



**WASH-US**

**Water Sanitation Hygiene for Urban Slums**



**COMMUNITY SOLAR WATER PLANT**



**SAFE**

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



## Genesis of the Project

While working in the science society interface, SAFE team observed that despite longstanding efforts, water and sanitation issues are still critical in India with the urban poor being worst hit. UN estimation (2010) shows 626 million Indians practice open defecation and 89% of urban poor lack safe water and hygienic sanitation. They complement a deficient public water service at prohibitive 'coping' costs of average US\$0.67/day, or 35% of their income. Reportedly the problems of water and sanitation are vastly interlinked and also energy intensive in urban areas. 'Water, Sanitation & Hygiene for Urban Slums', WASH-US primarily focuses on water and sanitation problems that emerged in the urban slum areas of Kolkata metropolis, purely due to lack of sensitization and infrastructure and also because they are located in low-lying and water-logged areas amid poor sanitary conditions and unhygienic surroundings further exaggerated by the drastic shrinking of wetlands increasing landfill emissions, pollution impelled diseases and escalating water footprints.



Daily struggle of women for 4 to 5 hours per day only in collecting drinking water.

SAFE has the mandate of natural resource conservation through equal and reciprocal participation of stakeholders and the community, which led to the formulation of this integrated model on water and sanitation



A walk through the lanes of Kalikapur slum with HSBC CSR Head from London.

that utilizes carbon smart energy and climate adaptive usage of water resources. Chasing resources for implementation of this innovative project was not so easy and since five long years, SAFE endured perpetual regrets for funding the project from almost all national sectors. In year 2013, the idea got a parenting support from HSBC under the aegis of HSBC Water Program.

The HSBC Water Programme is a five-year, USD100 million partnerships with Earthwatch, WaterAid and WWF – three NGOs that rank among the world's most reputed environmental

and sustainable development organizations. The programme also funds charities that manage local water projects proposed by HSBC employees. These partnerships provide the necessary scale to deliver the powerful combination of water provision, protection and education, benefiting communities in need, enabling people to prosper and driving economic development and growth. WASH-US is an icon of successful partnership of the HSBC, SAFE and the peri-urban Communities. SAFE is grateful to the Kolkata Municipal Corporation, and Rajpur Sonarpur Municipality for supporting the successful implementation of the project within the city.

## Rationale in the Project

Clean Water is touted as “Next Oil”. Water security and access to sanitation is still considered to be among the top global risks in terms of development impact and an integral part to the attainment of the Sustainable Development Goals (SDGs). The world will not be able to meet the sustainable development challenges of the 21st century that includes human development, habitable cities, climate change, food security and energy security without improving management of water resources and ensuring access to reliable water and sanitation services.



A landscape view of Kalikapur slum, Kolkata.



On going field assessment by SAFE and HSBC team for WASH-US project.

A World Bank report published in May 2016 suggests that water scarcity, aggravated by climate change could cost some regions up to 6% of their GDP, incite migration, and ignite conflict. Despite remarkable gains over the past several decades, today, 2.4 billion people lack access to improved sanitation, of which 1 billion practice open defecation. At least 663 million people lack access to safe drinking water. Poor sanitation, water, and hygiene lead to about 675,000 premature deaths annually, and estimated annual economic losses of up to 7% of GDP in some countries according to World Bank's latest report.

In India, World bank estimated that poor quality of drinking water causes 21% of diseases creating a burden of around INR 300 crores every year, despite the country spending INR 1,48,000 crores since 1990s in the WASH sector. It is a shocking fact that India ranked 120th in a survey of 123 nations on 'safe water index' by UNDP. This project primarily addresses the basic health care and sanitation of urban poor who face the toughest health challenges being victims of environmental pollution, poor sanitary services and contaminated drinking water.

A baseline sociometric survey in the slums of Kolkata showed SAFE a bizarre picture on the status of sanitation and drinking water, daily challenges of women, child health and life conditions. Perusal of results showed that 27% habitants sell out one-eighth of their daily income to purchase drinking water, which is allocated proportionately



Sociometric survey in Kalikapur slum, Kolkata.



Sociometric survey in Rania slum, Kolkata.

ensured strong focus on sanitation in new urban mission acknowledging the WHO recommendations and with provision of more public finance in the new mission to facilitate the urban poor. More so, what is the need of the time is equitable and reciprocal partnership to erase the shame on the urban face of India.

amongst the family members. On an average a woman get merely a liter per day. 88% use local water bodies for meeting household water demands. 52% have self-owned temporary toilets those are highly unhygienic and the rest who do not have sanitation facility at all are forced to practice open defecation. Women have long foregone the issues of dignity and safety and succumb to the sanitation practices in existence. At least 6-7 children in every ten are suffering from water borne diseases of stomach and skin and are born as 'citizens of dirt'.

