BESTPRAC

Case study series – No. 10

Managing climate risk: the new age of dynamical modelling

James Walker, Camden Park, Longreach QLD

BACKGROUND:

After more than a decade of unpredictable seasonal conditions, Longreach farmer James Walker wanted to get rid of the guesswork and ensure his decision making was as informed as possible.

The new age of dynamical modelling for seasonal outlooks, introduced publicly by the Bureau of Meteorology (BOM) in May 2013, has been an important step forward in weather and climate modelling and provides a valuable tool to farmers keen to more accurately manage their climate risk.

The Predictive Ocean Atmosphere Model for Australia (POAMA) seasonal outlooks indicate the probability that rainfall and temperatures will exceed the 1981-2010 average during the coming three month period. More than ten years of evaluation and refinement of research and development by the BOM and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) show the model is more accurate than the historical statistical model it's replaced.

THE CHALLENGE:

Together with his wife Manny and brother Daniel, James was farming 36,500ha on two properties, Wakefield (near Isisford) and Camden Park (near Longreach), central Queensland producing wool, cattle and hay.

James is also an AWI-funded Climate Champion. Along with 36 other farmers across Australia, he is part of the Climate Champion program designed to help farmers across the nation better their own farming practices.

“Over the past ten years, due to the seasonal conditions, we have had to destock both properties twice, pursue agistment and sell the stud nucleus,” James said.

James said he had no trust in the former statistical weather forecasts, where the indicators were based on historical snapshots.

“After doing some research, we realised there wasn’t anything robust enough to make a confident appraisal on long term weather to support strategic decision making.”

“There are too many variables in farming to rely on weather data from the past. It just wasn’t accurate enough. For us it simply didn’t produce enough confidence.”

Wakefield Grazing at a glance

- Family business, run with his wife Manny and his brother Daniel.
- James took over the operational side in 2002 at the age of 22.
- Farming area of 36,500 hectares on two properties.
- 14,000 sheep for wool and 2500 head of cattle (on property and agistment).
- Hay production.
- Average rainfall of between 150 - 380 mm per year.

FINDING POAMA:

James was first exposed to BOM's physics based dynamical weather modelling in 2012 as part the Climate Champions program, where Dr Andrew Watkins, Manager of Climate Prediction Services at the BOM led a workshop on the new model.

Andrew says POAMA produces over thirty forecast scenarios every week.

"These scenarios are combined to produce the likelihood of whether wet or dry, and warm or cool conditions will occur in Australia over the coming months," Andrew said.

"Previously seasonal forecasts issued by the BOM were based on statistical or historical data to predict future weather patterns.

"One of the problems with using historical patterns to make predictions is that we know these patterns are changing. In short, the past is becoming less of a guide to the future, making real time modelling increasingly important.

"Seasonal climate forecasts will never be perfect, but they don't have to be. In the same way you could make money betting on a loaded dice, a seasonal forecast can shift the odds in a farmer's favour. The new breed of seasonal climate forecast gives farmers the best chance in an uncertain future."

For James, POAMA has enabled him to make more informed strategic decisions based on the weather forecasted around his area in Longreach, Queensland.

THE IMPACT ON FARM:

Like all farmers, James will tell you that you can't control the actions of Mother Nature, but what you can do, is put yourself in the best position to understand what she may do, and counteract unfavourable weather conditions.

Using POAMA in October 2012, James, his wife Manny and his brother Daniel decided to destock their cattle numbers as a result of the dynamical outlook showing that the likelihood of above average rainfall over the following wet season was neutral.

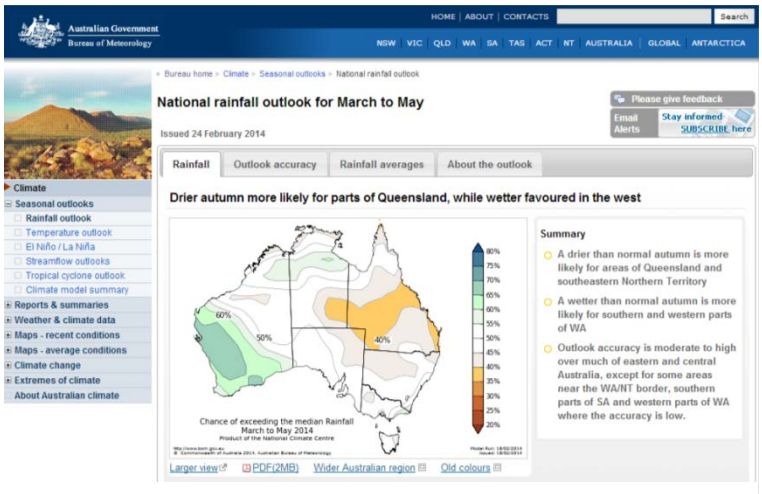
"We couldn't afford to risk having livestock we couldn't feed or sell. The forecast showed a 50-50 chance that we'd get the rain we'd need, and we couldn't take those odds with the cattle cycle also

being at its peak in the market. So we decided to liquidate part of the herd to reduce the vulnerability to our business if a drought set in, this would give us the option to buy back in at similar prices if the season was favourable. If the season became rainfall deficient the cattle market would be inundated with massive sell offs of cattle herd, creating a catastrophe for prices and placement" James said.

And the decision paid off, as a very late and poor 'wet season' set in across most of central Queensland and northern New South Wales.

While James' informed risk assessment and decision making proved to be sound, the Walkers received a bonus as an isolated weather anomaly saw four storms cross over their property, giving them an abundance of feed.

