

# NEUTRAL DENSITY FILTERS for DIGITAL PHOTOGRAPHY

# USING FILTERS for DIGITAL PHOTOGRAPHY

## Part 2 Neutral Density Filters



Quote: “You’re never more than a few steps away from shooting your best images ever”.

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Photography is a way to capture what you see, but capturing a certain scene sometimes feels impossible.

Perhaps you’ve found yourself in this scenario:

- *Those dynamic clouds should be included in the shot, but if you expose for the subject, all the detail in the sky is lost, and if you expose for the sky, the subject is a dark blob.*
- *Why do professional landscape photographers seem to have no trouble capturing the sky in a scene?*
- *What about those long exposure photos that appear to be shot in the middle of the day?*

You’ve tried them, and either ended up with an image which is overexposed or a shutter speed that wasn't slow enough.

Maybe there is a better way?



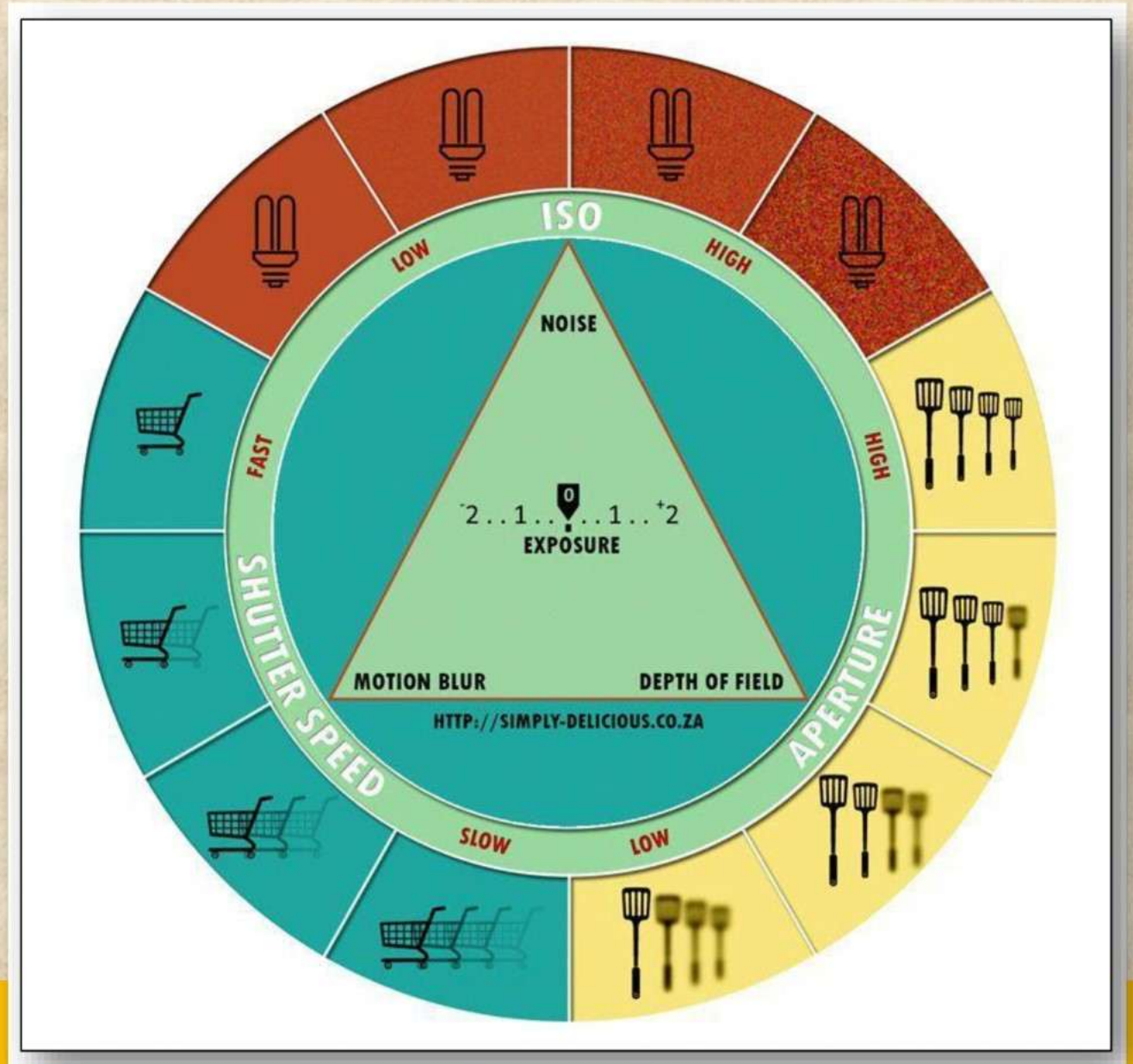
# Aspects of Control

There are three aspects that photographers routinely use to control exposure;

