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Translating global climate model projections into usable information for water managers and industry: A case study from Tasmania, Australia

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Translating meteorological projections from global climate models (GCMs) into useful information for water managers and industry involves addressing a combination of technical and communication challenges. The Climate Futures for Tasmania project has projected water yield in Tasmania, Australia to 2100. This paper describes how the Climate Futures for Tasmania project successfully translated climate projections into useable information for water managers and industry.

From its inception, the Climate Futures for Tasmania project has maintained a dialogue with the two major water managers in the Tasmania: the Department of Primary Industry, Parks, Water and Environment (DPIPWE), the government body with statutory responsibility for water management in Tasmania, and Hydro Tasmania, Australia's largest hydropower generator. Frequent discussions with these two organisations directed the technical research into future water yields.

Tasmania is a difficult region for climate change-hydrology studies. Tasmania's complex rainfall patterns are not replicated by GCMs, and hence GCMs produce information that is too general to be useful to Tasmanian water managers. To overcome this problem, GCM projections were downscaled to a finer spatial resolution. Downscaling greatly improved the spatial correlation of modelled rainfall with observations, and accordingly the usefulness of the projections to water managers.

The downscaled climate projections were fed into hydrological models to produce projections of streamflow. The hydrological modelling involved two steps:
1. Runoff modelling - calculating statewide, gridded natural runoff at a resolution of 0.05 degrees
2. River system modelling - aggregating the gridded natural runoff to 65 Tasmanian river basins and then accounting for human activities in rivers including dams, irrigation and hydropower generation.

Splitting the hydrological modelling into these two steps allows the effects of climate and human activity to be differentiated. This is important for water managers, as it separates elements outside of their control (climate) from those under their control (e.g. irrigation). While changes in human water use are not considered in the Climate Futures for Tasmania study, Tasmanian water managers will be able to adapt the river systems models to quantify changes in water management policies.

Finally, projections of runoff were adapted to run through the Hydro Tasmania Systems model Temsim. Temsim uses hydrological inputs in conjunction with projected power demand and energy prices to simulate the Hydro Tasmania power generation system. The Temsim runs translate CFT climate projections into metrics such as storage levels, power generation, and revenue – metrics that can inform the future operation of the Hydro Tasmania system. The result is climate information tailored to the needs of water managers and industry, ensuring the research will be understandable and useable. This paper presents the communication strategy implemented by Climate Futures for Tasmania, and provides a case study of how interaction with government and industry directed the technical research.