Accessing Safe Drinking Water During Floods in North Bihar

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Health of the local population encounters maximum deterioration, the impact of which extends far beyond the flood period, resulting in loss of life, affecting individual efficiency levels and putting additional financial burden on an already stressed environment

NORTH BIHAR has the distinction of having an additional season in a calendar year, clearly identified by the misery, destruction, and fatality accompanying it. This season in the region is commonly referred to as – Barh (flood). For centuries local people have treated it as 'a way of life', and found ways to deal with it. Post independence, this ' way of life' gradually transformed into an assured annual devastation. The once self-sufficient communities in the flood plains have been relegated to being highly dependent on sources external to the village for their survival during floods.

The changing face of floods in the region is characterized by frequent breaching of embankments and a more than doubling of the flood prone area between 1957 and 2002. Each successive flood has led to more devastation than ever before. Floods in 2007 devastated 25 million people; in 2004 it created havoc in the lives of 21 million people; in 1987 it affected 28.2 million population; in 1974 it disrupted the lives of 16.39 million people. The scale of the impact of 2008 floods spanned across 993 villages in 412 panchayats located in 35 blocks of Supaul, Madhepura, Araria, Saharsa and Purnia districts. A total of 3.3 million population was affected.

Apart from the physical and economic loss, health of the local population encounters maximum deterioration, the impact of which extends far beyond the flood period, resulting in loss of life, affecting individual efficiency levels and putting additional financial burden on an already stressed environment. The fact that this is a recurring phenomenon makes matters

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worse.

Reason for the health complications

The embankments or makeshift elevated shelters during floods turn into a chaotic location, with people and livestock staying together in inhuman conditions for at three months. The inability to access safe drinking water is the most serious problems faced un such times. Most of the existing hand pumps, the only drinking water source in north Bihar, get submerged in water or get silted up, or damaged by the gush of the flood waters. With many people having to live on embankments under marooned conditions access to hand pumps is further hindered. People are forced to use the dirty flood and river water for multiple purposes such as – defecation, drinking (if the hand pumps are submerged), immersing the dead persons and animals. The result is large scale transmission of communicable diseases like the water-borne typhoid fever, cholera, leptospirosis and hepatitis A or the vector-borne malaria, dengue and dengue haemorrhagic fever, yellow fever, and West Nile Fever. Cholera, a bacterial infection that spreads by the faecal-oral route, continues to remain the biggest threat during floods, assuming epidemic proportions and often causing death. Poor levels of nutrition aggravate the complications further, giving rise to general ill-health and a high incidence of malnutrition and anemia, especially among infants, women and old people. The extent of problems that can be estimated through the example of Digni village in Khagaria district during the 2004 floods

Number of households	200
Flood affected households in the village	200
Source of drinking water during floods	River and distant operational handpumps
Types of water borne diseases	Cholera, diarrhoea, fever
Other types of ailments	Kala azar, viral infection
Total number of sick people	43 (infants and minor) 28 (adults)
Number of death	6 (5 diarrhoea deaths and 1 due to Kala azar)
Total health expenditure	Rs 65,000

Government agencies, development organizations and civil society have been addressing the drinking water problem by providing water purification tablets, installing shallow handpumps and distributing packaged water. However, these interventions are external driven and during floods the transportation and distribution of the required materials becomes extremely difficult. Secondly, access to the interior areas is marred due to the floods thereby leaving large areas unattended. Further, external support has made the rural community highly dependent, and has completely destroyed its internal flood survival mechanisms, which at one time were acknowledged as local wisdom.

Local solution for accessing drinking water

The average annual monsoon rainfall is north Bihar is estimated to be 1250 mm. Out of the 120 days of monsoon season, the region in general experiences 56 days of rains, which occurs between June and September, normally coinciding with floods. Unfortunately, the rainwater completely goes untapped and the marooned villagers have to depend on contaminated water for their survival. The annual rainfall pattern indicates that harvesting and storing of rainwater for drinking purposes for the entire monsoon period is possible and can provide sufficient drinking water to last for the entire season. In the absence of industrial setup in these five districts, the perceptible threat to the quality of rain is minimal. Keeping in view the annual average rainfall and the total number of rainy days, low cost, local cum temporary rainwater harvesting technique is an effective tool to access safe drinking water especially during floods.

Megh Pyne Abhiyan - MPA (Clouds Water Campaign) is an initiative addressing water issues in the flood prone areas of north Bihar. The campaign was launched in May 2006 and presently is being executed in 22 panchayats across Supaul, Saharsa, Khagaria, Madhubani and West Champaran districts. During the initial phase, the campaign had intentionally concentrated on nurturing faith within people with regard to rainwater harvesting as a feasible option to access safe drinking

water. Subsequently, an additional component i.e. of rainwater storage was added to the rainwater harvesting strategy. The campaign formulated the following cardinal guiding principles, with the objective of intensifying rainwater harvesting in the flood affected region

- Reinforce the concept of DO-IT-YOURSELF
- Make people believe that local efforts has the potential to yield conducive outcomes
- Focus on collective effort
- Transform mindsets from dependence on existing development practices to local innovations and self-initiative leading to behavioural change
- Generate mass support for initiating a process of transformation
- Create a new functional model for collaborative action that could be utilized for other development interventions

Rainwater harvesting potential and technique

MPA adopted the following demand-availability method to calculate the household demand and potential of rainwater to be harvested for drinking purposes.