The union government and the state have

## Components of WASH-US

The program impacts the lives of over 14000 receivers of the project facilities surviving at the bottom of the economic pyramid and ensures 24× 7 supply of drinking water to nearly 2500 slum households. The integrated and innovative model of WASH-US has the following components installed in it. A detail of the components and their interlinking is presented here.

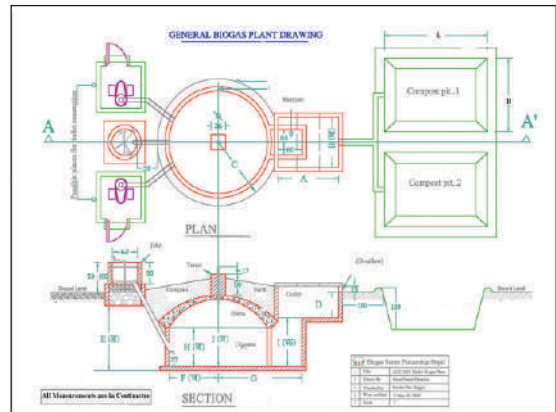


- **Solar Water Treatment Plant (SWTP) :** 10,000 liter per day capacity water treatment plant operating on modified micro-array Reverse Osmosis system that runs in Solar Power. The reject water is supplied to the sanitation units for cleaning and use.
- **Solar Power Plant :** 8KW Photo Voltaic Cell solar panel array of 250Wp square cells connected to a 12Kv Power Conditioning Unit and a Smart Energy Management Unit and 20 storage batteries.
- **Automated Dispensing Units :** ADU for water supply chain, touch sensitive to Water ATM RFID cards.



Bio-Toilet units with Bio-gas Plant & Community Kitchen

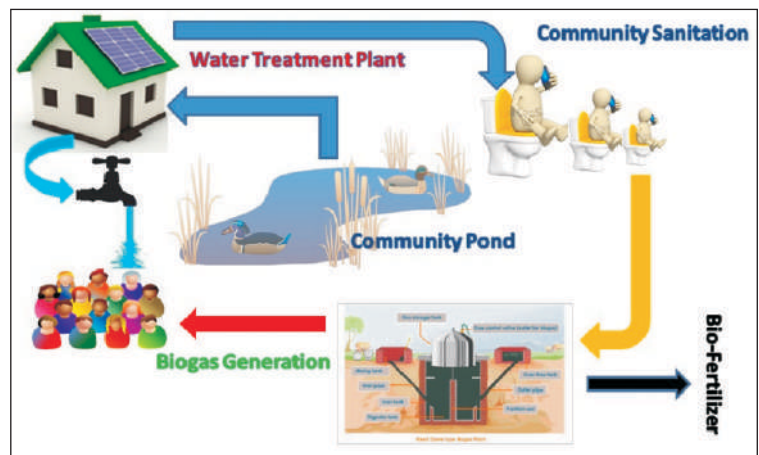
- **Bio-Sanitation** : Pre-fabricated modular bio-sanitation units attached with a bio-digester operating with beneficial aerobic microbes to ensure odorless near zero effluent.
- **Bio-Gas Plant** : A 4.5 Cu Mt Biogas Plant (Dinabandhu Model of IIT Kharagpur) running on human waste and municipal solid waste and connected to 04 conventional sanitation units.
- **Community Kitchen** : A community kitchen unit running on Bio-gas for cooking mid-day meal for the slum school.



- **Organic Manure Unit** : The rejected effluents leachate from the bio-digesters and slurry from the biogas plant will be used as organic manure.
- **Rain Water Harvesting** : This technology will be storing gallons of rain water to recharge the ground water level.

### The Climate Connection

The WASH-US facility not only runs on renewable energy, it generates too. The Water Treatment Plant and most of the lights in community sanitation facilities are entirely on solar power. This has a carbon offset equivalence of 28 Metric Tons per year. The 4.5 Cu Mt biogas plant generates gas from human waste and municipal solid wastes and deserves carbon equivalence too as it saves landfill emission and fossil fuel emission. These are adaptive



Integrated WASH-US model.

mitigations in the urban sector to downscale climate impacts. Further, reducing nearly 60% water footprints in a conservative method by utilizing the refusal water from water treatment plant in the sanitation units and harvesting 13420 thousand gallons of rainwater annually in a 3.8 hectare water system is yet another climate adaptive step in WASH-US. Added to this, using beneficial microbes in bio-digesters for sanitation units achieving 'Near Zero-effluent&Near Zero emission' status is also a commendable climate connection in WASH-US. (The calculations are based on UNFCCC guidelines and US-EPA mathematical models).

