OXFAM IN ACTION

Providing Safe Drinking Water in Flood-Prone Districts of Odisha

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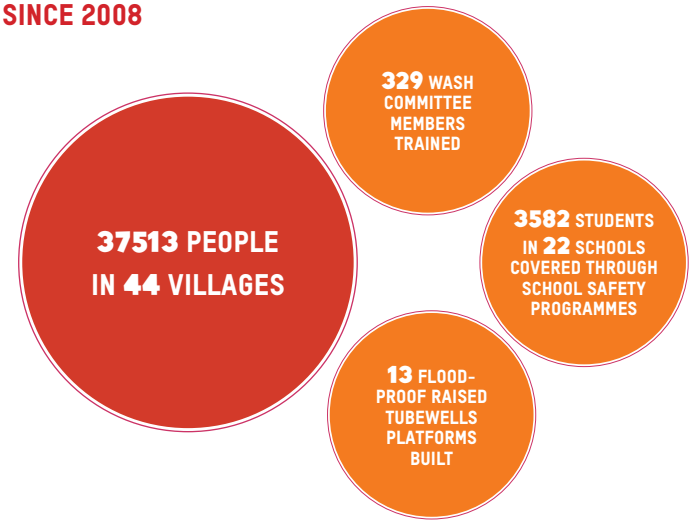
Over the years, Oxfam India[1] has established itself as a key player in rapid emergency response and humanitarian[2] core competencies like Water, Sanitation and Hygiene (WASH)[3] and Emergency Food Security and Vulnerable Livelihoods (EFSVL). Through its Disaster Risk Reduction (DRR) programme, Oxfam India aims at making communities resilient to disasters and lessening the vulnerability of people from potential shocks by reducing risks to lives and livelihoods (*See: Making Communities Resilient*). This includes supporting resilient livelihoods, assisting to disaster-proof agricultural practices and technologies, building suitable infrastructures, and ensuring access to safe drinking water. In Odisha, Oxfam India works in flood-prone settlements of Subarnarekha, Mahanadi and Daya river basins. Ensuring access to safe drinking water, during and after emergencies, is key to making communities resilient. In Kanas block in Puri district, Oxfam India and SOLAR[4] have established innovative WASH models for safe drinking water. The pilot demonstrations of Iron Removal Plant (IRP), flood-proof Pond Sand Filtration Unit (PSF) and raised tube well platforms aim at providing sustainable solutions to the community. Replication of these models by WaterAid India[5], another international NGO, in other parts of Odisha, indicate its success.

Puri, a coastal district in Odisha, with almost 150 km of coastline is prone to cyclone and floods. Epidemics are a regular phenomenon in these parts. Kanas block, Oxfam India-SOLAR's project area, lies in the waterlogged area. Its groundwater, like most of Puri, is saline and has high iron content making its' people vulnerable to unsafe drinking water. Data shows that almost 63 per cent of Puri's population is drinking iron contaminated water[6].

Unlike other heavy metals such as lead and arsenic, iron is not toxic but a higher concentration of iron (WHO approves 0.3 mg/l to 1 mg/l as the agreeable levels of iron contamination) is undesirable in potable water. It lends a foul taste and odour, and the water turns red on settling down. Puri is one of the 11 districts in Odisha where drinking water has iron above the prescribed limits[7].

The community, in order to avoid the foul-smelling tube well water, draws water from the contaminated ponds or river to meet their drinking, cooking, and washing needs. These surface water bodies have physical and biological contaminants. In rural areas, open defecation and draining of human and animal waste are key surface water contaminants. Furthermore, cities dump their waste in the rivers[8]; a tier II city like Bhubaneswar generates about 10 lakh litres of sewage daily and discharges it into the Kuakhai and Daya River. The latter flows through Puri and serves as one of the main sources of water for villages along its bank[9]. Lack of access to safe drinking water makes the community vulnerable to waterborne diseases like cholera, typhoid, diarrhoea and dysentery, and skin ailments and allergies[10].

OXFAM INDIA'S OUTREACH IN PURI'S KANAS BLOCK SINCE 2008



Oxfam India and SOLAR, a Puri-based NGO, have been working together, since 2008, to make communities resilient to cope with disasters. At present, Oxfam India has rolled out its programme in 15 villages in three Gram Panchayats in Kanas block. Access to safe drinking water is a key focus of the programme. Iron Removal Plant (IRP) alongside tubewells in Ogalpur and Jaguliapadar villages have been set up to filter out iron contaminants and improve the quality of groundwater. To improve the quality of surface water, a Pond Sand Filtration Unit (PSF) was set up in Harasapara village. The PSF provides clean and safe drinking water throughout the year, especially during floods. These three units provide direct access to safe drinking water to 502 households and 3037 persons in the three villages.