1. *Shutter speed is used to control how movement is captured,*
2. *Aperture dictates depth of field (the size of the sharp zone)*
3. *ISO gives you the flexibility to use different shutter speed and aperture combinations as light levels vary.*

Now there's a Fourth aspect worth considering:

4. **Neutral Density Filters**, often called ND filters, offer a means of controlling exposure by reducing the amount of light that enters the lens.



# Blocking Out Light !

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Blocking out light may seem silly to a photographer that's ever shot indoors or at night, but there's a few scenarios where there is such a thing as too much light.

A **Neutral Density Filter** blocks out light to either help with an unevenly exposed scene or to allow for more flexibility at slow shutter speeds.



# What is a Neutral Density Filter?

A Neutral Density Filter is a type of grey filter that easily attaches to a camera lens, to control how much light enters the camera's lens.

Since a Neutral Density Filter is *neutral*, it doesn't have any impact on image colour, contrast or sharpness.

By increasing *density*, or blocking out light to your camera lens, a Neutral Density Filter lets you manipulate your photos to achieve really creative results.

Think of an Neutral Density Filter as a pair of sunglasses with a neutral tint that cuts down on the amount of light into your eyes.



# How Is Filter Density Shown

There are 3 different ways of showing the neutral density strength of a filter.

The easiest of them to understand is by how many stops (f-stops) your exposure will have to be adjusted when you use a particular filter.

1. As f-stops like 1-stop, 2-stops, or 3-stops.
2. Absolute density values like 0.3, 0.6, or 0.9.
3. As actual exposure factors like 2x, 4x, or 8x, shown as ND2; ND4; ND8 . .



# ND Filter Density Chart



## NEUTRAL DENSITY CHART

[www.better-digital-photo-tips.com](http://www.better-digital-photo-tips.com)

The 3 ways of showing the ND Filter filter strength.

FILTER	DENSITY	ADJUSTMENT
ND 2	0.3	1 F-STOP
POLARIZER	0.5 to 1.50	1/2 to 1 1/2 F-STOP
ND 4	0.6	2 F-STOPS
ND 8	0.9	3 F-STOPS
ND 16	1.2	4 F-STOPS
ND 1000	3.0	10 F-STOPS

# How intense does it need to be?

The intensity needed will vary based on the situation. Shots in the middle of the day will require a denser filter, while shots towards the end of the day don't need so much light reduction.

Shots requiring a very long shutter speed will need a Neutral Density Filter with a higher number than shots with a shorter shutter speed.



Without Neutral Density Filter

With Neutral Density Filter

# How ND filters limit the amount of light

A Neutral Density Filter limits the amount of light coming in, this is designated by the ND number, so photographers can choose a filter that offers the right amount of light reduction for their shot.

Since you might not know what you need until you're setting up the shot, Neutral Density Filters are often sold in sets.



# How to Calculate Exposure Time

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There are various ways to calculate the exposure times especially when using the high strength ND1000 or 10-stops filter, when the exposure metering goes beyond the camera's capability.

Here are a couple of generally used techniques for exposure time calculation:

- \* Simple maths
- \* Exposure calculator apps
- \* Exposure calculation table



Faroe Islands

Fujifilm GFX 50S, Fujifilm 32-64mm @32mm, NiSi 10-stops Neutral Density Filter filter ISO-100, f/14, 120s

# Simple Maths

Sometimes, just simple maths will do the job.

The formula to calculate final shutter speed:

$$\text{Final shutter speed} = \text{Base shutter speed} \times 2^n$$

(n is stop value of ND filter)

For a 6-stops ND filter, and a base shutter speed (without filter) of 2 seconds.

$$\begin{aligned} \text{6-stops ND filter: Final shutter speed} &= \text{Base shutter speed} \times 60 \\ 120 \text{ Seconds} &= 2 \times 60 \end{aligned}$$

To simplify the calculation, we have assumed that the value of  $2^6$  is equal to 60 instead of 64.



