

A FIELD INVESTIGATION REPORT ON THE WELL COLLAPSES IN KOTTAYAM DISTRICT IN KERALA



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INTRODUCTION

A field based investigation was carried out on 21st August, 2012 in two different locations in Kottayam district of Kerala, following the press report on well collapse (Ref: 16th August, 2012, Malayala Manorama and Mangalam). It was reported that following the heavy rain fall of August 15th morning, two wells, one in Perunna, Chenganachery and other in Needoor, Near Ettumanor collapsed. A team from the Hazard Vulnerability and Risk Assessment (HVRA) Cell visited the above said locations and details were collected. The detailed features of individual events are described in the following sections.

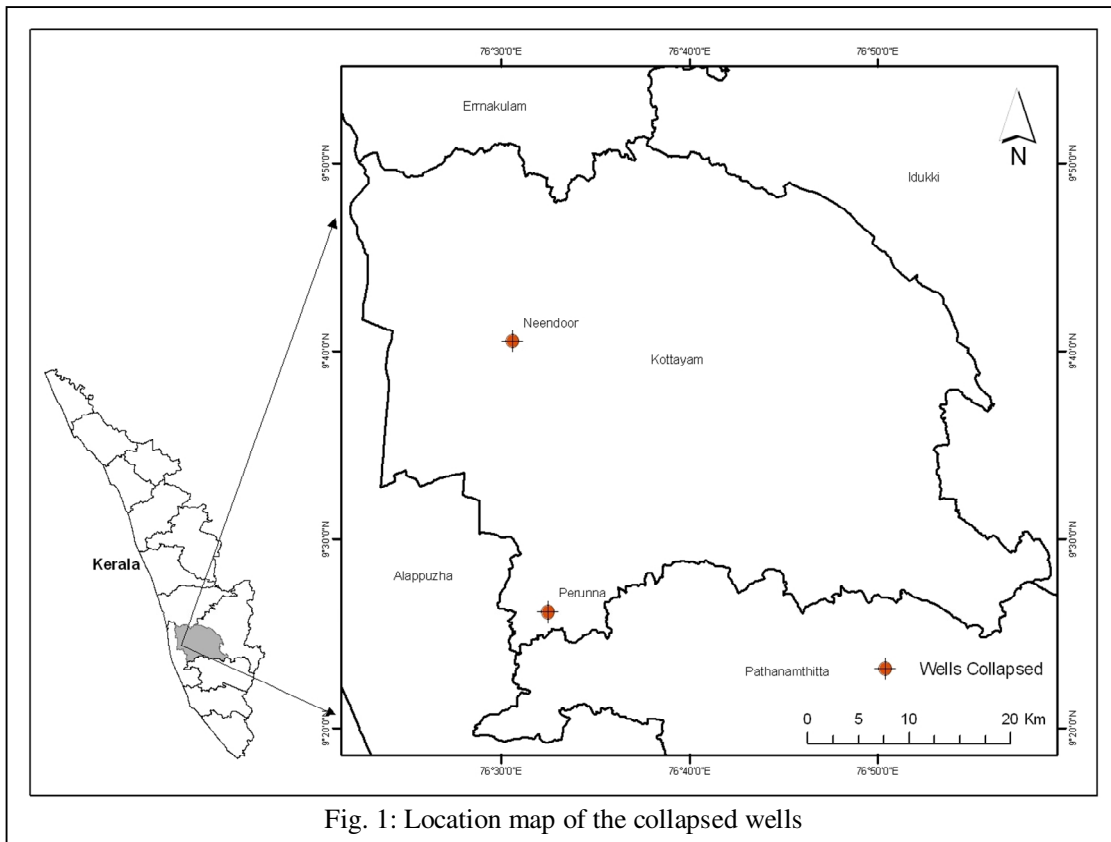


Fig. 1: Location map of the collapsed wells

LOCATION 1

PERUNNA, NEAR NSS HEAD QUARTERS, CHENGANACHERRY

The first well was (N 9^o 26' 11. 4" and E 76^o 32' 30.2"; 34 m above MSL) in the plot of Mr. Kunjukunju K. Maruvathu, Kuthukallunkal, Panachikavu P.O., Perunna (Chenganacherry municipality, Chenganacherry village, Chenganacherry taluk, Kottayam District). The plot was slightly elevated from the road. The area comes in Upper Kuttanad and geologically is sedimentary in nature. The collapsed well has a diameter of ~1.2 m, with a depth of 50 feet. The well was dug 100 years ago, had laterite lining and was perennial even during extreme drought conditions. About one month before the event

happened, the water in the well started showing an orange colour with effervescence effect and a bad odour (rotten egg's). During the period small changes in water level was also observed.

