Estimating groundwater extraction in a data-sparse coal seam gas region, Australia

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The semi-arid Surat and Bowen Basins in central Queensland, Australia, are groundwater resources of both national and regional significance. Regional towns, agricultural industries and communities are heavily dependent on the 30 000+ groundwater supply bores for their existence; however groundwater extraction measurements are rare in this area and primarily limited to small irrigation regions. Accordingly, regional groundwater extraction is not well understood, and this may have implications for regional numerical groundwater modelling and impact assessments associated with recent coal seam gas developments. Here we present a novel statistical approach to model regional groundwater extraction that merges flow measurements / estimates with other more commonly available spatial datasets that may be of value, such as climate data, pasture data, surface water availability, etc. A three step modelling approach, combining a property scale magnitude model, a bore scale occurrence model, and a proportional distribution model within properties, is used to estimate bore extraction. We describe the process of model development and selection, and present extraction results on an aquifer-by-aquifer basis suitable for numerical groundwater modelling. Lastly, we conclude with recommendations for future research, particularly related to improvement of attribution of property-scale water demand, and temporal variability in water usage.