Technology Fact Sheet for Adaptation

B. Improving the resilience of protected wells to flooding– Building a Concrete Apron/Collar on the well [i]

B.1 Introduction

Protected wells can potentially provide a water supply that is highly resilient to flooding. However, improper design and construction can make them vulnerable during flooding. The key vulnerabilities of wells during flooding are: (1) ingress or infiltration of contaminated waters; (2) lack of wellhead access due to flood waters; and (3) collapse of unlined hand dug wells.

Protected wells can include tubewells, boreholes and (hand) dug wells. Location is another key parameter in assessing the vulnerability of wells to flooding. Constructing drinking water wells in the vicinity of sanitation facilities can lead to contamination through subsurface transport of fecal pathogens, particularly during flooding. Wells should be constructed up the hydraulic gradient (usually uphill) from latrines and animal waste. The minimum recommended distance between a well and a single latrine is 30 m. However, in settlements where latrine density is high, greater distances are often needed.

In addition to protection of wells currently used for drinking water, sealing abandoned wells is also essential to protecting groundwater quality in flood zones. If an abandoned well in not properly sealed, floodwaters that inundate the abandoned well are likely to contaminate both shallow and deep groundwater

B.2 Technology characteristics

This involves constructing a different design to that of the normal wells. An apron/collar would be built at the mouth of the well so that it is less vulnerable during flooding. This improves the well and hence the water is protected even during the floods. It would involve changing the design of most wells by building concrete works on the well and around the well. Concrete rings would form an apron/collar of 1.5 m high and 3.0m in diameter. The slope of the base is 45-degrees, gradual enough to prevent damage to the base during flooding. The wells are usually operated with the hand pump.

B.3 Country specific applicability and potential

There are no national standards and guidelines on borehole and well protection in Zambia. However, good practice for digging wells and drilling boreholes exists. Projects promoting ground water access have adopted their own standards to suit local contexts as there is a lot of variability throughout the country. Good practice entails that water points are located away or protected from burial sites, pit latrines, runoff water, waste disposal, etc. On top of this, the water affairs department has been encouraging the communities to site the wells in locations which are not prone to flooding. The site for the wells is very important so that the well is on the hydraulic gradient (uphill) against the pit latrines. International organizations like UNICEF, SNV and Care have been promoting this in flood prone rural districts.

B.4 Status of technology in country

There is no information regarding the status of the proportion of boreholes and protected wells that can be regarded as resilient to climate change hazards. However, given that awareness to this need has only began to emerge slowly in the last decade, it can be envisaged that a big proportion of the boreholes and wells in flood prone area are vulnerable to contamination and damage due to flooding.

B.5 Benefits to economic / social and environmental development

The technology will reduce the chances of households failing to access potable safe water supplies during floods. It will reduce the time lost traveling long distances to access good drinking water when the water point gets either damaged, contaminated or cannot be accessed because of the floods. Avoiding such loss of time prevents disruption in productive activities and the negative implications this entails. Time loss to morbidity or taking care of a sick relative especially by women due to water borne disease from contaminated water points is also reduced. In the end we have a healthy community able to pursue livelihood objectives of its own choice.

B.6 Climate Change Adaptation Benefits

Overall the technology will reduce disruptions in access to safe water during flooding. The floodwaters will not only contaminate drinking water sources but also lead to the destruction of water and sanitation systems, increasing the risk for water-borne diseases such as cholera during the rain season.

B.7 Financial Requirements and Costs

Estimated unit cost of protected well built to be resilient to flooding is US$3,500. Actual cost however depends on geographical location, soil type-sandy or rocky and distance to site.

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[i] **This fact sheet has been extracted from TNA Report – Technology Needs Assessment for Climate Change Adaptation – Zambia. You can access the complete report from the TNA project website http://tech-action.org/**