

# RISK OF GROUNDWATER POLLUTION IN OPEN DUG WELLS IN THE PUNGUDUTIVU ISLAND OF THE JAFFNA PENINSULA, SRI LANKA

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(Received 26<sup>th</sup> August 2019; accepted 4<sup>th</sup> October 2019)

## ABSTRACT

Un-protected open dug wells of shallow groundwater environments are subjected to high risk of chemical and microbial pollution in many parts of the world. The present study was initiated in Pungudutivu, one of the surrounding islands of the Jaffna Peninsula, Sri Lanka, because the island totally relies on its limited groundwater resources extracted from open dug wells to meet all its needs. The study assessed the risk of pollution within the limited fresh groundwater found in unconfined aquifer systems of Pungudutivu, where high risk of pollution was expected mainly from organic sources, derived from human and animal wastes and easy infiltration and runoff returns. The fresh groundwater pockets of Pungudutivu were however found to be with less serious contamination risks other than high Fe<sup>2+</sup> and high faecal coliform counts. Low nitrate and phosphate concentrations with high COD and low BOD demonstrated less pollution from biodegradable organic sources in the midst of high oxidising potentials in the shallow dug wells as implied by the stability field of Fe(OH)<sub>3</sub> on the Eh-pH diagram; the argument of high Fe<sup>2+</sup> in groundwater however, wasn't supported by the said oxidation potential. High faecal coliform counts with high DO in groundwater probably indicated conditions implied by on site waste disposal in groundwater of Pungudutivu.

**Keywords:** Groundwater, Pollution, Risk, Pungudutivu, Jaffna Peninsula.

## INTRODUCTION

Groundwater acts as a major source for drinking in many parts of the world, thus, the quality of groundwater is important in preventing hazards towards human health (Chapman, 1996). Ensuring safe drinking water found in shallow and deep groundwater sources is the prime challenge faced by the developing world in the present era including rural Sri Lanka. Tapping groundwater from shallow aquifers implies challenges towards water quality, especially when such wells are closer to

settlements and related beneficiary communities (Lutterodt et al., 2018). In Sri Lanka, a majority of people extract groundwater for drinking from shallow dug wells (MENR, UNEP 2009). Monitoring and assessment of the chemical and microbial quality of water from hand-dug wells is therefore important in order to incorporate effective management strategies to improve the quality of water from the available sources and to bring them into optimum utilisation within communities that rely on them (Shivasorupy et al., 2012).