## Contamination of Shallow Dug Wells in Highly Populated Coastal Sand Aquifer: A Case Study in Sainthamarudhu, Sri Lanka

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Access to clean water and adequate sanitation facilities is a great challenge in highly populated areas. Sainthamarudhu, a town in the Eastern province with a population density of 24 069/km<sup>2</sup>, uses groundwater as the source for drinking water. Public water supply has not been successful since every family has their own well with adequate water. Septic tanks are located regardless of the well distance. In order to assess the groundwater contamination, 26 wells were selected and Escherichia coli (E. coli) level, nitrate concentration, and electrical conductivity (EC) were measured using water samples collected in two week intervals along with the water table depth for a one year period. Groundwater fluctuates within the depth of 3.4 m and -2.1 m from the mean sea level (m. s. 1.) and flows from land to sea in the southeast direction. Almost all the wells are contaminated with E. coli in this area and not safe for drinking according to the WHO standards for drinking water. E. coli levels increased in the wet season up to 700 colonies per 100 ml water sample compared to the dry season due to possible contamination of well water with septic effluents. The wells located in the southeastern area beyond the sewage drain are more prone to E. coli contamination. Higher nitrate levels, around 80.8 mg/l, were found in wells in the northwest regions and therefore, along the northwest-southeast diagonal between the main road and sewage canal, is a potential area for nitrate contamination. Levels of nitrate concentration and EC increased in the dry season when compared to the wet season, possibly due to the dilution effect. The wells closer to the sea have higher EC values, as high as 5,550 µs/cm, probably due to sea water intrusion. Contamination of *E. coli*, nitrate and dissolved solids is less in the wells closer to the main road. The high population density with lack of proper drainage systems and improper excreta disposal methods in the sandy regosols are the main reasons for the contamination.

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