Wetter since World War II

It's been getting wetter back of Bourke. Figures compiled by Dr Barrie Pittock of the CSIRO Division of Atmospheric Physics show that average summer (November to April) rainfall between 1946 and 1979 at Dubbo, Bourke, and points west in New South Wales was up 30% and more on the figures for 1913–45.

In most other parts of the State, summer rainfall increased by at least 20%, and increases of 10% and above showed up throughout northern Victoria, in south-central Queensland and parts of the

Northern Territory, and in eastern South Australia (see the map).

How the average rainfall changed with season is illustrated by the graphs of average monthly rainfalls for 1913–45 and 1946–79 in the Charleville–Cunnamulla area of south-central Queensland.

Figures Dr Pittock compiled earlier comparing 1913–45 with 1946–74 show increases in average annual rainfall of at least 50 mm in most of New South Wales. Along most of the State's coast and ranges, the increase exceeded 150 mm.

Does this mean there has been a persistent change for the wetter in eastern Australia? It is much too early to say. Forty years ago, it looked as if the trend was in the other direction. Figures compiled by Dr J. Gentilli, then at the University of Western Australia, show that most of eastern Australia between 1911 and 1940 was some 10–20% drier than in the 30 years up to 1911.

Attempting to unravel the causes of such changes is a task occupying many atmospheric physicists. Dr Pittock has found that, when the atmospheric pressure over the tropical part of the eastern Pacific Ocean is above average, the pressure over Darwin tends to be below average and northern and eastern Australia tend to have above-average rainfall.

Similarly, when the subtropical high pressure belt is at an above-average latitude, the Australian east coast tends to be wetter, and the south coast drier, than at other times.

Correlations such as these give clues to the mechanisms producing wetter or drier periods, but are not yet of much help to scientists trying to work out ways to predict long-term weather trends or even recognize whether such trends are occurring.

According to Dr Pittock, random changes in atmospheric activity — extensions of the random variations that produce day-to-day and year-to-year fluctuations in the weather — could account for the changes observed so far this century. There is no need to invoke external explanations involving sunspot cycles, volcanic eruptions, pollution, or whatever.

What's known as a 'random walk process' could be responsible. Dr Pittock offers the analogy of the progress of an inebriated pedestrian; the cumulative effect of lots of individually random steps can take him a long way from his original or intended position. Similarly, the sum of many individually random movements of weather systems can produce substantial changes in climate.

Of course, the changes in rainfall patterns detected since reliable records began about 100 years ago are minor compared with those occurring over thousands of years, as revealed in the geological and fossil pollen records. Some 20 000 years ago, average temperatures in eastern Australia were probably 3–5°C lower than today's, and rainfall was much lower, perhaps only half present figures. On the other hand, 8000 years ago temperatures were up on today's and rainfall may have been as much as 50% greater.

Nevertheless, changes like those revealed by Dr Pittock and Dr Gentilli can be of great importance. An extended reduction in average rainfall can be disastrous for individual farmers and can severely damage a region's economy.

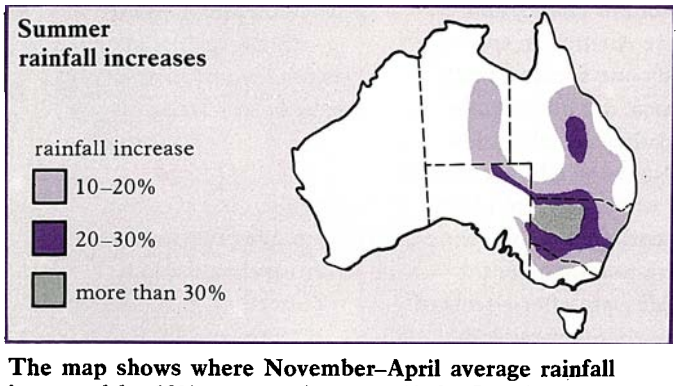
Dr Gentilli calculated that the boundary of Australia's arid zone moved eastwards in places by more than 100 km between 1881–1910 and 1911–40 — from, for example, near Wanaaring in north-western New South Wales to east of Bourke. It has since retreated westwards again.

Dr Pittock speculates that the recent serious drought centred in eastern New South Wales, although now broken, may herald another downward trend in average rainfall. 'But we don't really know', he says. 'The trouble with trends is that they have to carry on for quite a number of years before they can be regarded as established.'

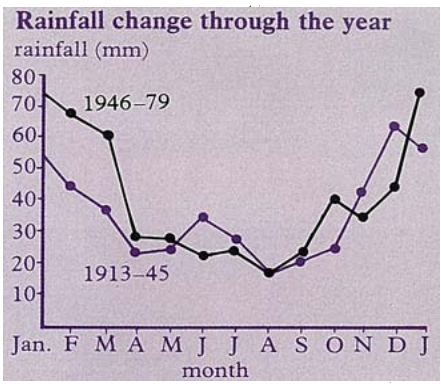
No doubt natural variations in climate will continue. However, in the next 20 to 50 years Dr Pittock expects these will be overshadowed by the effects of global warming due to the increasing concentration of carbon dioxide in the atmosphere.

If this is so, human activity — mainly the burning of coal, oil, and natural gas — will become the main cause of climate change. *Ecos* 28 looked at what might happen.

Atmospheric physicists are faced with the extremely difficult task of forecasting the effects on climate of the carbon dioxide and other products that industrial society is adding to the atmosphere. Equally difficult will be the job of actually identifying these effects — which it may be possible to limit or control if this is thought necessary — among the continuing natural changes.



The map shows where November–April average rainfall increased by 10% or more between 1913–45 and 1946–79.



Most of the increase between 1913–45 and 1946–79 in the Charleville–Cunnamulla area, Qld, occurred between January and April.

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