Title: 'Eventide'

Description: An impressionistic version of Deep Bay at sunset

Photographer's name: Noelle Bennett

Where and when: Deep Bay, Pelorus Sound, Marlborough. March 2021.

Sustainability: This is another sunset but it is quite different to 'Sunset strip'. The colours are so much more subtle than in 'Sunset strip', so how does that happen? Why is one all about oranges and deep yellows, whilst the other has such delicate shades of turquoise and pink. I think we need to call on science again to help us.

The familiar blue of the daytime sky is the result of what is known as selective scattering. Scattering is the scientific term used to describe the re-direction of light by small particles. So, for example, the reason shafts of light appear when the sun partly illuminates a smoky room or mist-laden forest is because the light is being scattered by dust particles or water droplets. Selective scattering, also known as "Rayleigh scattering", describes scattering that varies with the actual wavelength of the incident light. Particles that are very small in comparison to the wavelength of the incident light are good Rayleigh scatterers.

Ordinary sunlight is composed of a spectrum of colours that range from violets and blues at one end, to oranges and reds at the other. The wavelengths covered by this spectrum range from 0.47um for violet, to 0.64um for red. However, air molecules are about a thousand times smaller than this, so air is a good Rayleigh scatterer. But because air molecules are slightly closer in size to the wavelength of violet light, pure air scatters violet light three to four times more effectively than those longer wavelengths of the reds and oranges. And if it wasn't for the fact that the human eye is more sensitive to blue light than violet, a clear daytime sky would appear violet instead of blue. Now there's an interesting thought!

At sunrise and sunset, the sunlight has to take a much longer route through the atmosphere to reach us than it does in the middle of the day when it's overhead. And on that longer route through the atmosphere, there are a myriad opportunity for the violet and blue light to be scattered out of the beam so the light that reaches us is noticeably reddened. But what happens when airborne dust and haze enter the equation? Typically, pollution droplets found in summertime haze or dust, or in urban mists or smogs, exist in a wide range of sizes. Therefore the overall scattering they produce is not strongly wavelength dependent. Vibrant oranges and reds of 'clean' sunsets therefore give way

to pale yellows and pinks when dust and summer haze fill the air. I think that is probably what happened in this image from Deep Bay.

Airborne pollutants do more than soften sky colors. They also enhance the attenuation of both direct and scattered light, especially when the sun is low in the sky. This reduces the total amount of light that reaches the ground, robbing sunrises and sunsets of brilliance and intensity

But for this image we also need to factor in the clouds. To produce vivid sunset colours, a cloud must be high enough to intercept 'unadulterated' sunlight - in other words, light that has not been subjected to either attenuation or colour loss as a result of passing through the atmospheric 'boundary layer'. This boundary layer is the layer nearest to the land surface and so it contains most of the atmosphere's dust, haze and pollutants. This largely explains why spectacular shades of scarlet, orange, and red most often grace the high flowing cirrus and altocumulus clouds, whilst low clouds such as stratocumulus or stratus display the subtle colours we see in this image.

Photographer's notes: This was another image where I knew I wanted something a bit different from a standard sunset photograph. I wanted it to be an expression of colour and it was so important that the subtlety of the colours were allowed to shine through and not be overpowered by a super-detailed and very structure image. Yet again, an Intentional Camera Movement (ICM) was the best way I could think of to do this sunset - and indeed the whole setting - justice. So I set my exposure to 0.2sec and simply panned the camera as I pressed the. And I got what I'd hoped for - an image that was all about the subtlety of the colour.

Photo specs: I used ICM as the technique to produce this image in order to achieve not only the impressionistic feeling but also a celebration of colour. Technical specs: The image was taken using a Panasonic DC-G9 camera and a Panasonic Lumix G-Vario 12-35mm f/2.8 lens. Exposure details - 0.2sec at f/20 with an ISO of 200 and a focal length of 26mm (52mm full frame equivalent).

Digital specs: 7515 x 4472 pixels (33.61MP) @ 300dpi

Key words: Deep Bay, Pelorus Sound, Elaine Bay, Marlborough, sunset, sea, ocean, colour, pink, hills, clouds, atmosphere, pollutants, aerosols, scatter ICM, 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 Environmental Defense Society https://www.eds.org.nz/*.

We recommend that the donation goes to the *Environmental Defence Society* to support its big picture work on government policy and legislation, urban and built environments, industrial uses of resources and land. It is this broadscale level of work that is needed to reduce human-made aerosol contaminants that are the subject of this sustainability commentary and photograph. EDS is a not-for-profit environmental organisation comprised of resource management professionals.

Image ref: NB#045 (please use this reference in all orders and correspondence).

Noelle Bennett
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