‘Climate smart grazing tools’: new and innovative pasture budget information for managers of Queensland rangelands

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Background

The Department of Environment and Science (DES) led “*Innovative science to support climate smart grazing land management*” project aims to deliver new and improved products to assist in managing the risks associated with Queensland’s variable and drought prone climate and to achieve better outcomes for the grazing industry, the land, and reef water quality.

Skilful stocking rate and business management are critical in coping with highly variable rainfall and associated forage supply and achieving profitable sustainable grazing enterprises in Queensland rangelands. Forage budgets can assist graziers in making decisions at critical times to minimise the risks associated with high annual rainfall variability.

Intensive field sampling and hyperspectral imaging will assist in the development of high-resolution pasture quantity and quality information that will be made available to all property owners in Queensland via the FORAGE decision support system (www.longpaddock.qld.gov.au/forage).

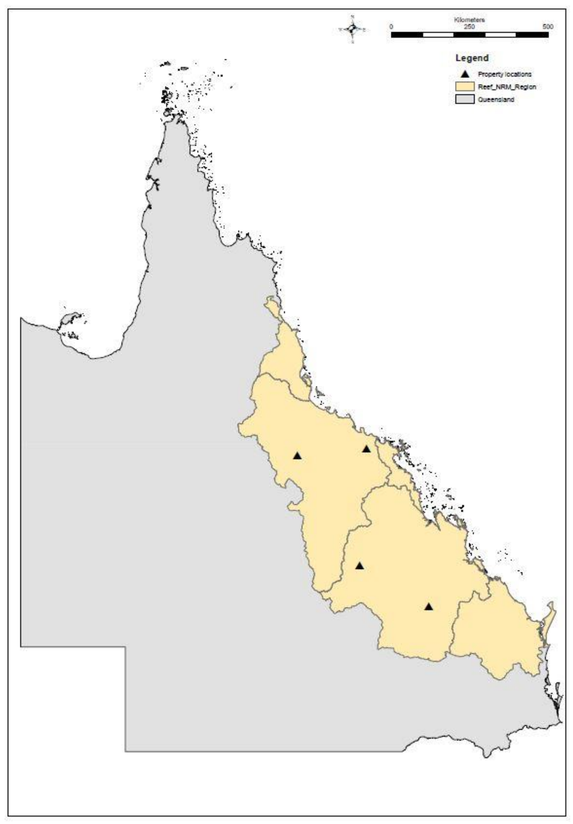

Figure 1: Location of the four commercial beef grazing properties

Methods

Four commercial beef properties (Figure 1) will be visited twice a year during the wet the dry seasons to intensively sample soil and pasture quantity and quality.

Field sampling (Figure 2) will include:

- quadrat pasture biomass and nutrient sampling
- plant transpiration (tree and grass) and carbon assimilation rates using a portable LI-COR 6800 instrument
- large area hyperspectral imaging with uncrewed aerial vehicle (UAV)

Field soil and pasture samples will be collated into formats usable for broader model platforms including the GRASs Production (GRASP) model and alternative machine learning modelling techniques.

The repeated on-ground field site measurements of pasture quality and quantity will also validate high-resolution hyperspectral and photogrammetric imagery captured through both remotely piloted aircraft systems and optical satellite imagery.

A new integrated system will be developed that uses outputs from both the field and UAV hyperspectral imaging to improve pasture modelling approaches and provide more robust seasonal pasture budget products.

Figure 2: Field measurements of pasture quality and quantity by Dr Jason Barnetson (DES researcher) and Dr Hemant Raj Pandeya using a) uncrewed aerial vehicles (UAVs) b) terrestrial 3D laser scanner c) portable LI-COR 6800 instrument d) RS-8800 field spectroradiometer.

Application

The innovative pasture modelling research using remotely sensed (UAV and satellite) imagery and pasture and soil field measurements will enable the development of seasonal forage budget products. This seasonal forage budget information will combine the latest developments in pasture modelling, remote sensing and climate forecasts to provide up to 6-month outlooks for land managers to use. The provision of relevant and valid seasonal forage budget information via the FORAGE online system will increase the capacity of climate smart grazing land management and improve the long-term sustainability of the grazing industry in the rangelands of Queensland.

Acknowledgement

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More information

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