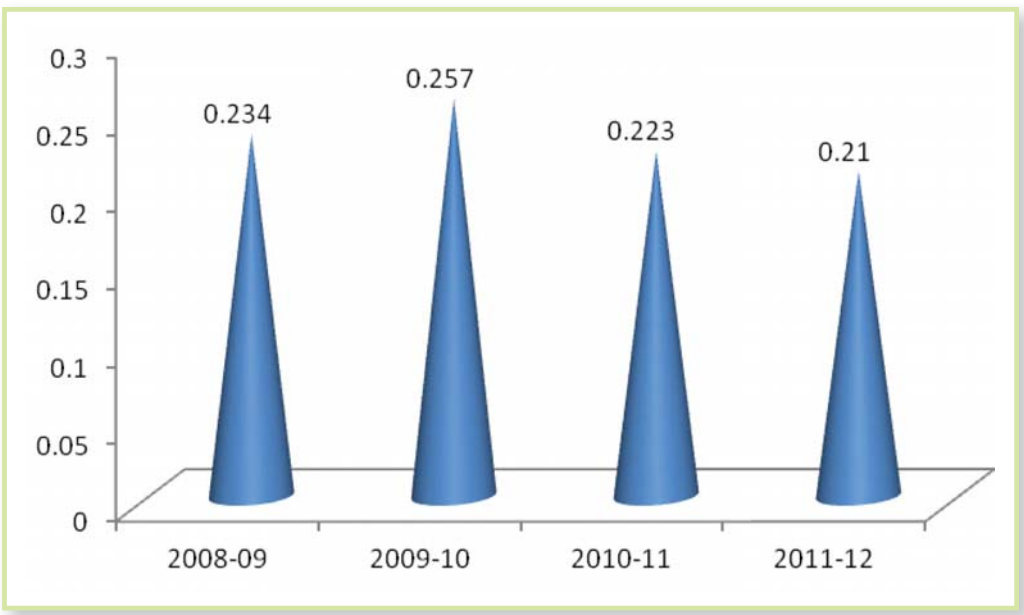
Future Projects for Rainwater Harvesting:

- **Roof top water harvesting inside the plant:** Arrangements have been made to collect rainwater from the semi-circular roof of raw material storage shed in a pit. Pumping facility has also been created to pump the collected rainwater to raw water storage tank. The expected rainwater collected from this project is 13,970 m^3/annum. This project is in completion stage.

- **Roof top rainwater harvesting in multi storied towers:** In the OCL township, multi storied buildings are under construction. It has been planned to harvest roof top rainwater at these buildings. Total estimated rainwater harvesting would be 2,582 m^3/annum from these buildings
- **Rainwater harvesting pond near STP:** A rainwater harvesting pond of capacity 2,250 m^3 is being dug. Around 50% of the work has completed. Rainwater from the colony will flow to this pond as the pond's location is in the lowest area.
- **Rainwater harvesting pond in plant:** Two ponds of capacity 7,500 m^3 and 6,000 m^3 are also planned to be dug at the lowest area inside the entire plant area to harvest rainwater.

Awareness generation and capacity building

Trainings, other awareness programmes and competitions are conducted for employees, colony ladies and children on a regular basis. Awareness programmes are also conducted for school students around the factory and mines area and for workmen. Environment day is also celebrated every year to create awareness among all employees. "EHS Sambad" a quarterly e-news letter on environment, health and safety is also circulated in-house, to create awareness.



Specific water consumption for industry (m^3/MT)

Contact person:
Mr. AC Das,
Assistant Executive Director
OCL India Limited
Email: acdas@ocl.in

Sterlite Copper

Location: Tuticorin district, Tamil Nadu

Production capacity of the plant

Product	Quantity	Unit
Copper Anode	4	Lakh MT/annum
Copper Cathode	4	Lakh MT/annum
Sulphuric Acid	4,200	MT/day

Maximum water demand of the plant and consumption pattern

The maximum water demand of the plant is 8,500 m^3/day. The industrial water consumption for the year 2011-12 was 23,13,623 m^3 out of which 22,64,421 m^3 for industrial process and 49,202 m^3 for drinking and service water. The source of water is surface water from Papanasam, Manimuthar and Srivaikundam dams.