"The model and our decision were right, we were the anomaly," said James.



THE RESULTS:

"I feel that using POAMA put us back in the driver's seat. For us, the ability to make a more informed decision is critical.

"You'll never remove all the risk, but if you can stack the deck in your favour, you're well ahead

"The season was incredibly challenging across the region, with many producers selling their cattle, which resulted in a crash in the cattle market.

"However we were the lucky ones who caught some freak storms and had an abundance of grass during the wet season in summer of 2012/13.

"Looking at the economic climate and the way it was shaping up, we decided to strategically put our capital aside and wait to reinvest in the cattle market around May."

"In considering this step, we looked at the forecast again. It indicated that the rain was going to hold off for an extended period into the later stages of 2013 and start of 2014. Based on this and because

people were highly motivated to secure grass, instead of buying back in cattle we decided to test the market and list the grazing asset for sale.

“The water infrastructure on the property and stock feed available saw us receive an overwhelming response, we attracted the premium we aimed for and the buyer was happy.

“We sold the property eight days after listing."

POAMA AT A GLANCE:

- POAMA was developed jointly by the BOM and CSIRO Marine and Atmospheric Research, and has been evaluated and refined over more than ten years of research and development.
- In May 2013 the BOM moved its official public seasonal forecasts over to this new system.
- POAMA is a state of the art long-range forecast system using ocean, atmosphere, ice and land data observations to initiate outlooks up to nine months ahead.
- The multi-week, seasonal and inter-annual climate outlooks indicate the probability that temperatures and rainfall will exceed the 1981-2010 median.
- The National Climate Centre utilises POAMA for several products including forecasts of the state of El Niño - Southern Oscillation (ENSO), Indian Ocean Dipole forecasts, and seasonal rainfall and temperature outlooks.
- POAMA forecasts are run every week, and consist of 33 scenarios for the coming 9 months. The seasonal outlook is issued monthly, and currently uses the most recent 99 scenarios to generate its probabilities.
- If 90 of the 99 ensemble members suggest dry conditions ahead, we can say there is about a 90 per cent chance of dry conditions in the next season.

BENEFITS OF POAMA FOR FARMERS:

- **Accuracy**: The model is physics based and findings show it is more accurate than the historical statistical model it's replaced.
- **Managing risk**: Farmers have access to long range climate outlooks, designed to help them make informed farming decisions.
    - Temperature: More accurate knowledge of heat or cold risk may help grain growers in managing their crop for season length and frost.
    - Rainfall: Farmers can more accurately calculate the risk of stocking rates for months in advance.
        - Knowing when and where they are going to have the most (or least) grass feed.
- **Future expansion**: As development continues, access to new outlooks may become possible
    - Humidity: Farmers may be able to determine what crop disease they could encounter in the next season.
- **Reliability**: BOM have been fine tuning dynamical modelling for more than a decade. It's now more reliable than ever.
- **World class**: Virtually all the big meteorology agencies around the world use dynamical seasonal outlooks. POAMA is comparable to any of the best dynamical modelling systems in the world.

WHAT YOU CAN DO – UNDERSTANDING POAMA

James says it is worth being aware of the new model and how it can benefit your decision making processes on farm.

"There is a lot of information at your disposal and initially it can be a little overwhelming. However, once you develop an understanding of the model and how it can be localised to your farming area and practices, it's a valuable tool and really quite simple to use."

James says the challenge for farmers is being diligent and actively using the information as much as you possibly can.

"Once I had a grasp on POAMA, I set up reminders in my calendar for key decision making points throughout our farming season," James said.

"Obviously climates and farming practices vary extensively throughout Australia, so the diary of a Western Australian wheat grower will look very different to a Victorian beef producer.

"Climate and farming practices are dramatically different throughout Australia, so what works for one farmer might not work for the next.

"Beef producers may be mostly concerned with the timing of rainfall, to determine if and when they need to buy supplements and fodder, or when to sell and or buy more cattle.

"Whatever the forecasts are showing, using POAMA regularly and correctly will help producers make more informed decisions."

RESOURCES - James as a Climate Champion:

Being part of the program opened James eyes' to dynamical modelling. Since then (2012), he hasn't looked back, and he is now determined to help other farmers' grow their business.

James is one of 37 Australian farmers recruited by the Climate Kelpie program, funded by AWI to provide climate related research information for farmers. This includes up-to-date research about new technologies, like POAMA, and various farming practices for dealing with climate variability and climate change.

As a Climate Champion, James can also provide information for researchers from the farmers about what is needed to minimise and manage risk associated weather on the farm.

James and his fellow climate champions are all passionate about how to manage risk associated with weather to improve farming practices and productivity.

"Once you get your head around it, POAMA is relatively easy to use," James said.

"I've been inspired by dynamical modelling, and I would be more than willing to help any farmer use POAMA to manage business risk and improve productivity on their farm."

Although POAMA is becoming a very accurate climate forecasting tool, I would certainly not use it solely in isolation for decision making. It is just one tool to add background to a decision process, but a very important tool as I have found.

MORE INFORMATION:

More information is available on the BOM website: www.bom.gov.au.

- The outlooks can be found at: www.bom.gov.au/climate/ahead .
- More information about the model can be found at: www.bom.gov.au/climate/ahead/rain_ahead.shtml#tabs=About-the-outlook

Climate Champions like James Walker can further help farmers in understanding the model. If you're interested in speaking to a producer about POAMA, or would like to know where to go for more information, James's contact details are:

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