## The WASH-US hubs around Kolkata

Currently the WASH-US intervention has been successfully implemented in Kalikapur, Bantala and Nonadanga and Rania, Garia of Kolkata.

### PHASE- I



Facility handing over ceremony on 11 September 2014, Kalikapur

#### Plant-1: KALIKAPUR

The WASH-US Model serves around 570 households in the Kalikapur Slum in Kolkata, an area that once witnessed daily conflicts and hardships for an ounce of drinking water. The model now delivers safe drinking water on a 24x7 basis to the communities. In addition, sanitation units along with bio-gas units have been set up. The biogas units use the refuse from the sanitation units to generate energy which is used for the community kitchen in the slum.

### PHASE- II



Facility handing over ceremony on 3 February 2016, Bantala

#### Plant 2: BANTALA

The Bantala site is located on the Bantala Godkhali Highway and is a registered slum near periurban wetland. The slum population is approx. 2500 in 447 households. 73% are below poverty line out of which the women population amounts to 48%. They are mainly occupied as marginal craftsmen, vendors, laborers, household support and small businessmen. There is no water supply in this area and very poor sanitation facility. In addition to this there is a free primary school with 300+ students but without any water and sanitation facilities. The bio gas facility in this phase is used for cooking the mid day meals of school children studying in the Bantala F. P. School.



Facility handing over ceremony on 1 July 2016, Nonadanga

#### Plant 3: NONADANGA

Nonadanga was chosen as the third area for the WASH-US model after a need based survey identified the place as one of the areas suffering from water and sanitation issues. The project caters to around 500 households and has been successfully running for almost a year now.

### PHASE- III



Facility handover ceremony on World Water Day, 22 March 2017, Rania

### Plant-4: RANIA

Rania in Garia, Kolkata is a remote location with critical water scarcity. More than 500 households had to depend on a single tube well to access a bit of drinking water for more than a decade. With the WASH-US plant in this locality, the dream of accessible water and sanitation facilities has become a reality to the inhabitants. In order to reduce wastage and maximum utilization of water, the 'Rain Water Harvesting' technology has been additionally implemented in this area that will help store gallons of rain water to recharge the ground water level.

### Strength of Volunteerism : HSBC Volunteer program



HSBC employee volunteers team in Kalikapur slum, Kolkata.

Under WASH-US project the HSBC Employee Volunteer programs (EVP) is intensive and allow employees to expand skills, build upon strengths and directly connect with the vulnerable communities. SAFE developed particular tools for effective participation and involvement of employees. The series of TOT (Training of the Trainees) programs for the employees as conducted by SAFE at HSBC, enabled employees to execute in toughest situations at the slum community and they successfully accomplished the task with great confidence and sensitivity. With HSBC Volunteer program, the experiences have

been fertile and engaging, and SAFE immensely appreciates the fact that the company has clear guidelines for employee volunteerism activities and a team to work meticulously on it. Under HSBC, EVP employees carried out the sociometric survey for the beneficiary peri-urban communities and actively conducted the house to house awareness program on WASH-US facilities and use within the slums for each phase of the project around Kolkata. The action, activities and measurable impacts have been documented by SAFE as case studies for effective replication and also to help us develop multiple tools for increased capacity of partnership and communication at all levels.



HSBC employee volunteers team in Nonadanga slum, Kolkata.



### Community Partnership : JLGs

Community participation is a vehicle for liberation from mental and psychological shackles that bind poor communities to never changing living situations. Democratization of participation is important and SAFE under the WASH-US program formed Joint Liability groups, JLG's within the community, encouraging more women to be the working member of the group. It has been found that a woman in the slum spends 3-4 hours time in collecting drinking water for the family. Participatory approach channels are developed by SAFE that generates space for



An ongoing women JLG meeting in Kalikapur slum, Kolkata.



JLG meeting in Bantala slum, Kolkata.

