# Chapter 8 — Climate and rainfall patterns

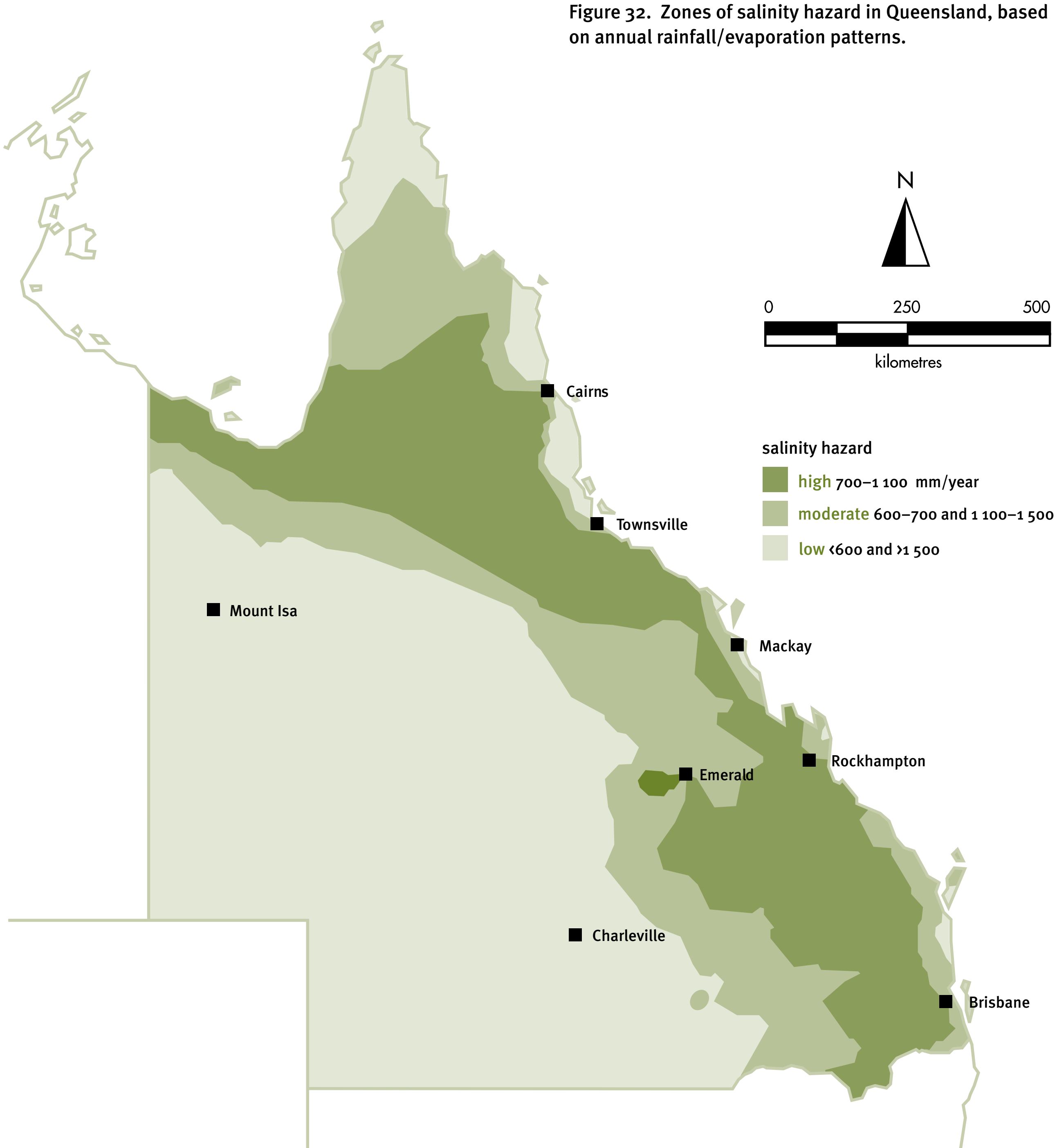
## Average annual rainfall characteristics

In Queensland, watertable salting is mainly confined to lands receiving 600 to 1 500 mm of rain annually, with the most marked effects occurring in lands receiving 700 to 1 100 mm of rainfall. (This is discussed in more detail in Seasonal rainfall/evaporation patterns page 11.)

