Contamination of Groundwater by Nitrate due to Intensive Use of Fertilisers (A Case Study from Sri Lanka)

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The use of fertilisers in agricultural practice is increasing rapidly in most of the developing countries particularly with the introduction of new high yielding crop varieties. In the areas where the amount of nitrogen in fertiliser and manure applied exceeds uptake by plants, the excess can leach through soil into groundwater, usually as nitrate. Most severe contamination occurs in shallow wells in dense agricultural areas. This problem become severe in rural areas of Sri Lanka, where the people residing are entirely depending on the drinking water from shallow dug wells.

Geochemical study was carried out within the Udunuwara area of Sri Lanka with the aim to study the nitrate contamination of groundwater in wells close to paddy fields, due to intensive use of fertilisers. Total of 115 groundwater samples were sampled periodically form 19 shallow wells and 4 deep tube wells.

The results revealed that 60% of the wells have elevated nitrate concentrations than the background level. However almost 90% of them were within the WHO standards of 50 ppm nitrate limit. Some wells showed remarkable increase of the nitrate levels upon adding fertilizer to the adjacent paddy fields. It was observed that the increased nitrate levels were then gradually reduced with time as a result of the local groundwater flow. Certain wells, including all the tube wells that yield water with very low concentrations of nitrates throughout the periodical sampling, showed no response to the application of fertilizers to nearby paddy fields.