Water conservation measures

Sterlite copper has employed a strategy to attain benchmarking specific water consumption (SWC).

More than 20 water conservation projects were implemented in the last two years. Some of these are mentioned below:

- Blow down water usage for ground floor F/C vacuum pumps saving 66,000 m^3 of water annually.
- Diversion of effluent treatment plant (ETP) – I water from other ETP water, saving 36,000 m^3 of water annually.
- Drip irrigation for entire gardening area.
- Reverse osmosis (RO) for rainwater treatment saving 60,000 m^3 of water annually.
- Additional air cooling for sulphuric acid plant saving 1,36,000 m^3 of water annually.
- ETP, RO water as input to refinery demineralising plant instead of raw water, saving 8,400 m^3 of water annually.
- New water storage pond construction for collecting water from gypsum, saving 10,200 m^3 of water annually.
- Usage of treated water for washing and cleaning of ETP and scrubber area, saving 3,500 m^3 of water annually.
- Upgradation of sewage treatment plant, saving 13,600 m^3, of water annually.
- Installation of mineral water plant, saving 1,700 m^3 of water annually.
- RO plant for ETP water, saving 3,06,000 m^3 of water annually.
- Usage of cooling tower blow-down for cleaning of equipments, saving 1,70,000 m^3 of water annually.
- Conversion of gland seal to mechanical seal, saving 33,000 m^3 of water annually.
- Upgradation of rainwater collection system, saving 55,000 m^3 of water annually.
- Usage of treated water in concentrate feed area, saving 7,300 m^3 of water annually.
- Sodium sulphide treatment facility in ETP, saving 27,200 m^3 of water annually.

Ferric sulphate treatment was generating hazardous waste. To reduce the hazardous waste generation, an alternate technology of sodium sulphide treatment was employed with the help of M/s. Chemetics, Canada. The sodium sulphide treatment resulted in 63 per cent reduction of hazardous waste, 50 per cent raw material consumption and 50 per cent lime consumption. It was also economically beneficial, resulting in overall cost reduction of 53 per cent.

Wastewater generation and treatment

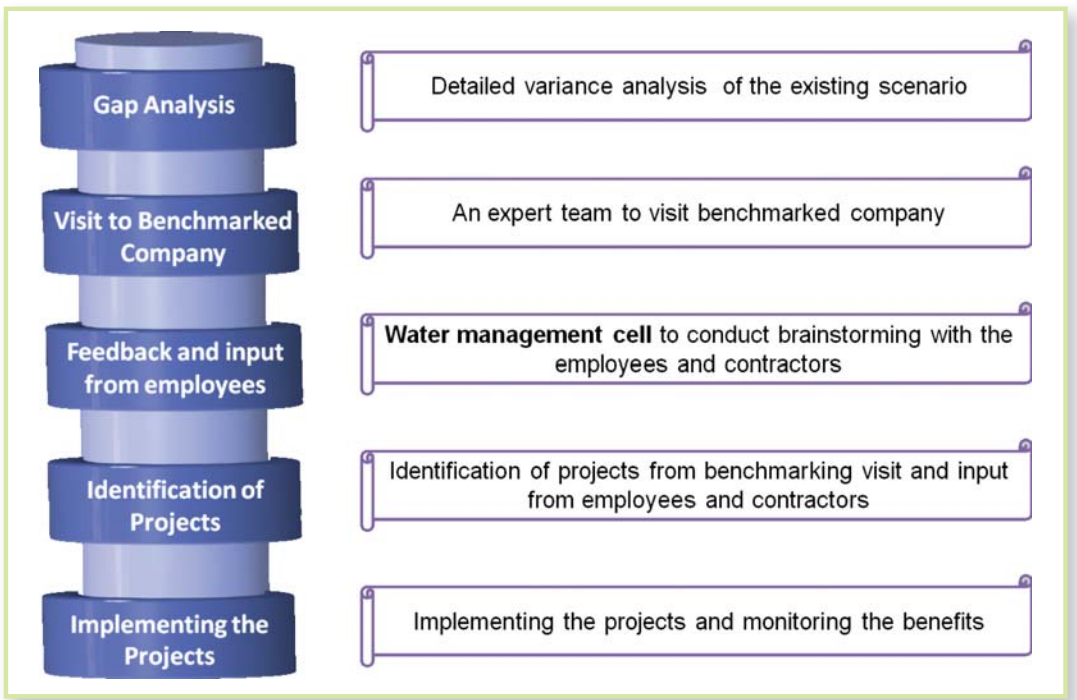
Total wastewater (effluent) generated during the year 2011-12 was 4,89,111 m^3 all of which was treated and 100% of the treated water was recycled back into the industrial processes maintaining zero discharge. Effluent from scrubbers is treated in ETP 1. Effluent from gas cleaning plant is treated in ETP 2, 3 and 4 and effluent from refinery is treated in ETP 5.