## Interpretation

The information in Table 23 (page 56) was derived by correlating salinity occurrences with rainfall/evaporation patterns at relevant locations. The data for correlating salinity risk with annual rainfall/evaporation patterns are based on water inputs from rainfall alone. Clearly, additional inputs in the form of irrigation water (particularly from surface waters) will effectively increase the rainfall to a particular landscape.

**Figure 32. Zones of salinity hazard in Queensland, based on annual rainfall/evaporation patterns.**



This is illustrated graphically in Figure 32. Of course, rainfall is only one factor determining the occurrence of salinity.

This map indicates only broad areas in which salinity outbreaks are most or least likely to occur based on current experience.

**Table 23. Correlation between average annual rainfall ranges and risk of watertable salting, based on input from rainfall alone (using average data available from the Bureau of Meteorology).**

| Average annual summer dominant rainfall (mm) | Indicative of salinity risk |
|---|---|
| ‹ 600 | low |
| 600–700 | moderate |
| 700–1 100 | high |
| 1 100–1 500 | moderate |
| › 1 500 | low |

# Moving average rainfall pattern

By looking at the moving average rainfall pattern for a region, it is possible to compare the current rainfall pattern with historic patterns and to assess whether a current expression of salting would be likely to increase or decrease with a predicted rainfall pattern. (This is discussed in more detail in Long-term rainfall trends page 11.)

## Sources of information

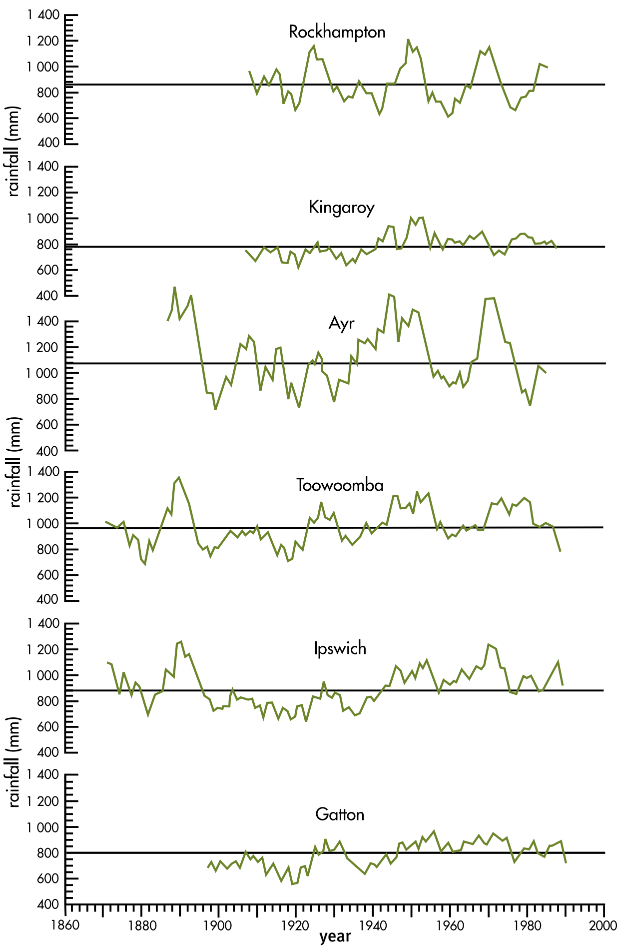
- Australian Rainman, a computer package with climatic information from most Bureau of Meteorology stations throughout Australia, is available from the Department of Employment, Economic Development and Innovation.
- Queensland's Rainfall History (Wilcocks & Young 1991) presents yearly, five-year and ten-year moving averages in graph format for 269 of Queensland's weather recording stations from 1880 to 1988.
- Bureau of Meteorology data on rainfall are generally accessible.

## Calculation

A five-year moving average is commonly used and can be calculated and plotted manually or using graphical software. The manual method can be quite tedious. In brief, five-year moving averages are calculated by averaging the data for years 1 to 5, then for years 2 to 6, then for years 3 to 7, and so on. Moving averages can be plotted against the first, last or middle year of the span being averaged. Because the cumulative effect of rainfall in previous years is important when looking at salinity, the average of the previous four years and the current year should be plotted against a year in question (that is, the average of years 1 to 5 is plotted against year 5, the average of years 2 to 6 against year 6, and so on).