# NiSi Exposure Calculator App

Use the NiSi Filters app to calculate the exposure time, when using ND filters.

Select a base/normal shutter speed before adding a filter to the camera.

Then select your filter and the new exposure time will be calculated.

If the exposure time is over 30 seconds a timer is also available to countdown the exposure time.

Available FREE on the Apple App Store and Google Play Store.



# Neutral Density Filter Calculator

The top row contains exposure times without a filter.

Based upon the correct exposure without a filter, calculate the long exposure by choosing the number of stops on the left of the chart and move to the right to find the corresponding exposure time below the unfiltered exposure.

The right hand column shows the value of the Neutral Density Filter filter.

## ND Filter Calculator

No filter	1/4000s	1/2000s	1/1000s	1/500s	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	No filter
<b>1 stop</b>	1/2000s	1/1000s	1/500s	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	<b>ND2</b>
<b>2 stop</b>	1/1000s	1/500s	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	<b>ND4</b>
<b>3 stop</b>	1/500s	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	4min	<b>ND8</b>
<b>4 stop</b>	1/250s	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	4min	8min	<b>ND16</b>
<b>5 stop</b>	1/125s	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	4min	8min	16min	<b>ND32</b>
<b>6 stop</b>	1/60s	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	4min	8min	16min	32min	<b>ND64</b>
<b>7 stop</b>	1/30s	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	4min	8min	16min	32min	64min	<b>ND128</b>
<b>8 stop</b>	1/15s	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	4min	8min	16min	32min	64min	128min	<b>ND256</b>
<b>9 stop</b>	1/8s	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	4min	8min	16min	32min	64min	128min	256min	<b>ND512</b>
<b>10 stop</b>	1/4s	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	4min	8min	16min	32min	64min	128min	256min	512min	<b>ND1024</b>
<b>11 stop</b>	1/2s	1s	2s	4s	8s	15s	30s	1min	2min	4min	8min	16min	32min	64min	128min	256min	512min	1024min	<b>ND2048</b>
<b>12 stop</b>	1s	2s	4s	8s	15s	30s	1min	2min	4min	8min	16min	32min	64min	128min	256min	512min	1024min	2048min	<b>ND4096</b>
<b>13 stop</b>	2s	4s	8s	15s	30s	1min	2min	4min	8min	16min	32min	64min	128min	256min	512min	1024min	2048min	4096min	<b>ND8192</b>

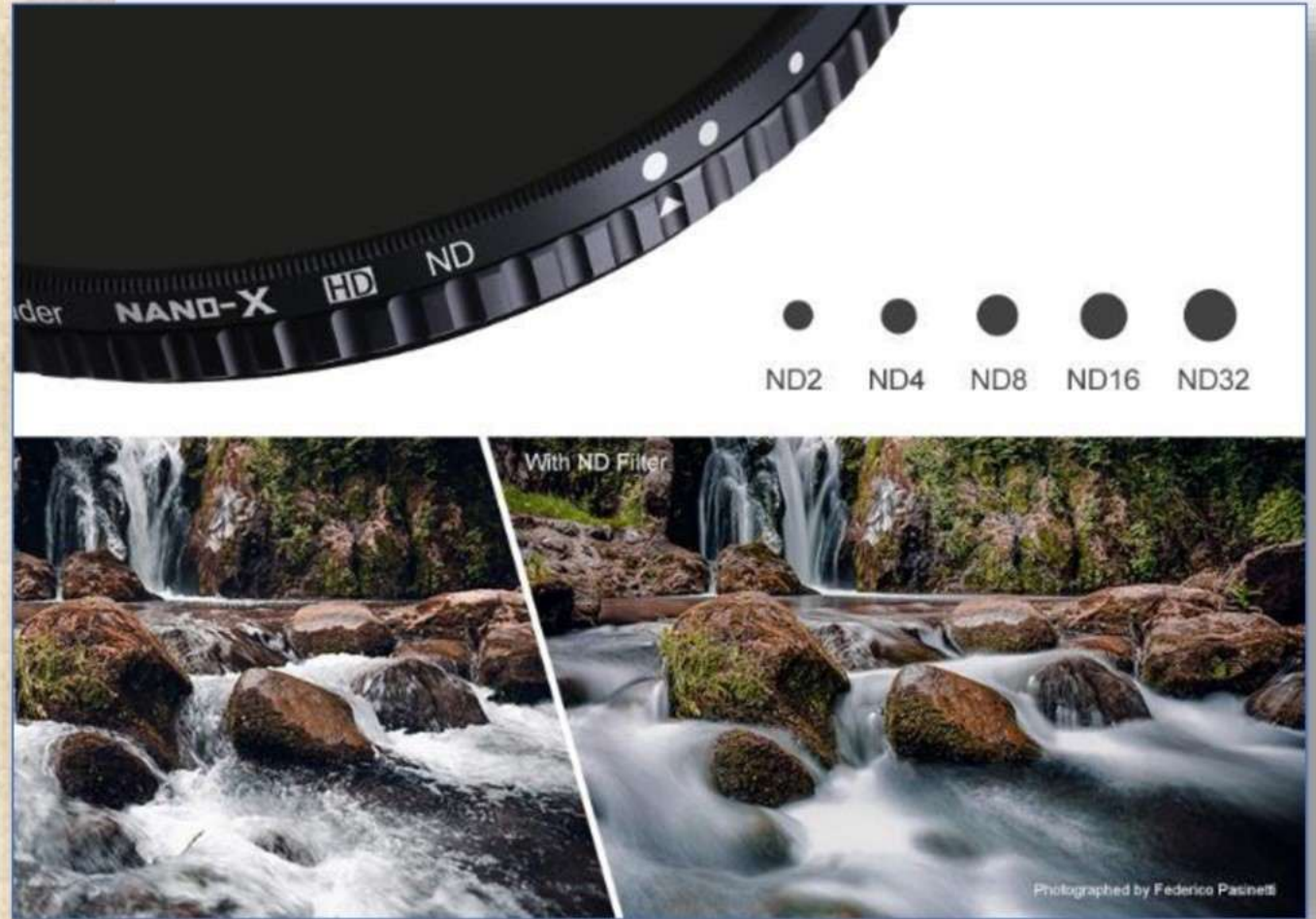
The top row contains exposure times without a filter.