Rainwater harvesting and use

Sterlite Copper has two rainwater catchment ponds of total capacity 1,00,000 m^3. During rainy season, rainwater is collected through drains to the rainwater catchment pond. The harvested rainwater is treated in ETP and RO and the treated rainwater is reused in the plant. The rainwater collected in the year 2011-12 was about 72,840 m3 and it was completely utilized in the processes.

Awareness generation and capacity building

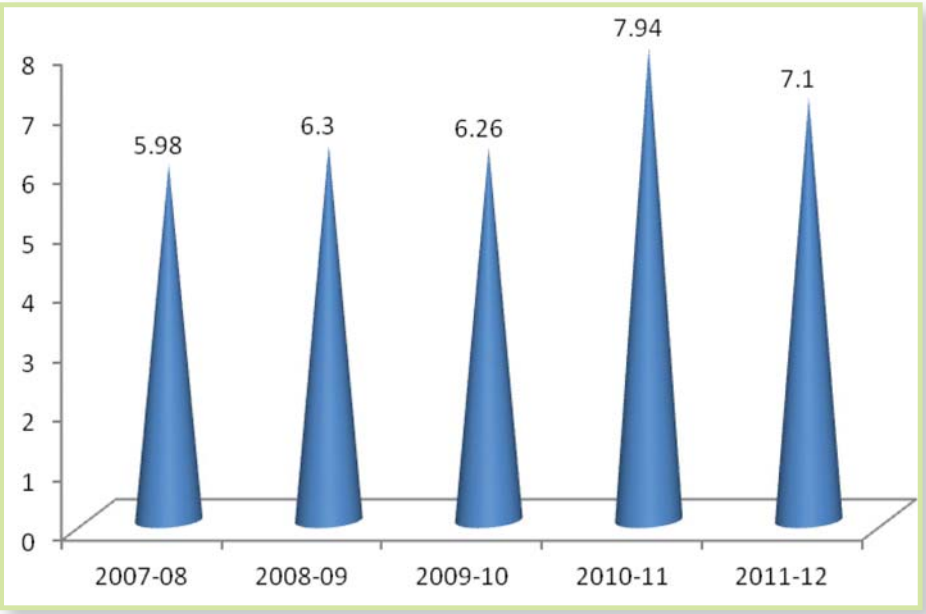
World Water Day was celebrated with pledge and awareness programmes for contract and company staff. Water conservation week was also celebrated in which various competitions like online quizzes, crossword puzzles, poster contest, slogan contest, best water conservation award etc were organized for contractors, employees and school children. Support for awareness on cleaning and maintenance of water channels for irrigation in nearby villages was also provided. Plant visits were also arranged for school children to enhance their knowledge in water conservation. Green supply chain has been implemented in the plant in year 2010-11. Suppliers were asked to fill a questionnaire and feedback and recommendations were given to suppliers on water conservation.



