



Future Proofing Groundwater Systems

Downscaling climate modelling

Factsheet 1



Earth Sciences
New Zealand

Current climate projections provide future timeseries for climate variables such as precipitation and temperature. These projections are downscaled to finer resolution to allow for assessment of local impacts from climate change. The two primary downscaling approaches are dynamical and statistical. Dynamical downscaling captures fine-scale processes at fine time scales more accurately, but is computationally intensive. Statistical downscaling establishes empirical relationships between climate variables and observational data on monthly to seasonal time scales, and is more computationally efficient.

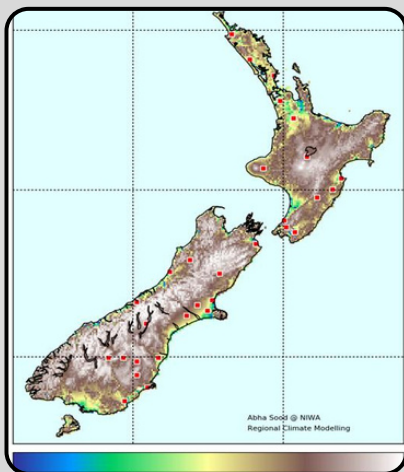


Climate models often exhibit biases due to imperfect representations of physical and environmental processes. Bias correction methods mitigate these discrepancies:

- Quantile mapping matches the statistical distribution of model outputs to observations.
- LeMOD retains the internal climate variability and temporal correlations between precipitation and temperature.

Downscaling climate modelling

In FPGW we are using quantile mapping and a refined LeMOD bias correction. This method allows us to improve confidence in hydrological predictions to changes in duration and severity of hydrological drought impacts. These impacts are driven by variations in both temperature and precipitation and the cross-correlations between these variables. We will use daily resolution and compute localised errors using hindcasting to preserve day-to-day correspondence. This allows more accurate assessment of the frequency, intensity, and duration of drought events.



These drought events will be explored in terms of water availability for irrigation, maintenance of streamflows, drinking water supplies. Periods of reduced water availability during drought typically coincide with increased water demand (e.g., for irrigation, streamflow). We are exploring the economic and social implications for decision-making in this context, at local, regional and national scales [Factsheets 2 and 3].
