

Murray drought wrongly blamed on humans

NH 19/1/09

El Nino, not global warming, was the cause, writes Stewart Franks.

IN 2002, we saw the first signs of an initiating El Nino event, which grew to maturity over the summer of 2002-03 and led to some of the driest and hottest conditions seen in the Murray-Darling basin.

Soon after the El Nino had faded, some reports claimed the air temperatures in the basin were elevated due to the increases in atmospheric carbon dioxide, and that the higher temperatures were driving increased evaporation of soil moisture.

A report released by the WWF-Australia stated: "This is the first drought in Australia where the impact of human-induced global warming can be clearly observed."

This was widely reported, and key authors and other Australian climate scientists have used this "cause and effect" relationship as an

example of how carbon dioxide emissions are driving the crisis in the Murray-Darling Basin, but also as an example of why everyone, everywhere should fear increased droughts into the future as carbon dioxide emissions continue to increase.

This bothered me greatly, because as a scientist trained in the physics of evaporation, I knew it to be inherently wrong.

The problem with the science of evaporation is that it is understood by very few, and it is counter-intuitive. While many people may think that higher temperatures cause higher evaporation, the truth is that it is evaporation itself that controls the air temperature.

Air temperature does not drive evaporation, evaporation drives air temperature.

When the sun beams down onto a wet land surface, there is plenty of moisture available for evaporation. Much of the sun's radiant energy goes into evaporation and only a small portion is left to heat the near-

surface atmosphere. The result is high evaporation rates, high relative humidity of the atmosphere and relatively low air temperatures.

When the land surface is dry, with very little soil moisture, little of the sun's energy can go into evaporation, and so the bulk of the energy goes into heating the near surface atmosphere. Evaporation is much lower than under wet conditions, the humidity of the atmosphere is low and maximum air temperatures soar.

In the Murray-Darling Basin, we know that an El Nino event led to drought conditions. It was associated with a marked reduction in rain and low soil moisture available for evaporation.

The lack of soil moisture during the drought meant that more of the sun's energy was converted into heating the near-surface atmosphere, meaning that maximum air temperatures rose sharply.

Less rain meant less cloud cover and more sunshine over the basin.

More direct bright sunshine further increased maximum air temperatures.

Consequently, we can understand why we had anomalously high temperatures in the Murray-Darling Basin – a combination of the natural factors that comprise the physics of evaporation, driven by an entirely natural mode of climate variability.

In the fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC), the Murray-Darling Basin and the incorrect scientific claims of enhanced evaporation due to higher temperatures were highlighted as an example of climate change.

It seems the physics of evaporation remains misunderstood by those we would hope would understand it the most.

Stewart Franks is an associate professor at the University of Newcastle and president of the International Commission on the Coupled Land-Atmosphere System.