Strategy to attain benchmarking SWC

Parameters	Ferric sulphate (before)	Ferric sulphate (after)	Reduction
Hazardous waste generation	0.80 MT/m^3	0.30 MT/m^3	63%
Raw material consumption	0.14 MT/m^3	0.07 MT/m^3	63%
Lime consumption	0.03 MT/m^3	0.015 MT/m^3	63%
Treatment cost	1,288 Rs/m^3	610 Rs/m^3	63%

Change in scenario: alternation in sodium sulphide treatment



Specific water consumption for industry unit (m^3 per MT of cathode)

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Tata Chemicals Limited

Location: Mithapur, Gujarat; Babrala, Uttar Pradesh and Haldia, West Bengal

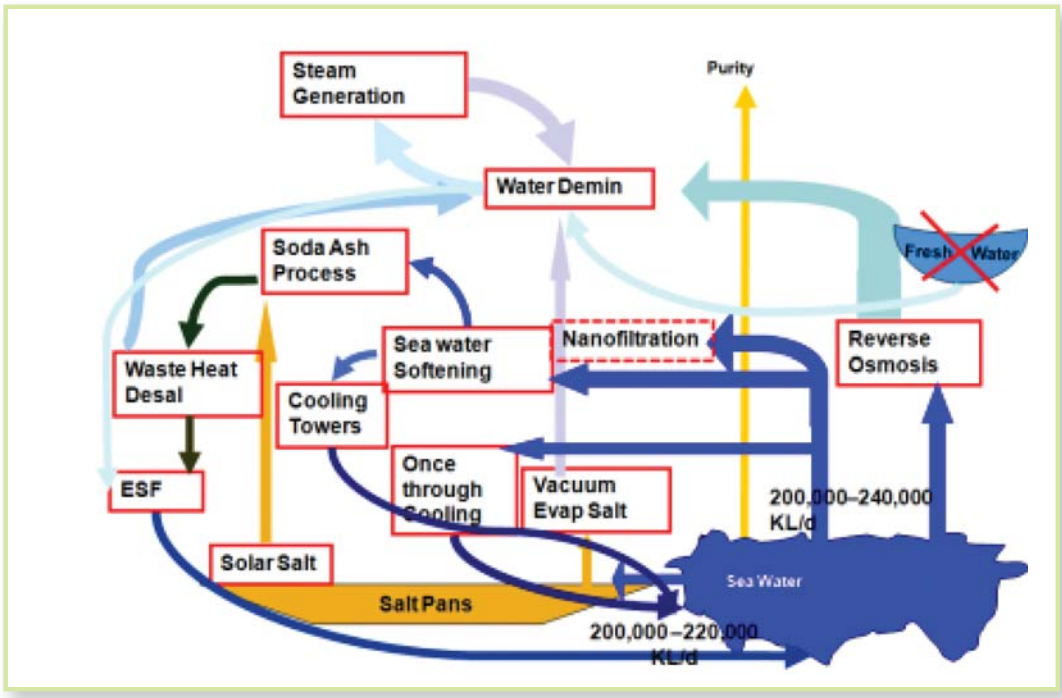
Production capacity of the plant

Location	Segment	Product	Capacity	Unit
Mithapur	Industry essential	Inorganic chemical complex producing soda ash, cement and other chloro-caustic chemicals	2.26	million MT per annum
	Living essential	Vacuum salt		
Babrala	Farm essential	Nitrogenous fertilizer producing urea and customized fertilizers	1.31	million MT per annum
Haldia	Industry essential	Phosphatic chemicals and fertilizers producing sulphuric and phosphoric acid	1.44	million MT per annum
	Farm essential	DAP/NPK, SSP fertilizers		
	Living essential	Water purifier (Tata swach cartridge)	3.10	lakhs no. per month

Maximum water demand of the plant and consumption pattern

The theoretical maximum water demand (industrial process) for Tata Chemicals Limited (TCL), India for above three manufacturing sites corresponds to 3,05,908 m^3 per day out of which approximately 78.5% is met with sea water i.e. 2,40,000 m^3 per day. Maximum water demand for each location is as follows –

- TCL, Mithapur – 2,40,000 m^3 per day (sea water) and 26,350 m3 per day (surface rain-fed lake water)
- TCL, Babrala – 35,400 m^3 per day (deep aquifer groundwater)
- TCL, Haldia – 4,158 m^3 per day (deep aquifer groundwater and municipal water)



Water pinch - sea water as raw material in utility

Water conservation measures at Mithapur

Mithapur operations have steadily reduced its dependence on fresh water by effective process integration and water pinch analysis. Some of the conservation measures employed include thermal desalination, softened sea water, substitution of raw water by sea water, water from effluent heat, sea water reverse osmosis (RO) and nano-filtration.

