

**34th WEDC International Conference, Addis Ababa, Ethiopia, 2009**

**WATER, SANITATION AND HYGIENE:  
SUSTAINABLE DEVELOPMENT AND MULTISECTORAL APPROACHES**

**Dry season water strategies in Myanmar  
after cyclone Nargis**

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REVIEWED PAPER 337

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*For many residents of the Ayeyarwady Delta of Myanmar, rainwater collection from village ponds and roof tops serves as the primary source of potable water throughout the year. In May 2008, Cyclone Nargis struck the Delta region, damaging many of these ponds by breaching their embankments or filling them with debris and saline water. Despite the efforts of the international aid community and local government to repair and rehabilitate these traditional water sources, concerns remain about a potential water crisis affecting thousands of Ayeyarwady Delta residents during the dry season from November to April. This paper examines the different water rehabilitation and supply strategies adopted by relief agencies and communities during the second half of 2008 to mitigate possible water shortages in 2009.*

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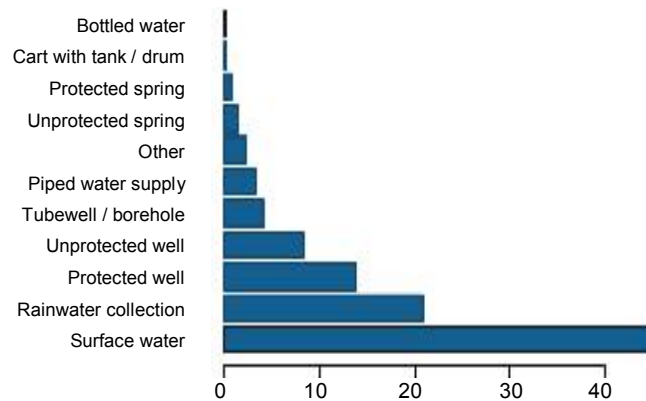
## **Background**

On the 2 and 3 of May 2008, Cyclone Nargis struck the Ayeyarwady Delta of south-western Myanmar with wind speeds of 200 km/h and heavy rains that lasted almost 10 hours. An estimated 140,000 people lost their lives, with severe damages to buildings, homes, land and infrastructure in 37 townships in the Ayeyarwady and Yangon townships. In the Delta region alone, the cyclone affected an area of 23,500 square kilometres of agricultural land, villages, and rivers.

The Ayeyarwady Delta region is known as the rice bowl of Myanmar, with most of the population reliant on work in the agricultural sector (crops, plantations, livestock and fisheries) as their main source of income. Paddy crops in the Delta rely on irrigation by rains during the rainy season (May to October), and from rainwater collected in communal ponds and diverted to paddies during the dry season (November to April). While larger villages may have as many as 6-8 ponds used for agricultural activities (including fish farms), most villages typically have one or two ponds. A survey conducted in July 2008 estimated that over 43% of the ponds in the Delta townships were damaged by the cyclone<sup>1</sup>.

Ponds are also used as water supply source for households during the dry season. While most Delta families use private rainwater collection devices (often a roof gutter leading to a large earthen vessel) for household consumption during the rainy season, many people rely on surface water from ponds or rivers during the dry season. A survey of drinking water sources of 2,356 households conducted at the start of the rainy season in November 2008 indicated that 48% of cyclone affected families have begun to collect from ponds and other surface water sources (see Figure 1).

To help ensure that as many Delta residents as possible have access to sufficient quantity and quality of water during the dry season, relief agencies and local governments have adopted a variety of approaches and strategies. These include: pond rehabilitation; water treatment and distribution; support for water vendors; and household water treatment and safe storage.



**Figure 1. Drinking water sources post cyclone Nargis (% of HH)**

Source: Tripartite Core Group Report – November 2008 (p. 26)

### Pond rehabilitation

Similar to other countries in South East Asia, rainwater collected directly in impluvium ponds is a common water supply source in the Ayeyarwady Delta. Traditionally, local villagers clean ponds of debris and repair embankments during the early months of the calendar year (Jan-April), prior to the coming monsoon season in May. The arrival of Cyclone Nargis in the early part of monsoon season meant that many ponds needed to be cleaned and repaired again.

The initial emergency response for many of the operational relief agencies working in WASH (Water, Sanitation and Hygiene Promotion) programs centred around providing buckets, plastic jerry cans, and water disinfectant materials to affected households. Assessment reports in the first few weeks after the cyclone indicated a huge need to assist villagers in pond rehabilitation activities. Many agencies responded by providing pumping equipment, fuel and hand tools for pond cleaning directly to village clean up committees. The WASH Cluster Coordination Group in Yangon and at regional hubs in the Delta provided technical support to this work through the translation and distribution guidelines for pond cleaning and rehabilitation. By late August, an estimated 1,566 ponds were reported as cleaned, with “many more [that] still require cleaning”<sup>2</sup>.

Post-cyclone pond cleaning in the Delta has encountered a number of challenges. Villagers are reporting that some ponds, especially in the coastal areas, are becoming saline again, despite having been cleaned. Whether this is due to saltwater intrusion from the underlying aquifer, or failure to adequately remove saline contaminated soils from the pond bottoms or embankments, is unknown. Many ponds reportedly cleaned are empty, as they were finished too late in the year to take advantage of the rainfall.

### Water treatment and distribution

Much of the cyclone-affected area of the Ayeyarwady Delta is a flat alluvial plain less than 4m above sea level. Only two highways lead traverse the Delta to the city of Yangon, with many of the Delta villages accessible only by boats and footpaths. For relief agencies involved in water treatment and distribution operations during the emergency response phase, the usual logistics difficulties associated with water tankering operations were compounded by the need to rely on boats and rivers, vs trucks and roads.