Based upon the correct exposure without a filter, calculate the long exposure by choosing the number of stops on the left of the chart and move to the right to find the corresponding exposure time below the unfiltered exposure.

# Variable Neutral Density Filters

An alternative to individual filters would be to use a single **Variable Neutral Density Filter**, which is a filter that can be rotated to cover a range of f-stops.

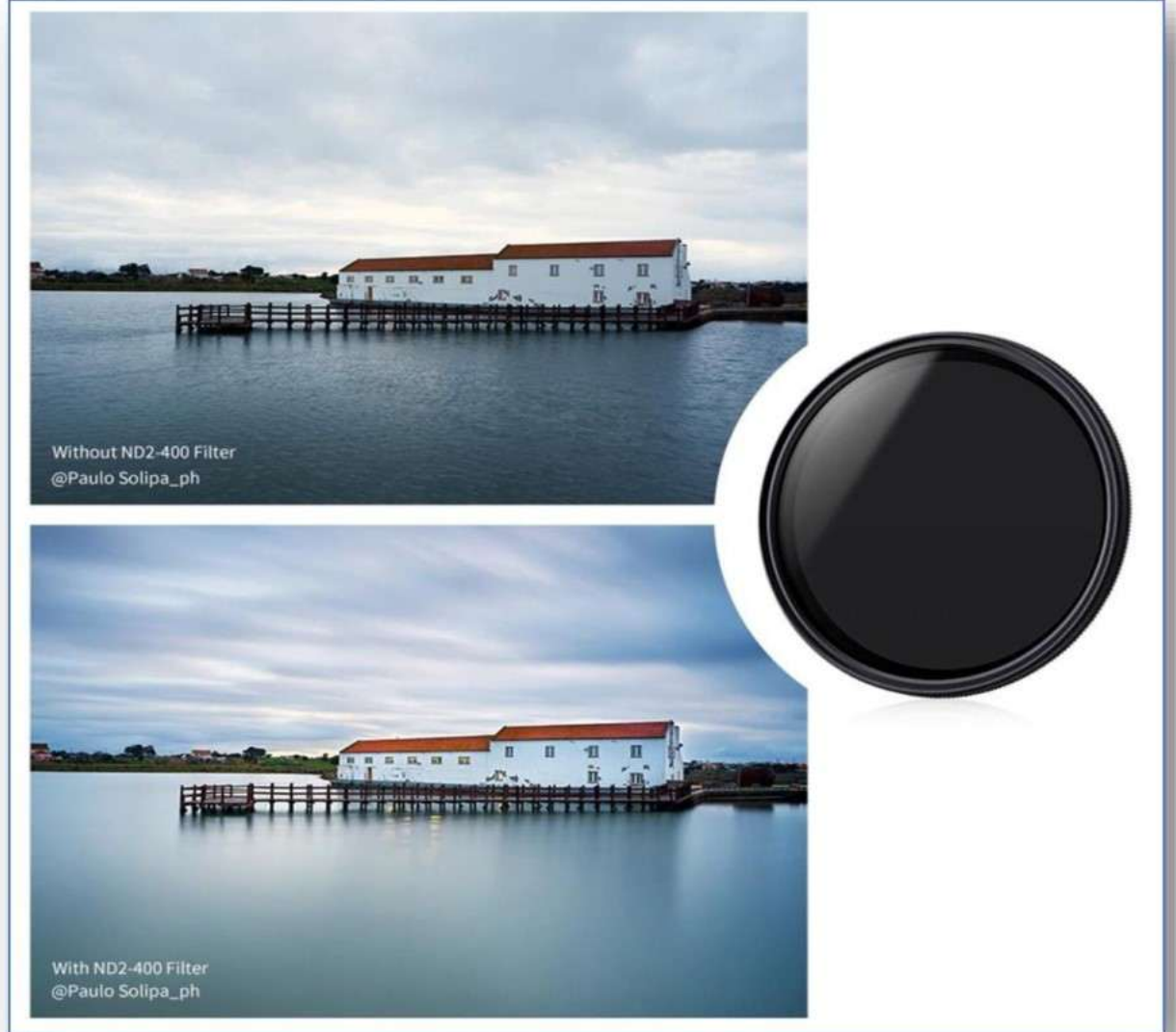
Because of its flexibility, it also means you don't need to keep changing filters every time you want to alter light levels.