Figure 33 illustrates graphically the rainfall variability, as plotted from five-year moving averages, for a number of Queensland centres.

**Figure 33. Five-year moving average rainfall graphs for a number of Queensland regional centres (data from Bureau of Meteorology).**




## Interpretation

To consider how the current position in long-term rainfall trends ties in with salinity processes in the local area, annual rainfall information can be analysed in conjunction with evidence of salting (initial or recurrent) on remote sensing imagery (such as aerial photos) and in other historical records of land use events such as clearing, irrigation, road or dam construction and so on.

The following points are intended as guides only to interpreting the effect of changes in long-term rainfall trends on current expressions of salinity or the effect of activities which otherwise place a landscape at risk of salting (such as clearing). Further interpretations can be made readily from data at hand.

- If the current five-year moving average is less than the 100-year average annual rainfall and waterlogging or salinity are currently in evidence, then the severity of these problems is likely to increase when annual rainfall exceeds the long-term average (Figure 34).
- If the current five-year moving average is greater than the 100-year average annual rainfall and waterlogging or salinity are currently in evidence, then the severity of these problems may decrease when annual rainfall decreases (Figure 34).

There is evidence that once a salinity problem develops in some regions (particularly those with Mediterranean climates), the problem is likely to remain and possibly increase in size. In contrast, in summer-dominant rainfall areas, such as the Burdekin area or the Lockyer Valley, the size of salinity outbreaks varies with rainfall.

**Figure 34. Projection for the progression of salinity, depending on whether waterlogging/salinity is in evidence when the current five-year moving average is either above or below the 100-year average annual rainfall.**

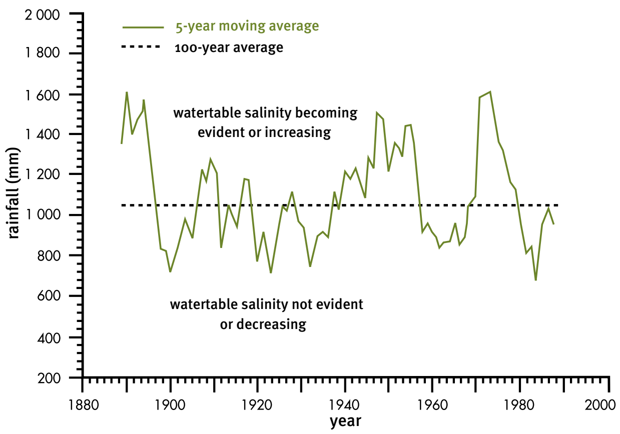
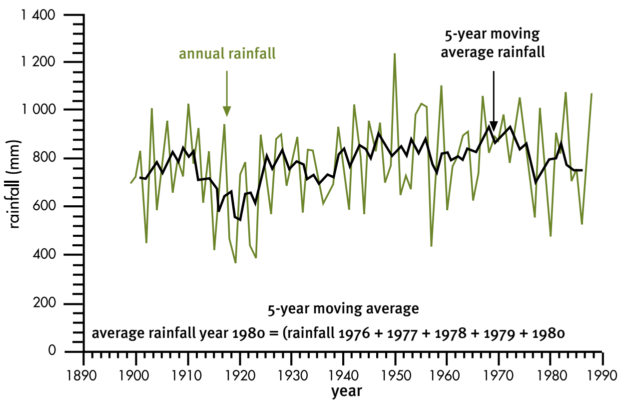



**Figure 35. Rainfall variability for Clare, south of Townsville.**




## Practical example

Rainfall variability in the Clare area, south of Townsville, is very high (Figure 35). Salting was evident in some areas under native vegetation in the early 1980s, due to higher rainfall periods and the strong influence of dykes within the landscape. In 1986, areas which were salted in 1980 showed no evidence of salting and normal vegetation was observed in previously bare drains. In 1992, following two cyclones and a very wet period, shallow watertables and salted areas were more in evidence than had been previously observed for a section of the lower right bank of the Burdekin River.

Using aerial photographs from 1945, 1961, 1971 and 1979, salting was evident on some occasions, depending on the rainfall pattern. This rough analysis indicates that if the rainfall exceeds about 1 100 mm for a few years, salting is likely to occur. Under irrigation, where more than 1 100 mm of water input would be common, severe problems could be expected.