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Reviewing historical climate information

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Introduction

The frequency, duration and severity of droughts can be assessed by reviewing historical records, and this provides a guide to the potential of future or developing drought events. While this will not enable you to provide a forecast for the current year, there is much to be gained from such an exercise.

RLPB historical drought declarations charts

By contacting your local Rural Lands Protection Board, you may be able to gain an insight into the length, duration, severity and timing of past droughts for your area using historical data. For example, the chart below shows the drought declarations for the Merriwa RLPB from 1952 to 1994.

MERRIWA DROUGHT DECLARATIONS 1952–1994

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1952–56												
1957						■	■	■		■	■	■
1958	■											
1959–64												
1965		■	■	■	■	■	■	■	■	■	■	■
1966	■	■	■	■	■	■	■	■	■	■		
1967–69												
1970							▨	■	■	■	■	
1971						■	■	■				
1972								■	■	■	■	■
1973–74												
1975	■	■	■	■	■	■	■	■				
1976–79												
1980			■	■	■	■	■	■	■	■	■	■
1981	■	■	■	■	■	■	■	■	■	■	■	
1982									■	■	■	■
1983	■	■	■	■	■							
1984												
1985				■	■	■						
1986					■	■	■	■	■	■		
1987–90												
1991				■	■	■						
1992	▨							■	■	■	■	
1993					■	■	■					
1994						■	■	■	■	■	NO	DATA
OCCUR.	9	6	8	10	10	12	13	14	10	11	8	6
YRS	42	42	42	42	42	42	42	42	42	42	41	41
% IN DR.	21%	14%	19%	24%	24%	29%	31%	33%	24%	26%	20%	15%

Figure 1. Merriwa drought declarations 1952 – 1994. Note: Hatched areas indicate that only part of the RLPB area was drought declared for that period.

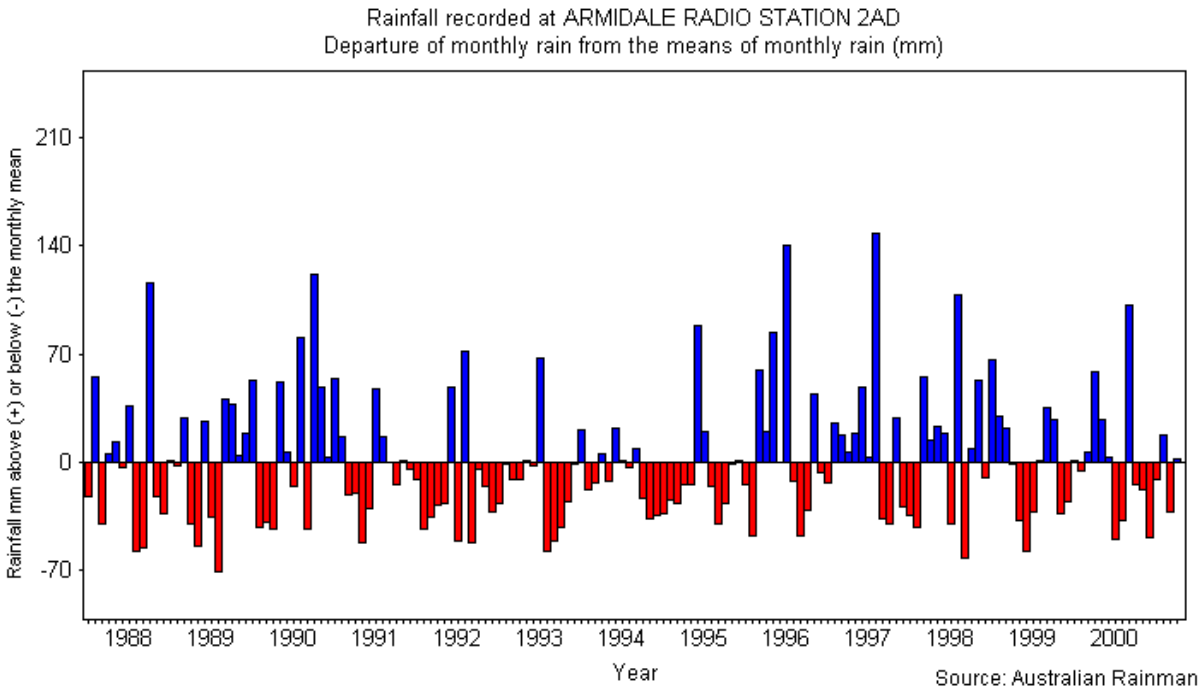

Figure 2. Rainfall recorded at Armidale radio station 2AD

SOI correlations with past rainfall

Linking historical rainfall records and the Southern Oscillation Index (SOI) can provide probabilities of rain for seasons of interest. The computer program Australian Rainman® has been designed to calculate these probabilities for all rainfall-recording sites in Australia. It is available from: Queensland department of Primary Industries and Fisheries via the web address www2.dpi.qld.gov.au/rainman

Figure 3. Chance of rainfall at Collector (Brookdale)

Chance of rainfall at COLLECTOR (BROOKDALE)
using SOI phases: Jul to Aug

Rainfall period: Sep to Nov	SOI falling	SOI negative	SOI neutral	SOI rising	SOI positive	All years
% yrs with at least 327 mm	0	0	12	5	4	5
240 mm	11	25	23	37	50	30
220 mm	21	25	27	47	50	34
200 mm	26	30	35	58	71	44
160 mm	37	35	62	74	92	61
120 mm	63	65	88	89	96	81
68 mm	84	95	100	100	100	96
% yrs above median 183 mm	26	30	42	63	83	50
KS/KW probability tests	0.983	0.958	0.385	0.769	0.999	0.999
Significance level	*	*	NS	NS	***	***
Years in historical record	19	20	26	19	24	108
Highest recorded (mm)	303	326	354	348	357	357
Lowest recorded (mm)	49	58	69	68	74	49
Median rainfall (mm)	143	137	174	216	237	183
Average rainfall (mm)	151	165	193	203	234	191

The sample output shown below was produced by the Rainman® program. The table shows an analysis for Collector in NSW in the spring. It shows the likelihood of rain over September, October and November for different phases of the SOI during July and August. Notice that when the SOI has been positive, the chance of having above-median rain is 83%, and when the SOI has been falling, the chance is only 26%. These sorts of changes in the odds can highlight both opportunities and risks.

Plotting historical rainfall

Plotting historical rainfall for a season of interest can highlight drought frequency and duration. The graph shown in the example below (generated by the Australian Rainman® computer program) plots the variation in each month's specific rainfall from the long-term median rainfall for that same month of the year. A sequence of below-median-rainfall months indicates a drought period. In this example, the period 1993-94 shows that there were only 5 months that had slightly above-median rain out of a 22 month stretch. The full 100+ years of data can be plotted.

The pie chart in the example below was generated by using historical records to predict the chances of rain in Wagga Wagga during July, August and September if the SOI had been negative during May and June. Clearly, the chance of receiving low rainfall for such a period is greater than the chance of receiving medium or high rainfall.

Conclusion

Utilising historical information in this way can indicate the chances of specific conditions occurring and hence the chances of successfully following related management options. However, you should always consider the consequences of the least likely conditions becoming the reality. Any decision will be guided by the scale of these consequences – there is no point in detailing the exact risk of a management option if you cannot afford to have it go wrong.

For the many options which can provide a big return and which have a relatively small downside if they do not come off, a serious examination of the risks can pinpoint the most likely outcomes and help you to choose the most successful path over the long term.

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Figure 4.