



Identifying palaeo and present-day controls on the large spatial variation in groundwater salinity in southwestern Bangladesh

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In southwest Bangladesh, the groundwater has a high spatial variation in salinity. Some of this variation has been explained in small scale study areas, but no mechanisms controlling the regional groundwater salinity have been described. In this study, we aim to provide guidelines for the groundwater salinity, by assessing to what extent the groundwater salinity is controlled by present-day surface features or by palaeo connate water. Groundwater salinity variation was assessed using a low-cost method, that consisted of measuring Electrical Conductivity (EC) of the groundwater at 1998 locations, complemented by 442 EC measurements from previous studies. Using 321 hydrochemical samples, an interpretation was made of the extent to which the EC values could be used as indicators for salinity. The EC database was statistically and geostatistically analysed using location data (latitude, longitude and depth of the filter) and geographical characteristics at the surface (land use, elevation, soil type and surface clay thickness). The results show that groundwater in the northwest and northeast is fresh, while it is saline in the south. In-between these extremes, a large variety in salinity is observed. EC correlates significantly with surface elevation, albeit with a low r -value, and there are significant differences in EC between groundwater under different soil and land use types, with groundwater under fluvial soils being much fresher than elsewhere. Based on the correlations, guidelines are proposed that can be used as a first estimate of the groundwater salinity throughout southwestern Bangladesh.