

Climate information to manage drought risk in NSW

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The impacts of the ongoing drought in NSW

For NSW, the drought of 2002/03 is severe, extensive and ongoing. As of the 21st of August 2003, 81.5% of the state (by area) was declared to be under Exceptional Circumstances (EC). Further applications have been submitted for 5.4% of the state and 11.3% are covered in reports under preparation. This leaves only 1.8% of the state which is not under consideration for EC.

Compared to 2001, the NSW 2002 winter grain crop production was reduced by 77% and summer crop production was reduced by more than 50%. By late June 2003, NSW Agriculture agronomists estimated that 72% of intended winter crop area has been sown, but much of this is on marginal sub soil moisture and is extremely vulnerable to conditions in spring of 2003. Agronomists have expressed alarm at the confidence some grain growers have shown in the winter cropping season of 2003. There is some basis for confidence in years following droughts. For example at Gunnedah if the 10 driest years in the last 100 are selected, 7 of the following years are above average. This pattern of better years following poor years has been shown in the national grain crop and attributed to the ENSO cycle (Rimington and Nicholls 1993). The confidence may also be an aspect of the gambler's fallacy whereby we have a tendency to believe that events are self correcting and will bet more on a head after a run of tails. In the early 1990s in southern Queensland, many farmers believed that they were owed a good season in 1994 after the two previous seasons being poor. Whether the confidence in 2003 is based on inbuilt psychology, the need for cash flow or the limited memory of years following past droughts, there will be a keen interest in the climate outlook for spring of 2003.

A survey of 4,700 rural landholders in NSW indicate a 29% reduction in sheep numbers and

25% reduction in cattle numbers. In the western districts the reduction in stock numbers was as great as 70%. The statewide *retention* of 71% of sheep and 75% of cattle was surprisingly high. This retention was conducted at a considerable personal cost to livestock producers. The rural newspaper "The Land" used approximate figures of barley at \$300.00/t and a farm that had 2000 sheep and 300 cattle (this is about average). Based on these figures it would cost about \$1.00 per day per sheep and \$4.00 per day per head of cattle which totals to \$4500 per week. As the vast majority of farms are family businesses it is difficult to separate business and family finances.

The last widespread drought in the early 1990s was exacerbated by low commodity prices. In contrast this drought was preceded by the 2001-02 financial year which was close to record income for the rural sector. Furthermore, interest rates stayed low and livestock prices remained high. Incomes are projected to fall by 60% for broadacre farms and 80% for dairy farms in 2002-03 (Martin et al 2003). As of 30th of June 2002, 28% of NSW farmers had stored \$46 million in farm management deposit bonds (FMD), some of this can be used to offset falls in income. In the grains industry 63% of farmers held FMDs compared to 27% in the sheep beef industry and 20% in the sheep industry. A number of consultants have reported an increased divergence between farm enterprises that have survived the drought well and those that are suffering.

One of the myths of irrigation in Australian agriculture is that it could be a source of drought-proofing. In this drought irrigators were hit hard and the production of irrigated crops such as cotton and rice have been substantially reduced. Through 2003, levels in most dams have stayed very low and the prospects for the summer of 2003/04 are looking grim.

The stress on the land resource was evident in a few dramatic dust storms, but more subtle water erosion and degradation of pasture stands (both native and introduced) are occurring. Rural counsellors and health workers are reporting an enormous increase in stress related calls. Although there is some patchy relief, for farm business cash flow and farm family stress, the second year of a drought (i.e. 2003) is far harsher.

El Niño 2002 as a signal or threshold event

As argued in Hayman (2003), the El Niño related drought of 2002 can be considered a signal event for Eastern Australia. Wilkins (2000), applied the term to the 1997 El Niño event in the USA. He took the term “signal event” from the literature of risk communication whereby an event such as the Chernobyl nuclear disaster becomes symbolically charged. For the next decade the El Niño related drought of 2002 will be an explicit or implicit part of any conversation on managing climate risk in Australia, the role of climate science in agriculture, the issue of climate change and appropriate ways to practice agriculture.

The drought of 2002-03 will be a milestone in rural NSW, mainly because of the intensity and spatial coherence of the drought. The 2002 drought is the first drought that the media has extensively attributed to El Niño. Although the 1994 El Niño did have a wide impact across eastern Australia there was less media reference to climate science. It was the 1997 El Niño that received saturation media coverage as the strongest event in history yet the effect on the northern NSW wheat crop was minor due in part to timely rain in September.

Changnon (2000) made the following observations about the 1997 El Niño from a US perspective.

- It was the first El Niño that was observed and forecast from start to finish.
- Some of the impacts made spectacular television (even though the event probably resulted in a net economic benefit to the US economy).

- A major reason for the longevity and interest in El Niño in the media was the ability of climate science to provide an explanatory narrative as a background to the pictures. Interest was sustained by the ability of climate science, once the event was under-way, to make predictions which were used by some decision makers for great gain.
- In the US, the 1997 El Niño also generated debate as to whether it was caused or enhanced by climate change and/or was a window on a future under climate change.

In terms of risk communication, there are many similarities between the 2002 El Niño in Australia and the 1997 El Niño was for the US. Climate science in Australia had a similar dual role of providing an explanatory narrative as a background to pictures and then becoming part of the story.

The development of the Farmhand Foundation organised in October 2002 had an impact on the national conversation on drought. Many of the founders of Farmhand were directly or indirectly involved in the media (News Limited, Telstra, John Singleton and foundation spokesman Alan Jones). The Farmhand appeal raised \$22.5 million. In addition to raising funds, the Farmhand Foundation prompted discussion on new ways to mitigate the impact of drought. The response of the Wentworth group of scientists to the notion of drought-proofing Australia has drawn much debate on appropriate forms of land management.

