Place-based climate data modelling for improved communication with landholders

Relevant Hub Outcome

ST2: Co-design and participatory approaches embedded in the design and delivery of Hub activities.

ST5: Efficient and effective activities to support RDEA&C and uptake by end users.

Impact Statement

Localised climate modelling has been undertaken for TNQ Hub NRM groups. This modelling facilitates trust in climate modelling by using hyperlocal data and enables research-management partnerships between the TNQ Hub, landholders and NRM groups. The place based nature and co-design of the modelling has ensured that it fits end-user needs and assists in planning for the potential impacts of climate change in the TNQ region.

Background

Most climate data available to farmers and landholders is not based on hyperlocalised data recordings. Instead, it is often interpolated – in other words it is 'theoretical' or modelled based on borrowed data sets or large scale regional information. Landholders have therefore been reluctant to fully accept interpolated climate data predictions as they lack confidence that the modelling truly represents local climate. Although Australian CliMate (https://climateapp.net.au/) does partially fill this gap by producing charts for specific locations, doing so is time consuming for multiple locations and climate variables and does not include a trend analysis. Southern Gulf Natural Resource Management Group (SG NRM) believed that using localised, accurate temperature data was the key to improving communication about climate with landholders by using trusted data from recognisable local sites.

Influence of the Hub

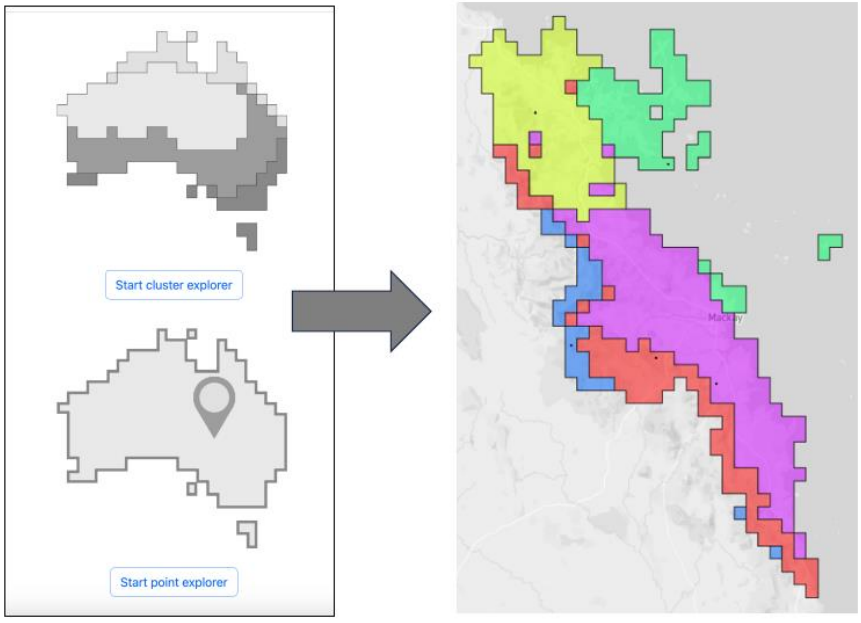
This climate modelling was undertaken through the TNQ Hub's Transformational Agricultural Systems program (TAS), funded by the Future Drought Fund (Department of Agriculture, Fisheries and Forestry). The Hub enabled this project by connecting SG NRM, who identified a gap in climate communication in their region, with JCU researchers who could perform and explain the analysis. This has provided an impact pathway for research in areas which are often under-connected with (such as Far West Queensland) and also created climate communication products understandable at a local scale. While this work initially focused on the SG NRM region, the TNQ Hub conducted a demand analysis with the other node organisations, resulting in this analysis being expanded to cover the entire TNQ Hub footprint.

Developed by: A/Prof Rachel Hay (remove for publication of case study/fact sheet)

Operations

Data was sourced from local post office recordings of temperature and rainfall over a 60 years period. For each trend analysis, data was collected from Bureau of Meteorology weather stations via Long Paddock (https://www.longpaddock.qld.gov.au/silo/point-data/) and My Climate View (https://myclimateview.com.au/). Using clustering for areas of interest the TAS team performed the clustering first for each variable in isolation and then for all variables combined. The analysis focused on several parameters, including Rainfall (Rain), Maximum Temperature (Tmax), Minimum Temperature (Tmin), Evaporation (Evap), Evapotranspiration for short crops (ETsc), and Evapotranspiration for tall crops (ETtc). The analysis encompassed annual, seasonal and monthly timeseries spanning the years 1963-1992 inclusively The analysis focused on a historical 60-year period (1963-2022).

Initially, the modelling was carried out for SG NRM and was later expanded to all TNQ Hub nodes.



Mackay Whitsunday Climate Zones

Issues being addressed

In response to a distrust of regional level climate modelling, SG NRM and TNQ Hub have facilitated the creation of localised, scientifically accurate and understandable climate modelling. This means that landholders are able to plan for the potential impacts of climate change (such as changed rainfall or extended drought periods) based on information they believe in. NRM Groups are also able to utilise this information when communicating with stakeholders in their regions, to contextualise changing climate to their region. As well as predict the impact of climate on future projects.

Developed by: A/Prof Rachel Hay (remove for publication of case study/fact sheet)

Impacts and benefits

The project brings together farmers, researchers and NRM extension to develop climate modelling that communicates local conditions. It integrates trusted local sources of climate data with scientific knowledge of climate change patterns for use in practical on ground applications. The modelling represents a proactive approach that responds to local end-user needs and equips them with a localised solution which can build capacity to prepare for drought. Importantly this modelling is place based and informed by co-design and participatory approaches. By including the NRM groups at every stage of the project, stakeholder needs have been integrated throughout resulting in products that are tailored to the unique needs of the region. This has contributed to driving step change in applications of drought resilience practice on farm and transferring knowledge. End-users of this information are able to better plan for a changing climate, and "know and do" differently as a result of this TNQ Hub Project. Informal feedback from NRM groups has consistently highlighted the practical value of the work. So far this modelling has been used by SG NRM at field days with landholders. Reef Catchments and NQ Dry tropics have also utilised this information to inform design of new projects and location of monitoring sites to ensure the breadth of climate variability in their catchments are captured.

Contact

For more information contact the TAS program lead, Ben Jarihani (ben.jarihani@jcu.edu.au) or the TNQ Hub (tnqhub@jcu.edu.au)

Developed by: A/Prof Rachel Hay (remove for publication of case study/fact sheet)