MAKING COMMUNITIES RESILIENT

1. Establish a network of local volunteer base at village level
2. Promote improved behavioural practices for safe water handling, storage and use through Public Health Promotion work
3. Build capacity of volunteers to maintain, repair and chlorinate drinking water sources
4. Pre-position equipment and resources for chlorination; replenish these resources before monsoons
5. Foster innovations in WASH, demonstrate resilient models and liaison with the state government-at all levels-for replication and scale up
6. Establish links of WASH committees with government line departments[11] to prepare post-disaster risk management plan[12]

IRON REMOVAL PLANT

"The cases of typhoid, diarrhoea and dysentery have reduced since last year," Mita Polai of Ogalpur village says with a toothy smile. She points towards a hand pump and a cylindrical tank attached to it. Ogalpur village is in Badal Gram Panchayat in Puri's Kanas block. The village is located in the Makhra River basin. The river and two tubewells were the main source of water for this village.

Mita elaborates how access to safe drinking water in the village improved their health. First, the hand pump was reinstalled on a raised platform by Oxfam India and SOLAR in 2013. This was to ensure that the shallow sub-surface tube well wasn't contaminated during floods. Second, the cylindrical Iron Removal Plant was built alongside the hand pump in 2015.

The Iron Removal Plant (IRP) is retrofitted with terra filters. These filters divide the IRP internally into two chambers. A motor pump lifts the water into the top chamber of the IRP; the filtered water is collected in lower chambers. Two taps are fitted at the bottom as outlets. The terra filters filter the iron out making the water potable — free of foul smell or taste. The IRP has a capacity of 2000 litres and is filled four times during the day. The plant provides access to safe drinking water to 100 per cent households in Ogalpur.

A similar plant has been set up in the neighbouring Jaguliapadar village of Gopinathpur Gram Panchayat. Jaguliapadar, on the banks of Daya River, has about 450 households. The water needs of the village are catered by 10 handpumps and the river. As a model, Oxfam India-SOLAR built one Iron Removal Plant that catered to four wards. "However, women from other wards do come to this handpump to draw water. So there are times when there is not enough water. The women from the other wards demand that more IRPs should be set up," says Bodoni Behera, president, WASH committee. The committee members have successfully convinced the *Sarpanch*[13] to build one more IRP. The proposal has been cleared in the *Palli Sabha* and will be taken up at the block level.

The members of WASH committees have been trained to run the IRP as well as clean and maintain the plant and its adjoining areas. "We have been through 6-7 trainings organised by Oxfam India and SOLAR. The tank and the filters are cleaned every Wednesday and Sunday; the insides of the tank and filters are scraped cleaned to ensure that no residues remain in the insides of the tank. Bleaching powder is applied, twice daily, in the areas adjoining the IRP and the handpump to keep it dry and disinfected," says Mita. She is a part of the seven-member WASH committee.

Though able to provide access to safe drinking water, IRP is unable to meet the cooking and washing requirements of the villages. Since they continue to rely on tube well and river for these purposes, some incidence of waterborne diseases and skin ailments remain. Apart from a demand from within the village to increase the numbers of IRP, there is a request to build similar structures from the neighbouring villages.

"They can see how it has improved our health. We too would like more IRPs in the village so that our cooking needs are met. While the community is willing to contribute to the construction of IRPs, the support of Oxfam India and SOLAR will be instrumental," says Gourimoni Behera of Jaguliapadar village.

ECONOMICS OF AN IRON REMOVAL PLANT:

TO BUILD:
RS 35000 TO RS 45000

TO MAINTAIN:
RS 5 PER HOUSEHOLD PER MONTH

TO RENOVATE:
RS 2000 TO RS 5000

ELECTRICITY COST PER MONTH:
APPROX. RS 600

FLOOD PROOF POND SAND FILTRATION (PSF) UNIT

Not far from Ogalpur, is Harasapara in the Khandahota Gram Panchayat. Babita Dalai leads us to the pond that her village used to draw water from. They still use the pond for washing and cleaning purposes. Women heading to the pond with clothes to wash and utensils to clean corroborates Babita's statement. The pond was their main source of drinking water until 2014.

