Introduction

Over the closing decades of the twentieth century the term El Niño has become synonymous with social, economic and environmental crises in many parts of the globe. El Niño signals a major departure from the normal climate patterns, particularly those affecting tropical regions. For some countries an El Niño event is typically associated with abnormal heat and drought, whereas for others it is persisting rain and devastating flooding. Loss of crops, stock and food reserves, destruction of shelter and community infrastructure, and outbreaks of disease are some of the impacts that impose hardship and set back social and economic development.

However, drought, flood and other manifestations of climate extremes are not recent phenomena. What is new is the knowledge to link a pattern of simultaneously occurring climate extremes within a global framework. This knowledge, with a developing capability to predict a season or more in advance in some regions, is providing new tools for preparedness and early warning to reduce the risks and better manage the impacts of climate extremes, and to underpin strategies for sustainable development.

The suggestion of a possible linkage between climate extremes in different parts of the globe has its origins in reviews of the calamitous events of 1877 and 1878. During this period drought was widespread across northern China, India, southern Africa, northeastern Brazil, Australia, and the islands of the South Pacific. Also, the Nile River was very low during the period, causing scarcity of food in Egypt and indicating drought in Ethiopia. Famine accompanied the drought in China and India: nine to 13 million people are estimated to have died in northern China; over eight million deaths in India could be attributed to famine and outbreaks of disease. There were also very heavy rains and flooding along the Pacific Coast of South America and a rare hurricane struck Tahiti in February 1878.

The failure of the 1877 monsoon rains over India prompted Henry Blanford (first Imperial Meteorological Reporter to the Government of India) to seek additional meteorological observations in Australia and across the Indian Ocean. It was this scientific initiative that laid the groundwork for gathering essential meteorological data for study of the Indian summer monsoon, and later understanding of the seasonal atmospheric circulation of the Indian and Pacific Ocean basins. These meteorological data provide the basis for linking social and economic hardship with a recurring climate pattern.

Drought again affected many parts of the globe in 1888. Particularly severe impacts were reported in India, Ethiopia, northern Brazil and Australia. Famine, accompanied by disease, was experienced in India and Ethiopia and led to many deaths. More than one and a half million people perished in India and it was estimated that more than one third of the population of Ethiopia was lost.

The pattern of drought has recurred many times in the latter part of the nineteenth and early twentieth centuries. Systematic studies by scientists using data from the expanding network of meteorological observing stations have provided a coherent picture of the seasonal patterns of climate, and of the major changes that occurred during periods of major drought.

During the early decades of the twentieth century scientists began to

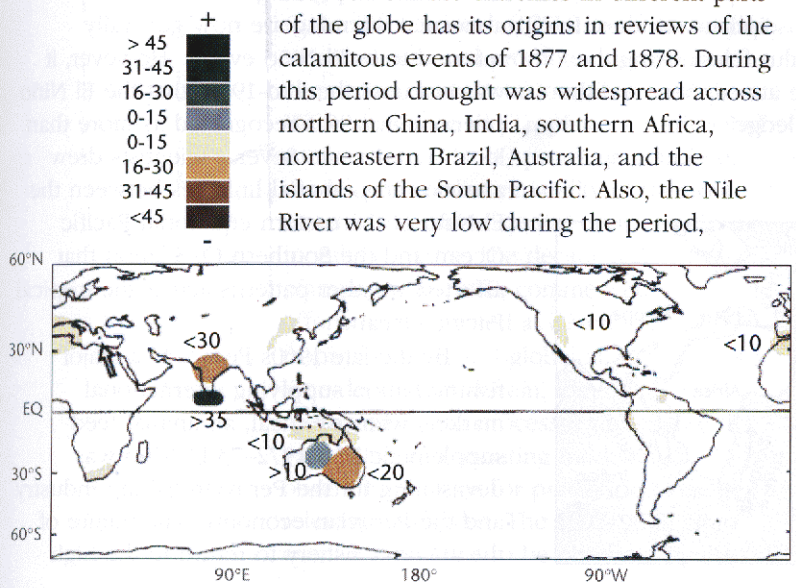

Figure 1
Regions with significant rainfall deficiency during 1877.
(Allen *et al.*, 1996)