Water New Zealand Modelling and Digital Water Groups' Symposium
Deep South Climate Challenge Session Summary

15-16 March 2017, Heritage Hotel, Auckland

Workshop Outcomes

OUTPUTS FROM THE DEEP SOUTH CLIMATE CHALLENGE THAT COULD BE UTILISED BY THE MODELLING COMMUNITY

Guidance on managing uncertainty

Currently there are multiple global climate models and multiple representative concentration pathways. The range of available results produces large bands of uncertainty for modellers trying to utilise projections for decision making. Modellers would benefit from guidance that assists in narrowing down the number of scenarios required to be examined, and ranking global climate models (if these should still be used in addition to the Deep South model) in applicability for NZ.

Guidance on incorporating climate change data into 3 water decision making

Standardised guidance documents are important to facilitate discussions and provide reference for what and how to make decision in regards to adaptation. Modellers are interested what areas of the country should prioritise climate change considerations and conversely, if there are areas in which climate change considerations are not as important.

Discussion centred on decisions around water availability that would benefit from inclusion of climate change impacts; temperature rise influence on water urban water demand, when water stress is likely to act as a trigger for prioritising water demand management, and how changes in water availability due to climate change should be factored into resource consents for water takes.

Regional climate projections are needed to support council's political buy in of adaptation assessments

Official recommendations of what regional climate projections should be adopted by territorial authorities in climate change planning, would assist consultants and council staff develop the business case for undertaking detailed adaptation studies.

Individuals need assistance developing a defensible position for investigating adaptation work in councils where there is currently insufficient political will to investigate climate change. For example in Auckland Council flood modellers where interested in testing the envelope around the extent of future flooding across a range of climate scenarios, but limited to using a scenario of for increase in rainfall intensity that aligns with council policy.

It was noted that climate change impacts are required to be considered in the National Policy Statement on Freshwater Management, the Coastal Policy Statement (which requires councils to look at sea level rise to 100 year time frame), and the Auckland Unitary plan, however in general there are no mandated requirements for considering climate change in flood policy.

FUTURE DIALOGUE WITH THE WATER INDUSTRY

The Modelling Special Interest Group contains good connections into the water industry, across consultancies and Territorial Authorities and would provide a good vehicle for feedback to the Deep South Challenge in the future. Consultants reinforced the need for good engagement with Territorial Authorities, who dictate what adaptation work will be examined for local communities. Questions discussed that the Modelling community could assist Deep South in answering;

- In what areas is information on sea level rise important (e.g. just cities and coastal communities?)
- What design storm intensities are frequently used for modelling
- What time scales are important i.e. typical infrastructure life
- What period events are of interest to modellers (e.g. 1 in 100 year rainfall, 1 in 50 etc)
- What are acceptable time intervals between data points

Deep South Presentation Summaries

BACKGROUND TO THE DEEP SOUTH CLIMATE CHALLENGE

Mike Williams – Director Deep South Climate Challenge

The objective of the challenge is "To enable New Zealand's to adapt, manage risk and thrive in a changing climate".

This will be achieved by building on improved predictions of future climate supported by new understanding of Antarctic and Southern Ocean processes. These are major influences of New Zealand climate, which there has been little focus other than these internationally.

The challenge will utilise and develop the UK's earth system model to adapt it for New Zealand. Deep South Scientists are looking for stakeholders to assist in further dialogue that will translate outputs of the Earth Systems Model into tools that water industry infrastructure planners can use.

The Impacts and Implications will focus on four priority impacts; Extreme weather events, drought, changes in typical weather patterns (shifts in events). MBIE ran a climate change implications program (wrapped up in September last year) which will be developed by the Deep South impacts and implications program.

Dynamic downscaling of the larger earth system model will be undertaken, nesting a regional model within the global climate model. Concurrently NIWA are working on a project called "weather at home" to better understand the nature of current extreme events and the contribution of climate change to them.

An Information Hub is being developed in conjunction with the National Geographic to disseminate information.

Data will be available to commence discussions at the end of year. Earth System model outputs are expected in two years, funded till mid 2019, and it is hoped a further 5 years funding will be obtained enabling conversations to be ongoing.

CONNECTING SCIENCE RESEARCH AND MODELLING COMMUNITIES ON CLIMATE CHANGE DATA NEEDS

Daniel Collins – NIWA Hydrologist

A climate change primer was provided. Deep South outputs likely to be relevant to modelling group:

Earth System Model

- Time-series of rainfall outputs

Impacts and Implications Modelling

- Hydrological states/fluxes for all Strahler 3 catchments, 15 minute intervals to 2100; 6 climate models and 4 scenarios; no random ensembles
- Derived hydrological statistics, including;
    - Drought and water supply reliability
    - Mean annual flood
    - Drought and flood extent
- Hydrological trends
- Times of emergence of climate change signals
- Non-stationary flood frequency analysis method
- Sea level rise in some locations
- Strategies to stage adaptation – water reservoirs (when should you economically build a reservoir for irrigation, how should you stage flood protection)

The impacts and implications program is utilising a hydrology model centred on top-net.

Water Industry Case Studies

Dunedin City Council
Dunedin City Council has undertaken a study assessing risks climate change poses to the city's wastewater and stormwater assets. The study has been used to inform future works program.

Sources of information used for Dunedin Climate Change study:

- Climate change impacts based on a report commissioned by council Fitzharris in 2010, downscaling New Zealand climate change impacts to understand regional impacts on Dunedin City Councils operating area
- The WERF report *Implications of Climate Change Adaptation for Wastewater and Stormwater Agencies* was used to examine what impacts were to be investigated
- Adapted the *IPCC Common Methodology for assessing the vulnerability of coastal areas to sea-level rise assets* – a 7 step risk based process with an extra step added by Dunedin City Council to embed outputs into business planning processes

The Dunedin study utilised a risk based methodology for undertaking coastal impact assessments which examines climate change influence on likelihood of event occurrence, which in turn influences risk (the product of likelihood and consequence). The approach was applied to a case study in Warrington and provides a reusable framework for assessing climate risks to new assets and that can be reassessed when updated climate projections are developed.

Wellington Water
Wellington Water has incorporated climate change models into the Sustainable Yield Model developed for the Waiwhetu aquifer. The Sustainable Yield Model is a science based model for understanding the aquifers water balance. The aquifer sits under wellington harbour and so is heavily impacted by sea level rise.

Rebuilding the aquifer model and incorporating climate impacts was a 6 year process. Sea level-rise and aquifer impacts are not linearly related, there is a complicated interaction between the two that remains the subject of scientific debate.

Anticipated climate change affects are a small influence on the demand for water, yield impacts from the influence of sea level rise on the aquifer, and changes to rivers flows impacting on surface water availability.