



Title: 'Utopian sunset'

Description: West Coast sunset as seen from where the Orowaiti River meets the sea

Photographer's name: Noelle Bennett

Where and when: Utopia Road. Westport. July 2021.

Sustainability: Have you noticed how many "once-in-a-lifetime" or "once-in-a-hundred-year" weather events we seem to have been having over the last few years? Certainly, 2021 seemed to have its fair share of those type of events. On 17 and 18 July, there was a torrential rainstorm that led to significant flooding and states of emergency being declared in Buller District, Tasman District and the Marlborough Region of South Island New Zealand. It transpired that during that event, flood flows on the Buller River were the largest of any river in New Zealand in almost 100 years. Two months earlier, at the end of May, there had been huge floods in Canterbury. Apparently, that was a 1-in-200-year flood. And at the end of August 2021, it was Auckland's turn to experience nature's wrath.

So is this all courtesy of global warming or is something else at play? And why would global warming produce more flooding? Recent research suggests that something known as atmospheric rivers may be at play here. Atmospheric rivers are narrow corridors of concentrated moisture in the atmosphere. They are thought to cover about 10% of the globe's mid-latitude circumference, but account for roughly 90% of moisture transportation in that region. So they can move incredible amounts of moisture.

Approximately 40 atmospheric rivers make landfall in New Zealand every year. Of those, 20 are described as 'weak'. Between 10 and 15 are classed as 'rank one', the low end of the scale. Four or five are 'strong' and occur predominantly in the summer. Extreme high impact atmospheric rivers occur about every five years. However, warmer climate is creating a wetter atmosphere - with more moisture in the atmosphere, the frequency and magnitude of atmospheric rivers in New Zealand are likely to increase. Research also suggests that these atmospheric rivers are shifting southward in New Zealand.

Atmospheric rivers are thought to be responsible for the vast majority of extreme rainfall here along with over 50% of all precipitation. They seem to have the greatest impact on the West Coast of South Island New Zealand, accounting for much of the heavy rain that commonly falls there. So is it possible to predict where and when they

will appear, especially as it seems that a warming climate is likely to cause more of the extreme events? Research is ongoing into finding ways to automatically detect and understand the severity of atmospheric rivers before they make landfall which in turn could be used to try to reduce the impact on those areas such as the West Coast of the South Island. I guess we'll just have to watch this space.

These huge flushes transport huge amounts of debris and sediment down the rivers. The land's ability to hold its vegetation and soil at these critical times of stress that determines the long-term outcomes for the land and the subtidal ecosystems around river mouths and then along the coast where currents disperse the load.

Photographer's notes: So what has this rather pleasant coastal sunset got to do with atmospheric rivers and extreme weather events you might ask? Well, it was taken on 19 July this year (2021) in Westport. As luck(!) would have it, we were looking after a friend's property and dogs! We had arrived on 15 July...and then the rain started - and it rained, and rained and rained. The property backs onto the beach on the west side of Westport, just where the Orowaiti River exits the lagoon and joins the sea. We had watched as the river volume became more insane. We were incredibly fortunate to be just far enough outside Westport to avoid the flooding unlike the hapless people at the other end of the road.

When the rain finally stopped, this was the sunset that followed but the power and the turbulence in the Orowaiti were something to behold. It simply stunned me that the scene could appear so benign after having witnessed what had preceded it. Long-term resilience depends on smart land use for protection at peak disturbance time, and the natural regeneration and stabilisation that follows – a calm vibrance after the storm.

Photo specs: I deliberately slowed the exposure time down for this image to try to accentuate the movement and swirls where the river meets the sea. Technical specs: The main image was taken using a Panasonic DC-G9 camera and a Panasonic Lumix G-Vario 12-35mm f/2.8 lens. Exposure details - 1/15sec at f13 with an ISO of 100 and a focal length of 15mm (30mm full frame equivalent).

Digital specs: 7707 x 4244 pixels (32.71MP) @ 300dpi

Key words: Westport, Orowaiti, Orowaiti river, flooding, floods, atmospheric rivers, west coast, Buller, resilience, climate change, Noelle Bennett, Ecosystems Photography, sustainability.

Price: \$300 (incl. GST) for use of the digital image. Visit www.ecosystemsphotography/sales for details & to order, or to get a quote if you would like a high-quality print.

Donation: The price includes a \$100 donation to a sustainability organisation or project of your choice, or otherwise to the West Coast Branch of the *Royal Forest & Bird Protection Society* <https://www.forestandbird.org.nz/branches/west-coast>.

We recommend that the donation goes to West Coast branch of *Forest & Bird* to support their work on predator trapping, environmental advocacy and education. They have a Kiwi Conservation Club for younger members. Mobilising conservation action on the West Coast is a formidable logistic challenge – the district is 400 km long and there are about 80 members only – they could do with our support.

Image ref: NB#013 (please use this reference in all orders and correspondence).

Noelle Bennett
28 December 2021