

## National spatial assessment of arsenic in groundwater in Ireland

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Globally the presence of arsenic within the groundwater system has caused both environmental and health related issues mainly in South East Asia and America. Within these regions several studies have focused on national assessments of arsenic [1, 2], however the presence of a similar study within an EU state does not exist.

A national database (EPA) was used as a tool to monitor the assessment of elevated arsenic (groundwater threshold value (GTV):  $7.5 \mu\text{g L}^{-1}$ ); however, due to different water usage patterns this data was separated into two databases containing poorly productive aquifers (PPA) project data (EPA-PPA – 8339 measurements) and a database without PPA data (EPA-NPPA – 7334 measurements). The EPA-PPA and EPA-NPPA datasets comprise of 294 and 222 unique monitoring locations. A geochemical classification using five intervals was completed, (0,1], (1,7.5], (7.5,10], (10,100] and (100, 234] using ArcGIS® 10.2 (ESRI®, Colorado) (data not shown). While the majority of sites fall into the (0,1] & (1,7.5] intervals (elevated =  $\geq 7.5 \mu\text{g L}^{-1}$ ), some do exceed these categories. Removal of the PPA data reduced the number of sites exceeding the arsenic GTV value from 26 to 9 (generally the PPA sites contain elevated arsenic). Using spatial interpolation methods, several hotspots of arsenic contamination in Ireland were revealed. In addition, statistical methods were employed to assess whether statistically significant differences existed between certain rock types, i.e. sandstone and shale (data not shown).

This present study, while not showing grossly elevated arsenic concentrations, identified persistent low-to-medium levels of arsenic within certain locations in Ireland. The presence of arsenic within groundwater presented at a national level highlighted potential areas of contamination for future monitoring and research needs. The framework of this study can be implemented within other EU states to help achieve objectives of the Water Framework Directive (WFD).

[1] He and Charlet (2013) *J. Hydrol. (Amst)* **492**, 79-88. [2] Welch *et al.* (2000) *Ground Water* **38**, 589-604.