Geophysical Research Abstracts
Vol. 20, EGU2018-3984, 2018
EGU General Assembly 2018

Influence of climate change and hydroclimate variability on the impact of coal resource development on runoff

David Post (1), Francis Chiew (1), Guobin Fu (2), Yongqiang Zhang (1), Biao Wang (1), and Neil Viney (1)
(1) CSIRO, Land and Water, Canberra, Australia (david.post@csiro.au), (2) CSIRO, Land and Water, Floreat, Perth, Australia

There have been a number of proposals to further develop coal seam gas and coal resources in eastern Australia. These developments may have an impact on water resources and the environment. The Australian Commonwealth Scientific and Industrial Research Organisation (CSIRO), in partnership with the Department of Environment and Energy, the Bureau of Meteorology and Geoscience Australia, have undertaken a series of "Bioregional Assessments" to assess the potential impacts of coal seam gas and coal mining development on water resources and water dependent assets such as wetlands and groundwater bores.

This paper investigates the sensitivity of the bioregional assessment results to climate change and hydroclimate variability, using the Gloucester subregion as an example. Specifically, the paper quantifies (i) the relative impact of coal mining development versus impact from potential climate change, (ii) the modelled impact of additional coal mining development (relative to "baseline" development) for different plausible climate futures, and (iii) the influence of hydroclimate variability (sequencing of future hydroclimate time series, particularly when the mine footprint is largest) on the modelled impact of additional coal mining development.

The results for the Gloucester subregion indicate that the impact of climate change on runoff can be considerably greater than the impact of coal mine development. However, the difference in the modelled impact of additional coal resource development relative to the baseline for a given climate future is relatively small, but not insignificant. The sequencing of hydroclimate series (hydroclimate variability), particularly the rainfall when the mine footprint is largest, significantly influences the modelled maximum additional coal resource development impact, and much more so than the future mean annual rainfall. If the rainfall is high in the period when the mine footprint is largest, the modelled maximum impact on volumetric and high flow hydrological variables will be higher, and the modelled maximum impact on low flow hydrological variables will be lower.

The results suggest that detailed analysis of coal resource development impact where proposed development is large should take into account climate change and hydroclimate variability. The relative and combined impact (which can enhance or compensate) from climate change and coal resource development should be modelled, as well as the range of possible rainfall sequencing (stochasticity and uncertainty) when the mine footprint is large.