Water conservation measures at Babrala

- Cooling water treatment optimization to increase the cycle of concentration, instrumentation control by installing 3D tracer.
- Boiler water treatment optimization to minimize blow down quantity
- Tapping points at cooling tower blow down header for horticulture purpose, saving 5,000 m^3 of water annually.



Rainwater harvesting in residential colony

- Provide water cooler in recycle line of high speed diesel (HSD) pump to control HSD temperature in the day tank and thus eliminating use of water spray on the tank during summer, saving 7,000 m^3 of water annually.
- Recycle of captive power plant area steam condensate to demineralising (DM) plant, saving 25,000 m^3 of water annually.
- 100% recovery of urea spills dissolving wash water to improve water efficiency.
- Replacement of ion exchange resins of DM plant for optimum throughputs, saving 16,170 m^3 of water annually.

Water conservation measures at Haldia

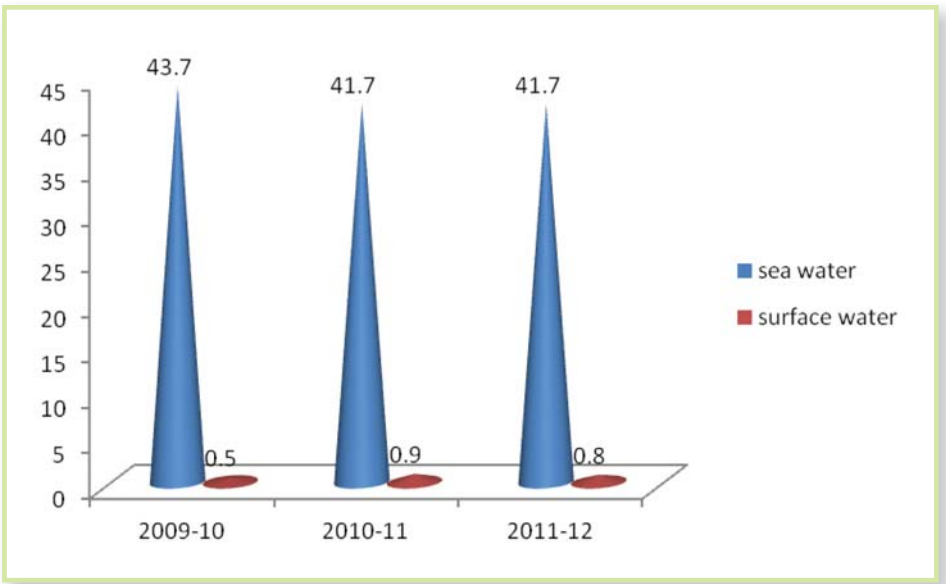
Fresh water consumption at Haldia has reduced from 240 m^3/hr to 160 m^3/hr and currently operating at around less than 100 m^3/hr, working towards zero base approaches for achieving theoretical water consumption of 90 m^3/hr. Some of the water conservation measures employed at Haldia include internal recycling, effluent recycling, condensate recovery system, automation of sulphuric acid plant continuous scrubbers, replacement of cooling tower to efficient one, provision of float valves, rainwater sumps, ultra filtration (UF) and reverse osmosis (RO) to improve DM plant efficiency etc.



Rainwater harvesting (RWH) pond

Wastewater generation and treatment

The total wastewater generated for Tata Chemicals India during the year 2011-12 was 84 million m^3 out of which around 95% was treated while 5 per cent was recycled back without any treatment in processes to recover nutrients. The treated effluent was 100 per cent recycled at Babrala while at Mithapur before final discharge, the effluent is recycled for various purposes replacing 93 per cent to 95 per cent external water. Sewage treatment plants (STPs) are also installed at all the three locations for the treatment of domestic effluent.