In many humanitarian responses, water treatment and distribution is typically viewed as an interim emergency measure until existing water sources are rehabilitated, or new ones developed. This in part due to high operating costs, but also reflect concerns over creating dependency among end users. In the Ayeyarwady Delta, concerns over potential water shortages in the dry season have led them to expand their emergency phase water treatment and distribution plans during the coming months. Some agencies have purchased an installed reverse osmosis (RO) water treatment to desalinate salty water from ponds, wells, and rivers. In recent years, improvements in efficiency and more durable filter membranes have made portable RO treatment units more suitable for possible use in emergency responses. As with any type of portable

water treatment unit, however, the high investment and maintenance costs (including fuel) means that poor communities or local governments are unlikely to afford to use the units once funding for relief operations ceases. Ensuring sustainability in water supply activities is always a key challenge to the aid community, but especially those that focus on external water treatment units and distribution.

### Support for water vendors

Although Cyclone Nargis was the most destructive natural disaster to strike Myanmar in years, villages in the Ayeyarwady Delta face water shortages on an annual basis. A study by ACF in Feb 2008 highlights the role that water vendors play in providing a water supply. In surveys of water usage in villages conducted in three Delta townships, over 53% of householders paid for water during the dry season months. Costs range from USD 0.025 to 0.10 per 20litre bucket, and vary depending upon the seller, village leaders, and the month<sup>3</sup>. Water is collected from private and/or communal ponds, and from less salty wells, and is distributed by boats or handcarts. A more recent report suggests that some village leaders are restricting water collection from ponds and levying a usage fee to enable the community to buy water from other villages when their ponds runs dry<sup>4</sup>.

In recognition of the role of water vendors in helping address water shortages during the dry season, some agencies are providing support directly to vendors. A key component of Save the Children's dry season water strategy is to work directly with local governments and private water vendors in at-risk communities. By providing equipment grants and fuel support to water vendors, it is expected that the distribution capacity of these water vendors will be improved, and that prices charged for delivering water will be less susceptible to the usual market fluctuations. A monitoring system developed in collaboration with local leaders is included in this program, to help ensure that prices remain stable, and that the poorest families are able to access water from vendors.

### Household water treatment and safe storage

Prior to the cyclone, it was generally believed that while Ayeyarwady Delta residents had a high degree of awareness of the need to treat water before consumption, the knowledge of how to most effectively treat water varied among households. The ACF report of February 2008 found that while many households (77%) routinely filtered the water to remove debris, sand and other particles, only 23% of households used boiling or chemical disinfectants to kill bacteria and/or viruses. The most common water treatment practices in the Delta are filtering sediments and debris through cloth, or allowing water to settle overnight before consuming<sup>5</sup>.



Photograph 1. Chlorinated water distribution by boat

Source: Rolando Wallusche



**Photograph 2. Rainwater Collection in Earthen Jars**

Source: Prafulla Shrestha

While filtering can improve the appearance and acceptability of water, it is not 100% effective in killing water-borne bacteria or viruses. In the initial emergency response phase, many agencies distributed sodium hypochlorite (manufactured in Yangon by PSI International under the trade name WaterGuard) and buckets or jerry cans to provide cyclone affected households with a simple method for disinfecting water. Despite the fact that WaterGuard had been widely marketed and promoted in the Delta in the past several years, a post-cyclone survey conducted in November found that less than 5% of households used WaterGuard or other chlorine based water treatment methods<sup>6</sup>.

To reduce the risks associated with unsafe water consumption and storage, hygiene promotion activities directed towards ensuring lasting changes in behaviours and practices are recommended interventions for emergency responses. Most agencies involved in addressing the water supply needs have included programmes that encourage proper household water treatment and safe water storage in their programmes.

Despite these current efforts, and those of UNICEF and the Ministry of Health in the Delta prior to Cyclone Nargis, the low numbers of households who actually practice these techniques should remain a concern for local government and relief agencies involved in relief and recovery activities in the Delta.

## **Conclusion**

At the time of this writing (December 2008), it is unknown whether a severe water shortage in the coming months will create a second humanitarian crisis in the Ayeryawady Delta. What is known is that the primary water supply sources for Delta communities – ponds and wells - have not yet been sufficiently repaired, rehabilitated, or recharged since Cyclone Nargis. Despite the successes of the relief effort, and better than expected cumulative rainfall totals since August, there remains a great deal of concern over the availability and access to safe water supplies for thousands of cyclone - affected families.

Although agencies involved in the relief and recovery effort have analyzed this risk in similar manners, the strategies adopted to address a potential water crisis in the Delta differ in the level of technical sophistication and community engagement (including formal and informal water markets). For some agencies, the most viable solution is to continue the emergency phase distribution of disinfected water using reverse osmosis or other portable water treatment units. For others, the focus is on basic household level access, storage, and simple disinfectant methods. Despite these differences, each approach attempts to address the priority of water supply operations in emergency settings: to ensure equitable access to safe water.

Given the seasonal fluctuations in traditional water sources, Ayeyarwady Delta residents will continue to face periodic water shortages in the coming years. The success of the dry season strategies adopted by agencies in 2008-2009 cannot be determined in the short term, but on whether these interventions have had a lasting and sustainable impact on Delta residents in the years to come.

### **Acknowledgements**

The authors would like to extend thanks to their colleagues at Save the Children in Myanmar: Sheila Ramaswamy and Bagus Setyawan.

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