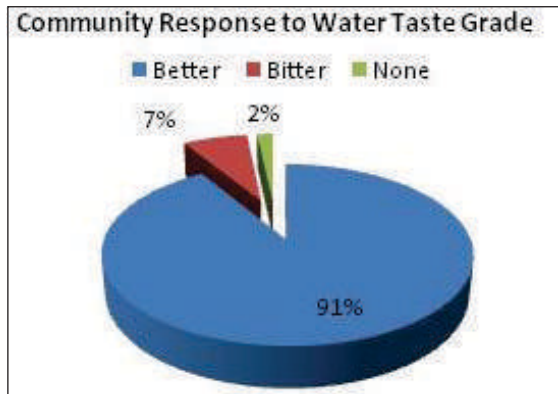
dialogue to identify collective problems and help design need based development plans. The goal of participation efforts is to facilitate the consent of the marginalized communities of unequal in social, political, and economic structures within the society. JLG's have actively mobilized the families to take part in WASH-US activities and have made valuable contribution in successful implementation of the project. SAFE has developed participation and feedback systems which are part of the WASH-US project and is certainly beyond pragmatic goals as higher productivity or consumption patterns, our community participation and partnership is associated with empowerment, associative

strength attained by community, resourcefulness and responsibility sharing. Beneficiary Assessment (BA), and measurable impact studies are being well documented by SAFE for improved models and tools in designing sustainable development plans.

### Impact Assessment & Outcome

The impact assessment was designed around key parameters such as Water Quality, Distance, Time, Energy, Accessibility, Community Participation and Equity. The perception of change and development among the community members has also been explored. Perusal of results and outcome show impressive impacts and refer to the systematic change in the WASH sector.

- **Community Responses to water quality grades :** Water quality and taste has a major impact on health and consumption trends. In the survey conducted to identify the trend, the reference of better taste was received from 91.3% users with 99% of the womenfolk very satisfied with the overall quality of water from the



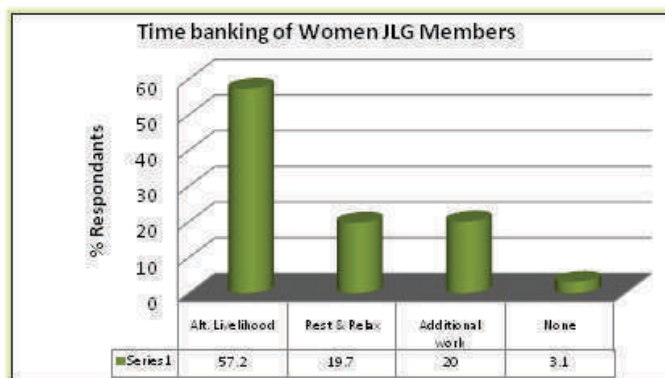
solar water treatment plant. 7% referred 'bitter tastes and light feeling' compared to previously collected tap water, which is actually due to low amount of TDS (Total Dissolved Solids) and only 1.7% couldn't comment on taste. Significantly, a large section (77%) showed their preference of TDS grade, which could be identified with the batch of delivery water based on dates.

- **Equity in Accessibility :** Equal accessibility is the first criteria for 'water justice'. Equitable access to water energy and sanitation to above 14,000 beneficiaries at the bottom of the economic pyramid and 24 × 7 supply of drinking water to nearly 2500 slum households in a year.



Community have registered for Automated Water Cards.

- **Time banking :** Easy access to safe and tasty waters and assured delivery in time has promoted the women folk for better time management in their daily life, saving time and space for more productive work. 98.5% agreed to the fact that the facility has saved an average of 4 hrs of queue time per day. In a Focused Group Discussion (FGD) conducted with the women members of the Joint Liability Groups it has been noted that 57.2% women members are willing to plan for creating alternative livelihood opportunities since they have adequate time that can be used for capacity building exercises. However, a growing change in trend has been flagged in the FGD that the male members in the family are taking interest in water collection, measured usage and resource saving in the community. This is also another factor that is saving time for the women folk.



- **Pinking Health Cards :** Positive impact on health, especially children and women, owing to better sanitation and safe drinking water supply has been significant that is unanimously endorsed by the community members. Reduction in infections and water borne diseases by 87% in the communities is rendering a cost cut of 35% on average in medical expenses. This has brought a good impact on the health of children and brought about a societal motivation for use of safe water and hygienic sanitation.

### Sanitation Usage

- **Changing habits and attitudes :** Gradual dismantling of nearly 47 temporary toilets for open defecation has shown a strong community trend of shifting to proper sanitation and hygiene practices. Ensuing changes in sanitation habits towards healthy practices is marked from the community responses wherein 100% convergence has been endorsed by the community. A remarkable point in this attitude change, as has been measured in a 5-point attitude scale amongst the age groups, wherein the strongest impact has been seen in young women members especially school going folks, followed by young men and elderly women.