To calculate the quantity of rainwater to be harvested for meeting the drinking water requirement, information about the following parameters was essential

- Area of the catchment
- Monthly average rainfall
- Run-off coefficient = the percentage of water run-off from the catchment area

To calculate the potential of harvested rainwater the following assumptions were considered

- The catchment area 12 feet x 15 feet = 180 square feet i.e. 16.722 sq metre (sq m)
- The average annual rainfall = 1250 millimetres (mm)
- The runoff co- efficient for rooftop = 70 per cent of total rain which falls on the rooftop

The potential of rainwater harvested from a polythene sheet of 16.722 sq m would be

Catchment	Area of catchment (sq. m)	Potential of total rainwater harvested during monsoon
Rooftop	16.7	16.7 x 1.250 x 0.7 = 14.6125 cubic metres or 14,612.5 litres

Component	Unit
Number of heads per household	5
Daily drinking water demand	2 litres per capita per day (lpcd)
Total water demand per day	10 litres (2 litres x 5 members)
Drinking water demand per month	300 litres (10 litres x 30 days)
Number of rainy days in a month	15
Number of dry days	15
Drinking water required during rainy days that can be collected in a container on a daily basis	10 litres per day (2 litres x 5 members)
Drinking water required to be stored during dry days in a rainy month	2 litres x 5 members x 15 days (dry period) = 150 litres

However the possibility of harvesting rainwater during monsoon will depend on the following parameters

- Month specific rainfall
- Total catchment area and
- Type of catchment area

MPA has been propagating 'low investment and high return' rainwater harvesting techniques in the one flood affected region of north Bihar since 2006. The rainwater harvesting technique remains to be extremely simple. For harvesting and storing the rainwater hygienically the following resources are required, which in most cases are locally available

- Polythene sheet
- Bamboo
- Rope and
- Storage facility (earthen or plastic)

1) Harvesting rainwater on embankments or elevated regions

In makeshift embankment dwellings, it is not feasible to make additional structures for rainwater harvesting due to excessive space

crunch. Therefore, in such a location, the rainwater is harvested from the rooftop of polythene sheets, which are normally used by the villagers as their temporary dwelling.

2) Harvesting rainwater in isolated dwellings within the village

Rainwater harvesting is also useful for people who continue to live in their own houses, but cannot access safe drinking water as they may be virtually marooned during floods. In such cases it is often feasible to build temporary water harvesting structures. These temporary systems can be set up in an open space (courtyard, outside the main entrance, on the terrace (if the house is pucca), in front of the house on a raised platform). A small sheet of polythene can be tied horizontally at a gradient so that it can easily drain out the rainwater into a storage facility.

Outcome of rainwater harvesting initiative

The rainwater harvesting efforts of the campaign resulted in

- Large scale acceptance of rainwater as a safe drinking water source – In 2006, approximately 13,000 people out of a population of 46,000 across four panchayats drank rainwater. During 2007 floods, a total of 36,352 households had accessed rainwater across five districts. In Khagaria, approximately 6,255 people external to the campaign panchayats benefitted from rainwater harvesting during the flood period. Post flood assessment in 2007 of Khagaria district indicated that there was substantial health impact due to consumption of rainwater by the affected population during floods. For instance in Digni village, incidence of water borne disease had reduced substantially

Number of households	200
Flood affected households in the village	200
Source of drinking water during floods	Rainwater
Types of water borne diseases	-
Other types of ailments	Viral infection
Total number of sick people	7 (infants / minor) 2 (adults)
Number of death	1
Total health expenditure	Rs 5,000

- There is a decrease in chronic gastric disorders. In the following panchayats Dakshini Telhua panchayat (West Champaran), Dahmma Khairi Khutaha panchayat (Khagaria), Mahishi Uttari panchayat (Saharsa), and Balva panchayat (Supaul), various people reported a decrease in the incidence of dysentery, diarrhoea, and other intestine related ailments, most prevalent during the flood season, in comparison with the precedent flood
- Besides drinking, there is a marked acceptance of rainwater for cooking, putting into aching eyes. It is also considered a tastier drinking option by many, for example Ram Dulari Devi, from Sarsava Panchayat, Khagaria, and her family.
- According to Dhanraj Sada of Kharra Tol in Sarsava panchayat, Khagaria "Post floods in our village, normally all the 75 households use to have at least 2-3 sick people, but this year, despite the devastating floods, surprisingly, not a single case has been reported.
- Draupadi Devi, a lady from Saharsa district, was happy about all the money and the time she saved for having her own individual way of collecting rainwater.

This change in mindset was a big leap forward for the campaign for two reasons. One, rainwater harvesting for drinking purpose was never considered as an option pre 2006. Two, a well established myth exists that consumption of rainwater will lead to formation of goiter or ghegh as referred to locally. ❑

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