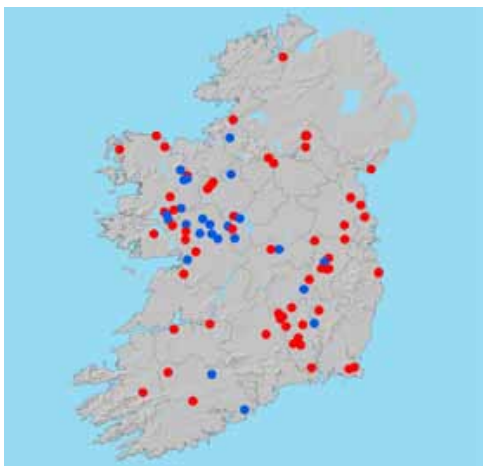


4.11 Groundwater

Ned Dwyer

Groundwater is located beneath the ground surface in pore spaces and fractures of geologic formations. If the geologic formation can yield enough water for a significant supply then the term aquifer is often used. It is estimated that almost 30% of the world's freshwater is stored as groundwater. Globally, it is a major source of drinking water and is also widely used in agriculture and industry. In Ireland about 26% of drinking water is from groundwater sources. Groundwater recharge is influenced by not only rainfall and dry periods but also by human use. Risks to groundwater quality and quantity that may be exacerbated under a changing climate include depletion, pollution and salinisation.

Photo: © Ned Dwyer



Map 4.4. Location of groundwater monitoring stations.

Measurements

Groundwater level data have been collected in Ireland since the late 1960s. In the 1990s the EPA took responsibility for its monitoring and maintains a groundwater level monitoring network of approximately 70 sites. The data collected include groundwater level (red); overflow and abstraction at springs; well head elevation and aquifer unit/type. For some monitoring locations the specific yield, storage and the transmissivity of the aquifer have been calculated. Flow discharge at springs is also measured at 25 locations (blue).

Satellites which form part of the collaborative US and German Gravity Recovery and Climate Experiment

(GRACE) are being used for the monitoring of groundwater over large areas. Large pockets of water exert a greater gravitational pull on the satellites than areas without water. Over time the satellites can measure groundwater fluctuations.

'No systematic analysis of national groundwater levels has been carried out to date.'

Time-series and Trends

No systematic analysis of national groundwater levels has been carried out to date. [Figure 4.19](#) shows an example of measurements of the daily mean level for a well in Knocktopher, Co. Kilkenny from 1980 to 2011. There are many data gaps in the early part of the series prior to installation of a digital system. Levels change on a seasonal basis with a minimum during the summer months and a maximum during winter, when groundwater recharge occurs. There is no evident long-term trend in the data.

'Selection of groundwater sites for climate monitoring purposes is under way.'

Maintaining the Observations

The EPA is responsible for groundwater monitoring and in 2006 the network was reviewed and updated in accordance with EU legislation. The selection of the subset of stations for climate monitoring purposes is underway. There have been significant upgrades to the groundwater level monitoring network in recent years and time will be required to collect and evaluate data from this. The network will be refined and data gaps filled as analysis of these data improves understanding of the hydrogeological systems.

4

Daily Well Groundwater Levels (1980-2011)

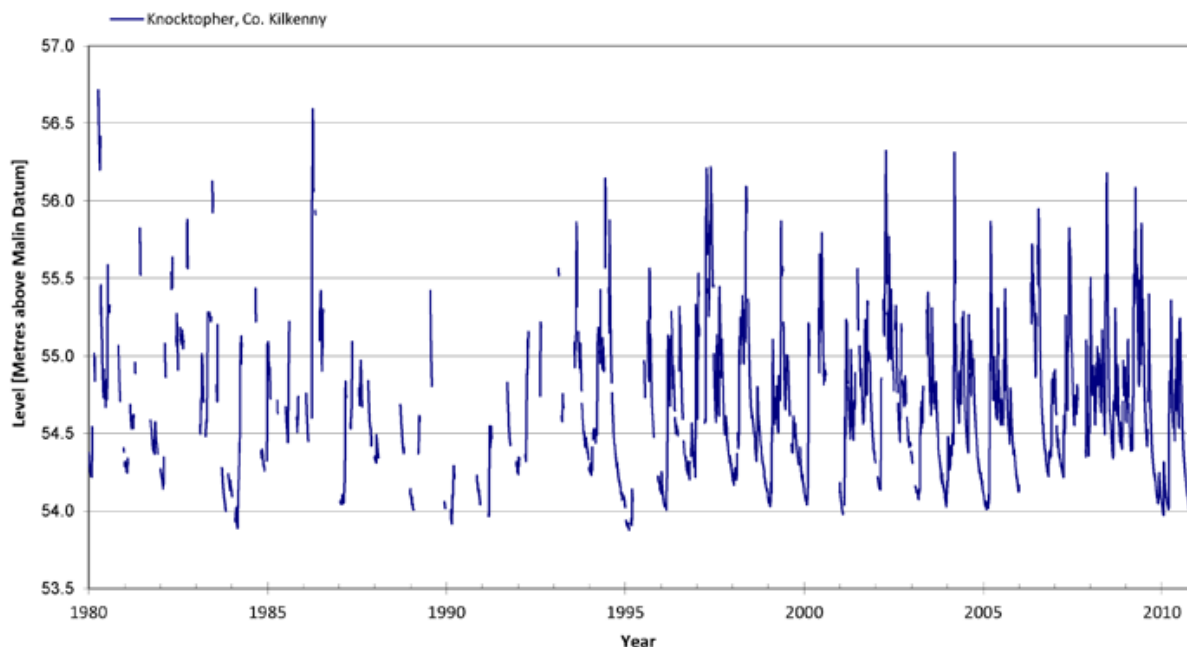


Figure 4.19. Daily mean groundwater level at a well in Knocktopher, Co. Kilkenny (1980–2011).

Further Information and Data Sources

Lucey, J. (comp.) (2009) *Water Quality in Ireland 2007–2008: Key Indicators of the Aquatic Environment*. EPA, Johnstown Castle Estate, Co. Wexford, Ireland. p. 52.

McGarrigle, M., Lucey, J., and Ó Cinnéide, M. (2010) *Water Quality in Ireland 2007–2009*, EPA, Johnstown Castle Estate, Co. Wexford, Ireland. pp. 148: <http://www.epa.ie/downloads/pubs/water/waterqua/name.30640.en.html>

Tedd, K., Misstear, B., Coxon, C., Daly, D., Hunter-Williams, T., Craig, M. and Mannix, A. (2010) *Review of Groundwater Level Data in the South Eastern River Basin District*. STRIVE Report Prepared for the EPA and the GSI by Trinity College, Dublin.

The EPA's website on groundwater monitoring: <http://www.epa.ie/whatwedo/monitoring/water/groundwater/programme/>

Information on the GRACE mission: <http://www.csr.utexas.edu/grace/>

Groundwater aquifer maps, well locations, groundwater vulnerability maps and other relevant data may be downloaded from the Department of Communications, Energy and Natural Resources, DCENR: <http://www.dcenr.gov.ie/Spatial+Data/Geological+Survey+of+Ireland/GSI+Spatial+Data+Downloads.htm>

Groundwater relevant data may be viewed on the GSI's web-mapping service: <http://www.gsi.ie/Programmes/Groundwater/Groundwater+web+mapping.htm>