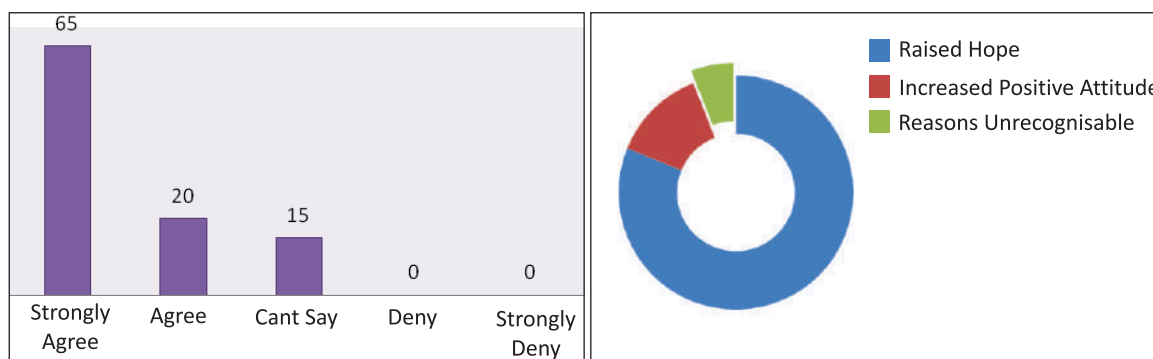
- **Responsible usage of facility** : It is unique to observe that community has developed the acquaintance for self-cleaning of the sanitation facility by default and has been responsible in using the facility as their own one. Prolonged awareness campaign and knowledge sharing has impacted the mindset very positively and convincingly that has helped in sustainable usage.
- **Increasing demands** : As a consequence to the above scenario, the demand for proper sanitation has increased in the community.
- **Priority usage** : Very interestingly, with the advent of facilities being created, human values have been found emerging strongly in the community. Nearly 63% respondents accepted and agreed that children and senior citizens should be given priority in using the sanitation facility. Even during the peak hours such priority usage have been identified, following which the 'willingness' scaling was done.
- **Evolving mindsets** : Another very remarkable change that has been identified in the community is the change in mindset. After gender counseling and awareness campaign on the menstrual health of young women and girl child, now the women are not inhibited to use proper sanitation measures during pregnancy or menstruation period. Safe access during night hours has largely endowed the female members with this empowerment that has brought both relief and care.

**New-energy use in community:**

Introduction of new energy in WASH sector is obviously a courageous innovation, despite the fact that renewable energy is still not affordable to the urban poor. The use of solar energy in water and sanitation has worked out wonders and there was 98.33% agreement of order of the beneficiaries in accepting the fact that energy paucity has not held back the supplies and services as promised by the agency in this project. Most interestingly the use of energy from bio-methanation of human waste has rolled in within the community in exceptionally shorter period and this has a very strong impact in terms of energy usage. 63.2% women agreed to use bio-gas for home cooking and 87% of the community beneficiaries expressed their acceptance despite the fact that the energy is being yielded from the human waste. Further, the solar water treatment plant and the lights in the community sanitation areas have a carbon offset equivalent of 280 metric tons per year.

**Development:**

The womenfolk felt increased sense of dignity and social recognition with this project. The sense of security and safety had increased with the commencement of this project. Many recounted incidents which made them feel a sense of pride. This plant is seen as a great source of hope for the future of the community. The newfound faith in the goodness of mankind is a remarkably visible. The women folk hope for further development activities in partnership with SAFE.



## Replication of the Model

SAFE in partnership with World Bank has successfully replicated the WASH-US program, renamed as NEWS-UP (Non-Conventional Energy in Water sanitation for Urban Slums) in Guwahati, Assam and Shillong, Meghalaya to cater to the water and sanitation deprived local communities.

SAFE plans to scale the WASH interventions to further serve more slum households in the city as well as the entire nation through more such WASH Hubs.

## Awards & Accolades :

The WASH intervention has been a successful initiative at the community level and the consistent effort has brought SAFE in the prestigious ASHDEN long List. This Model has also been awarded the esteemed-

- UN Water for Life Award, 2015 for 'Best Management Practice'.
- WORLD BANK -Development Marketplace Award 2014



Rainwater harvesting system at WASH-US site



Bio-gas under construction at WASH-US site



Water purification system



Safe drinking water for community 24x7

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