GROUNDWATER

Drought impacts on domestic and stock bores

August 2016

Current drought conditions

Over the last three years a significant proportion of NSW has experienced below average rainfall with severe rainfall deficiencies seen in north western NSW (Figure 1a). Rainfall averages from February to April 2016 show that the regions experiencing below to very much below-average rainfall grew to cover most of the state during those three months (Figure 1b).

During periods of severe dry seasonal conditions and surface water scarcity, groundwater resources become more heavily relied upon and are often the only water supply available during drought.

Groundwater level response in droughts

Groundwater levels generally fluctuate in response to climatic trends and seasonal pumping. During a drought there is less rainfall recharge and increased pumping from groundwater systems; as a consequence groundwater levels typically decline.

The influence of rainfall patterns can be seen when groundwater levels are compared to rainfall using a cumulative rainfall deviation plot. This compares the monthly rainfall data to each month’s long-term average. By sequentially plotting this difference from the average, periods of above or below the long-term average can be seen. A downward slope shows periods lower than average rainfall whilst an upward gradient shows periods with higher than average rainfall.

Groundwater patterns over time, shown using a hydrograph, have a similar response in that groundwater levels fall during periods of reduced rainfall and rise during wetter periods. By plotting the groundwater levels and the cumulative rainfall deviation on the same graph the influence of the drought conditions can be clearly seen.

Figure 1 New South Wales Rainfall deciles a) 1 January 2013 to 31 December 2015 b) 1 February to 30 April 2016, Bureau of Meteorology.
Figure 2 shows a sample hydrograph and the cumulative rainfall deviation (CRD) from 3 different locations since the mid-1980s. Groundwater levels are currently declining during the most recent drought.

Figure 2 Hydrographs and the rainfall trends for the Tamworth, Dubbo and Wagga Wagga regions.
Managing declining groundwater levels during drought

Knowing your bore

Ensuring that your bore works as efficiently as possible can help keep operating costs down. Landholders should routinely inspect their bore water system and ensure it is operating properly. An inspection can include:

- **Measuring the depth to the water level**
  - Having an understanding of the differences in water level before and during pump operation can help ensure the pump has been placed at the right depth and will help to maintain supply during drier times.
  - Measurement of the water level can be used using a weighted measuring tape or taking observation of pump pressure gauges.

- **Understanding pump performance**
  - Keeping a detailed record of pumping dates, duration, rates, power or fuel consumption can help you see longer term changes in pump performances that may require maintenance or replacement of the pump and possibly the bore.

- **Checking the depth of the bore**
  - Silt, other particulates, biological fouling or chemical scaling may clog the bore, affecting its performance. A weighted measuring tape can be used to measure if there has been a build-up of silt or other particulates at the base of the bore. A drilling contractor can clean out bores.

Getting your bore water tested will provide information on whether your bore is at risk from clogging. This can impact on both the bore and pump efficiency over time.

Ensuring bore and pump infrastructure is maintained and able to continue to access supply is the responsibility of the bore owner.

Landholders are required to ensure all new domestic and stock bores are constructed to a sufficient depth to maintain long-term access to the water source.

Managing local drawdown impacts on domestic and stock bores

In many areas domestic and stock bores were installed prior to wide-scale use of groundwater for irrigation and other purposes. Old domestic and stock bores were commonly constructed just into the water table. Irrigation bores were subsequently drilled to greater depths to obtain the full yield potential of the aquifer.

The cumulative impact of low groundwater levels during droughts and from pumping from irrigation bores can impact on nearby domestic and stock bores. This can become an issue for shallow bores which may lose access during the irrigation season (Figure 3).

![Figure 3 Water table during a) average conditions and b) drought conditions](image)

The Department of Primary Industries Water undertakes assessments of all new water supply production bores or dealings that trade entitlement or allocation in order to manage the potential impact on neighbouring bores. To manage these impacts distance conditions or limits may be placed on the amount an individual bore can extract.
However, this assessment does not extend to limiting access to protect supply to very shallow bores and wells. Water Sharing Plans require domestic and stock bores to be drilled to a sufficient depth so that groundwater resources can be shared equitably.

**Groundwater monitoring data**

Water NSW monitors groundwater levels in 4,700 bores at 3,000 sites located across the State and in particular, in areas of significant pumping. Department of Primary Industries Water use the information collected from this network of monitoring bores to manage NSW groundwater resources so they can be equitably and sustainably used.

For groundwater level information for your area see the [All Groundwater Map](http://allwaterdata.water.nsw.gov.au/water.stm)

**More information**