In 2014, the community spent Rs 100,000 to clean the pond. This year, too, the pond was cleaned, but before the sludge and silt could be removed from the pond, unforeseen rains offset the efforts of the community. To make matters worse, the area surrounding the pond is a site for open defecation which flows into the pond during the monsoons contaminating the water body. This, according to the villagers, was regular.

ECONOMICS OF A FLOOD PROOF POND SAND FILTRATION (PSF) UNIT:

TO BUILD: RS 75,000 TO RS 4,50,000[14]

TO MAINTAIN: RS 5 PER MONTH FROM EACH HOUSEHOLD

TO RENOVATE: RS 2000

ELECTRICITY COST PER MONTH: APPROX. RS 250

Oxfam India had earlier worked here during floods and cyclones. In 2014, it set up a flood proof Pond Sand Filtration Unit. The Unit, approximately 10 feet above the ground, was made flood proof by building it on top of stilts[15]. The tank has six chambers. An electric motor, run for a couple of hours every morning, draws water from the pond and stores it in the first open chamber. Through internal inlet, it then moves into a chamber containing stone chips (20mm). This water is again stored in a third chamber, before it is sent to the fourth chamber with stone chips (10 mm) and a penultimate chamber with sand and charcoal. Finally, the filtered water, which is fit to be consumed, is stored in the last chamber. This water is supplied through taps, below the overhead tank. The PSF takes care of the turbidity and physical contaminants.

The PSF Unit holds about 10,000 litres of water. A handpump has been fitted to the Unit to ensure that water can be raised into the tank even when there is no electricity. The unit provides almost year-round access to safe drinking water. During the non-emergency times it takes pond water and treats; during floods it can treat both rain water and flood water; during monsoons the source of water shifts to rainwater, which is harvested and then filtered to a safe level. In the three months during summer, when the pond dries up, the community has to access water from a canal, a kilometre away from the village. The PSF Unit is cleaned once weekly (*See: Trained Well*).

"For us this is the most viable option of drinking water. The incidence of diseases like typhoid and diarrhoea have reduced. It would be better if we could use the same for cooking as well. At the moment we are using pond water for cooking and washing. We know the water isn't good. We need more PSF Units," says Prasadin Biswal. There is a growing demand for these units. "About 30 families from the neighbouring villages come to this PSF Unit to draw water. They want us to help them set up one for their village," says Babita.

TRAINED WELL

Niwas Kumar Biswal talks to Oxfam India about PSF Unit. A class 9 dropout, Niwas likes his work and vouches for the quality of the water from the Unit.

Have you been trained to clean the tank?

I have been through three trainings by Oxfam India and SOLAR. Six of us had volunteered, from the village, to undergo this training. In fact, now I can train others to clean up the tank.

How do you clean the tank? How often is it done?

The tanks are cleaned once weekly. This is done using the backwash technique. All outlets are opened, water is let out, and sediment and muck is cleared from the tank. The stone chips, sand and charcoal, are cleaned with fresh water. This whole process, roughly, takes about six hours. Once clean, the outlets are shut, the motor is turned on and the tank is ready to be used. If the pond water has been very dirty then filters need to be changed annually. The adjoining areas of the tank have to be kept clean and dry as well. Bleaching powder is applied at least once daily to disinfect the area.

As a WASH committee member, what else are you involved in?

We run and clean the PSF Unit. A couple of WASH committee members are responsible for running the motor. On days when there is no electricity, WASH Committee members take turn to manually pump the water into the Unit. We also update other members if there is need for any repair in the PSF Unit — either in the taps, hand pump, filters or the electric motor.

How important is PSF Unit for the village?

It is very important. The quality of water is much better than the pond or tubewells. In my village, the cases of diarrhoea have been reducing the last couple of months. It can be better if there are more Units or alternatives.

WAY FORWARD

Though IRPs and PSF Unit are extremely important and are able to meet most of the drinking needs of the community[16], there are a few teething problems. For instance, drawing water is contingent to electricity supply. Erratic supply means that these Units do not run at their full capacity. Villagers then have to go back to either the handpump, river or pond. In order to keep the tanks running at all times, sources of renewable energy like solar panels could be used. According to the women, long queues at these Units are a deterrent. This too could be dealt by building additional tanks to store the filtered water.