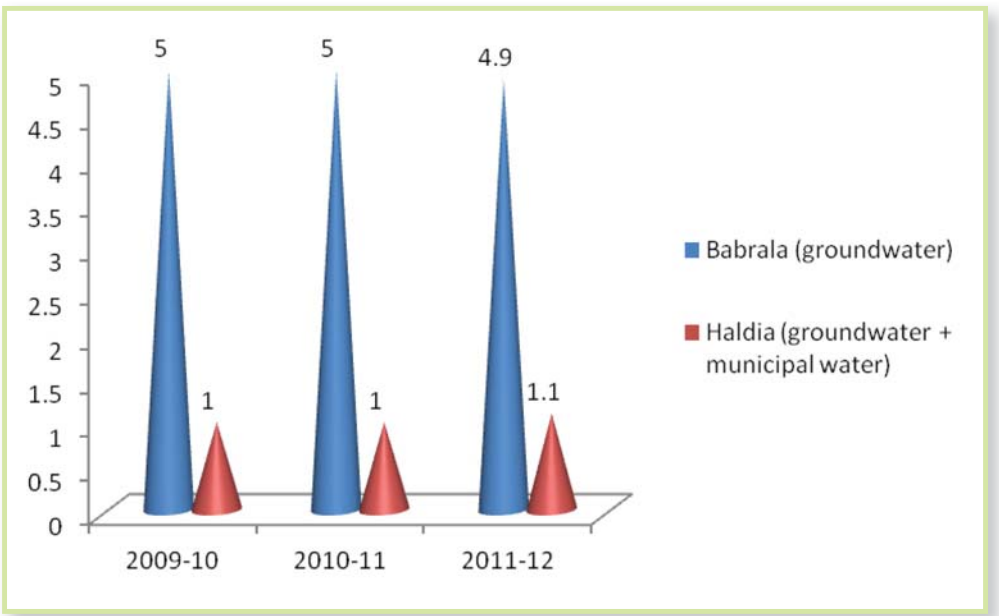
Specific water consumption at Mithapur (m^3/ unit of production)

Rainwater harvesting and use

A watershed conservation project was initiated at Mithapur location and community engagement was taken as one of the key elements to ensure that villagers become real managers and owners of the water harvesting structure. Various capacity building and awareness programmes are conducted in the community at regular intervals. At Babrala, two water harvesting ponds of capacity 1,500 m^3 and 600 m^3 were constructed in the residential complex for water conservation and recharging around 5,300 m^3 of water into ground in rainy season each year. At Haldia, various rainwater collection pits are available in DAP/NPK plants and the collected water is utilized within plant processes. Apart from that, a detailed study has been carried out by KRG rainwater harvesting, Chennai, to identify potential sources for rooftop and surface runoff and some rainwater harvesting projects will be taken up in the next few years. The harvested rainwater is used in industrial process, non-industrial processes (horticulture, agriculture and animal husbandry) and to recharge groundwater.

Awareness generation and capacity building

The awareness and capacity building programmes at Tata Chemicals Ltd. are not only restricted to employees but also include their families and the supply chain. Responsible Care inbound-outbound logistics code is widely used for connecting suppliers and distributors. Periodic supplier, distributers, customer meets are conducted and awareness is created among them. Trainings, knowledge initiatives – K-Café programme, six sigma programme, cross functional team workshops etc. are carried out at regular intervals.



Specific water consumption (m^3/ unit of production)

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FICCI Water Mission

Access to safe water is one of the essential elements for sustainable development and poverty reduction. However, the past few decades have seen an increase in demand amongst various water using sectors, putting enormous stress on the natural resource.

FICCI constituted a 'Water Mission' to promote and provide thought leadership in the area of water efficiency. It aims to facilitate the sharing and dissemination of best practices across industry sectors in order to encourage corporate and industry players to imbibe a culture of water conservation within their organizations.

The Mission is working to create awareness on the existing situation pertaining to water scarcity, quality and to generate a discourse on sustainable use of water amongst various users. With growing and extensive depletion and pollution of our water resources, our current work is being restructured to bring this issue back in focus to provide a sense of urgency to the debate of water management.

The objectives of the Mission's work are:

- To formulate suggestions for changes in policy framework in India for better water resource allocation, conservation and management;
- To promote fresh water conservation strategies across the irrigation, industry and domestic sectors;
- To document and disseminate best practices across various sectors and create a forum to facilitate exchange of information and experiences in the country;
- To promote new innovative technologies of water saving and management like rainwater harvesting, watershed management, desalination, water auditing and accounting across water intensive sectors through projects, workshops, conferences and training programmes.

Queries to FICCI may be directed to:

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