On 15th August, around 08.00 am, a small sound similar to boiling water was heard from the well and change of colour, effervescence and slight crystallisation on the top of water were observed. On the same day around 10.00 am, water in the well up-welled with effervescence, following which with a big sound, one side wall of the well collapsed. At the same time a new hole with same depth of the collapsed well developed adjacent to the well and the walls of this sink hole collapsed within a few minutes. The colour of the water turned starch like and had the water felt thick; white suspended sediments were also found in the water.

The basement of a 200 years old house inclined towards the western side (opposite to the direction of the well) and a new crack developed near to the kitchen area.

INFERENCE

In order to make a general assumption about the process, information regarding the wells in the neighbouring houses were also collected. None of the wells in the neighbouring houses reported any unusual phenomena. But neighbours heard a large sound like something falling from the top. The detailed investigation and field observation carried out in the plot indicate that, more number of small hollows present in the land. This phenomenon was come to notice, while the owner was taken a small pit for growing the vegetables. The pit he has taken was gone down without showing the bottom of the same. These kinds of more number of small holes were noticed around the collapsed well. From the field observation and feedback data collection, it was assumed that the well collapse and associated hole development was due to the activity of soil piping and the was accelerated by the ground shaking contributed by the earthquake on 22nd July, 2012.





LOCATION 2

NEENDOOR, NEAR KAIPUZHA JUNCTION, ATHIRAMPUZHA

The second well was located in the northern side of Kottayam district, (N 90° 40' 33.8" and E 76° 30' 36.4" with an elevation of 24 m above MSL) in the plot of Mr. E.G. Gopakumar, Gokulam, Neendoor (Neendoor Panchayath, Onamthuruthu village, Kottayam taluk, Kottayam District). The house is located on the flank of small mound, with paddy field on other side. The collapsed well was of a diameter of 2 m with a depth of 25feets. The well was constructed on 30 years back and lined with Laterite bricks.

Details about the previous earthquake occurred on 22nd July, 2012 was asked to the residents of house, in order to identify the link between well collapse and earthquake. Nobody in the region felt the effect of earthquake on that days and they only came to know through the news papers. They are using the well water for their daily needs, including drinking and other domestic applications and not observed any colour changes and odour changes in the well before the collapse.

15th August, 2010, morning 08.30 am, slight inclination was observed in both pillars of the well, following the upliftment of side floors. At the same time, one wall of the bathroom adjacent to the well also detached from the main basement and other wall. Suddenly with a big sound, the detached portion of bathroom, pillars and rings of the well went down to the watered portion of the well. At the same moment, the surrounding land portion also collapsed into the well. An inventory of wells in the neighbouring houses were also carried out for enquire about the changes of water level and other related issues in the wells and no such incidents were reported from any where.

INFERENCE

To understand the force and factor behind the well collapse, history of the well and construction procedures were also enquired during the

investigation. The well was constructed in the flood plain area, in which the bottom rest on sandy clay layer. The lining of the well was done with locally available laterite brick and two pillars were also constructed in the top. Few years back, some of the laterite bricks, which are used for the lining, were fallen down and no maintenance were done for the same. This has enhanced the movement of side filling material into the well bottom, which become made a huge void in the well wall. Due to heavy rain and associated infiltration of rainwater, this void acted as a conduit for easy down movement of the materials. This caused the loss of support and cohesion of the side wall material, which lead to the collapse of the well. This finding was supported by the field photographs, which shows the direct central down movement of the overburden, which contains the remaining lining material and pillars of the well.