The issue of global warming was another feature of this drought (Károly et al 2003). As pointed out by Nicholls (2003), droughts in Australia have been getting hotter since the 1950s. This link was picked up in a recent opinion piece in the Sydney Morning Herald on the 22nd of August by the Premier of NSW, Bob Carr titled “An even more sunburnt country, thanks to global warming”.

Information flowing into NSW Agriculture

NSW Agriculture has a clear role of not issuing forecasts. Rather we aim to work with climate science to ensure that the advances can be used by

agriculture in NSW. We have benefited from the Climate Variability in Agriculture Program funding conferences, workshops and projects which have given us familiarity with BoM, CSIRO and QDPI.

NSW Agriculture meets every 6 months with BoM in Sydney or Orange and have adjoining stalls at field days such as Agquip. We have trained and equipped advisers with RAINMAN and benefited from the patch point data set and the excellent updated maps and information of the BoM and QDPI website.

Special mention should be made of the El Niño Wrap up site (www.bom.gov.au/climate/enso) which provides the latest observations of various ENSO indicators, with a balanced commentary and links to the relevant global climate models. The regular update of a subjective probability of the chance of an El Niño developing (say 50% compared to a base rate of about 25%) has highlighted both the scientific uncertainty and the dynamic nature of the climate system. This web site is an excellent way to follow the reasoning process in the climate science community. The ready availability of staff from the National Climate Centre as a source to direct media and to answer specific questions has also been a valuable resource.

Information flowing out of NSW Agriculture

During the drought NSW Agriculture has held 487 workshops/farm family gatherings involving 19,250 producers. There have been 7332 calls to the drought hotline and many hits on the Drought Homepage. The Drought Home page was developed well before the current drought largely in response to the 1994 drought. The internet site aims to cover production, social and environmental aspects of drought management. In response to requests from farmers and advisers, much of the information was reproduced in hard copy, although the Internet suits some people, there are many who prefer a hardcopy output.

It would be a mistake to assume that climate science was the major feature of most of these workshops and publications, many farmers are after very specific drought feeding rations to keep stock alive. However, the web site had a link to

the Bureau of Meteorology site and experienced livestock officers remarked that having some climate forecast information was a new feature of this drought and although it did not provide certainty, it gave some basis for risk management.

The notion of what the last 23 El Niño events have looked like from the 18 months Jan yr 1 to June yr 2 was a powerful tool and the chocolate wheel was spun many times as a means of conveying skilful but uncertain forecasts. We benefited from simulation modelling to put the outcomes in context (wheat or sorghum yields rather than rainfall).

Use of climate information

In NSW this was the first drought with widespread media coverage of climate science. Although there remains a mismatch between the lead time and accuracy that farmers want and climate science can deliver, there appeared to be widespread following of climate science. Farmers used this information in a variety of ways from ignoring it to trusting it in alarming ways and most points in-between. Many questions from farmers were more strategic (area of summer vs winter cropping) than tactical (which winter crop and how much N input). For many, the confirmation from climate science followed what they saw out there window.

In general terms climate science did a better job on communicating answers to the question “is this an El Niño and will it hurt ?” than the more difficult question of “when is it likely to stop hurting?”

Communication to stressed people

Although many definitions of communication stress the flow of information from climate science to users, a more people orientated definition is “The reciprocal construction and clarification of meaning by interacting people”. Drought is an intense lived experience, and unlike bushfires or floods is a creeping phenomena which is extraordinarily stressful for those living through it. As argued in greater detail in Hayman and Cox (2003), drought is seen as a metaphor for rural suffering bringing to head many deeply felt inequities between rural and urban communities.

If the task is one of transferring information on equatorial sea surface temperatures to farmers, then communication is a relatively simple task. However, if we are to engage in the question of how to use the advances in climate science to improve the risk management of farming systems, not only is the task more complex, much of the knowledge lies in the farming community which has grappled with El Niño long before it hit the headlines.

Some words from 100 years ago

Following the drought of 1902, the Agricultural Gazette put together a series of articles titled "Lessons of the Drought". Mr R.H. Gennys from NSW Agriculture's Glen Innes experimental farm gave the report for New England. He concluded with the following lessons.

- *Keep a large reserve of pure water*
- *Grow plenty of fodder when you can and put it away for bad times; it will pay for the trouble with large interest when the dry times come, as they surely will in a few years.*
- *It is cheaper to grow fodder in good seasons than buy in bad*
- *Get stock of hardy constitutions and do not keep too many old ones; when they begin to decline in value fatten when possible and sell to the butcher.*
- *Stock should not be allowed to get too low in condition before starting to feed them. This is an important matter.*

Just in case we are tempted to think that the notion of seasonal climate forecasts are new to farmers in Australia, it is sobering to read the 1902 Agricultural Gazette where John Barling, a landholder from upper Manilla, near Tamworth advised to destock when the forecast is for a dry season and increase the stocking rate when a damp season is forecast. Barling acknowledged Sir Charles Todd, H.C. Russell and Clement Wragge and based his work on cycles in the climate record. This was quite a challenge as records for Manilla only started in 1885. Undeterred he found a relationship between

climate variables in a number of country areas and Sydney and then used the Sydney records from 1840 for analysis.

We are greatly aided by access to the internet and advances in climate science, but this must build on the wisdom of Gennys and Barling rather than be seen to replace it.

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