These simple initiatives would ensure that water is available for drinking and cooking purposes to all households in these villages. As Oxfam India moves into the next strategy period (2016-2020), it is deliberating on WASH models to suit individual households. For instance, a low-cost model can be built using a bucket, and lining them with layers of stone chips, sand and charcoal, with a small outlet at the base. The steady flow of filtered water can be collected in extra containers since a single bucket filter would not have any storage capacity. This household-level filter will remove the iron contamination of the water. To further remove bacterial contamination the filtered water will have to be boiled. The maintenance of these filters are easy, cost effective and can meet the requirement of water for both drinking and cooking purposes.

The community models that Oxfam India has set up have clearly made a difference in the lives of the community. They have better access to safe drinking water, their expenses on treatment of water borne diseases have come down and they are prepared with a better source of drinking water during and after natural disasters. The individual household models, the Oxfam India is deliberating, will further ensure that no household is deprived of clean drinking water.

NOTES

1 Oxfam India works in six focus states- Uttar Pradesh, Bihar, Assam, Jharkhand, Chhattisgarh and Odisha

2 Through its partners, it works with communities to build their capacities to deal with disasters; building village level contingency plans, evacuation routes and safe structures, and formation of task force groups

3 Water, sanitation and good hygiene (WASH) practices, are crucial for survival in the initial stages of disaster. Water contamination at source and during handling at the household level is a major factor which aggravates the health problems in a post-disaster situation. In many cases, post-disaster disease outbreaks are also due to the unsafe water, sanitation and hygiene practices. The drinking water sources including the individual and the community hand pumps easily gets damaged or contaminated during floods and need urgent repair. WASH programme promotes good personal and environmental hygiene in order to protect health. An effective WASH programme relies on exchange of information between the agency and the disaster-affected population in order to identify key hygiene problems and culturally appropriate solutions. Health promotion is vital to successful WASH intervention

4. Society for Leprosy Amelioration and Rehabilitation (SOLAR)

5 WaterAid is an international charity that works on improving access to safe water, hygiene and sanitation. (http://www.wateraid.org/)

6 http://indiawater.gov.in (till Dec 31, 2014)

7 The other districts are Balasore, Khurda, Kendrapada, Angul, Boudh, Kalahandi, Gajapati, Mayurbhanj, Keonjhar and Dhenkanal; Vision 2017: RWS&S, Rural Development Department, Government of Odisha

8 According to a study, cities use about 335 litres of water per household daily for different domestic purposes. About 70-80 per cent of this water drains out to nearby ponds, tanks or rivers through the drains or *nallahs*, carrying loads of harmful bacteria and viruses. (Contamination of Drinking Water Sources in Odisha; 2014-15; Supported by: Inter Agency Group)

9 Contamination of Drinking Water Sources in Odisha; 2014-15; Supported by: Inter Agency Group

10 A pre-intervention disease survey, conducted by SOLAR, shows that in Harasapara village the incidence of waterborne diseases was high between the months of April and July. The highest number of cases were reported in June and July; 12 % of the population in the village were affected

11 The government departments include trained mechanics of the Rural Water Supply and Sanitation (RWSS) department, Auxiliary Nurse and Midwives (ANM) and Accredited Social Health Activist (ASHA)

12 Particularly drinking water source management and diarrhea control measures

13 Village head

14 The height of these units are determined using the highest flood levels. The highest flood levels are determined by evaluating water levels of major floods through the Central Water Commission's flood monitoring station at Rajghat and further assessing the levels of inundation in bigger floods though community consultation

15 The range of cost is due to the difference in designs and capacities of the different flood proof Pond Sand Filtration (PSF) Unit

16 The average water use for drinking, cooking and personal hygiene in any household is at least 15 litres per person per day. On breaking it down, the water intake (drinking and food) for basic survival needs is 2.5-3 litres, and basic cooking needs would be between 3-6 litres per day. (Humanitarian Charter and Minimum Standards in Humanitarian Response: Minimum Standards in Water Supply, Sanitation and Hygiene Promotion)

Author: *Savvy Soumya Misra*
Contributors: *Animesh Prakash*
Inputs: *Parmeswar Patil, Akshaya Kumar Biswal, T Prabhakar Reddy, Ranu Kayastha Bhogal*
Photo credit: *Animesh Prakash*

ऑक्सफैम इंडिया
OXFAM
India

Oxfam India, 4th and 5th Floor, Shriram Bharatiya Kala Kendra, 1, Copernicus Marg, New Delhi 110001
Tel: +91 (0) 11 4653 8000 www.oxfamindia.org

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