# Why use an ND filter

There are 5 main reasons for using a Neutral Density Filter. All 5 of which will aid you in improving your photography:

1. To create motion blur in your photo by using a slower shutter speed.
2. To open to a wider aperture and reduce the depth of field for a blurry background.
3. To synchronize the shutter opening when using a flash in brightly lit situations.
4. To photograph an eclipse.
5. By using a GRADUATED Neutral Density Filter, you can darken the sky.



# When to use an ND Filter

By reducing light entering the lens, a photographer can use a wider aperture for a longer period of time, to create a number of desirable image effects, many of which wouldn't be possible in bright conditions.

You can capture blurry, smooth, misty or silky images of water, using a longer exposure time with an ND filter.

This effect is especially awesome when shooting moving water, such as waterfalls or choppy waves. It adds huge drama and visual appeal to an image.

But it can also let you introduce movement in one scene, whilst keeping the rest of the scene static.



# Clouds & Foliage

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Clouds and foliage also make great subjects for shooting with a Neutral Density Filter.

Moving objects, such as people or vehicles, can also be blurred or distorted to great effect with this lens filter.



# Bright Sun

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When the sun is very bright, it's hard to capture the perfect shot.

This is where a Neutral Density Filter comes to the rescue.

It lets you use a wide aperture to achieve a shallow depth of field, without causing any overexposure.

Without a Neutral Density Filter, a camera would struggle to achieve a small enough aperture to capture these same effects.



# Landscape & Outdoor Photography

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If you are interested in either landscape or outdoor photography, you'll find that a Neutral Density Filter comes in handy many times.

By adding motion or blur to images, you can bring static scenes to life.

This introduces a more interesting dimension to what might otherwise be a rather dull subject.

What also makes this filter so useful is that many of its effects can't be replicated by post-production software editing.



# High Speed Synchronisation (HSS).

When using a flash on a camera with a focal-plane shutter, exposure time is limited to the maximal speed (often 1/250th of a second, at best), at which the entire film or sensor is exposed to light at one instant.

Without a Neutral Density Filter, this can result in the need to use an aperture of f8 or higher.





## Some good examples of ND filters at work.

- Widen Apertures
- Balance Landscapes
- Shoot Waterfalls
- Smooth Rivers and Lakes
- Make Waves
- Streaking Clouds
- Shoot the Sun
- Darken Skies
- Slow Time
- Sultry Sunsets and Sunrises



## Widen Apertures

A Variable Neutral Density Filter would be a great way for changing how much light is cut out to suit the environment, enabling an aperture value as low as  $f2.8$  in bright conditions.

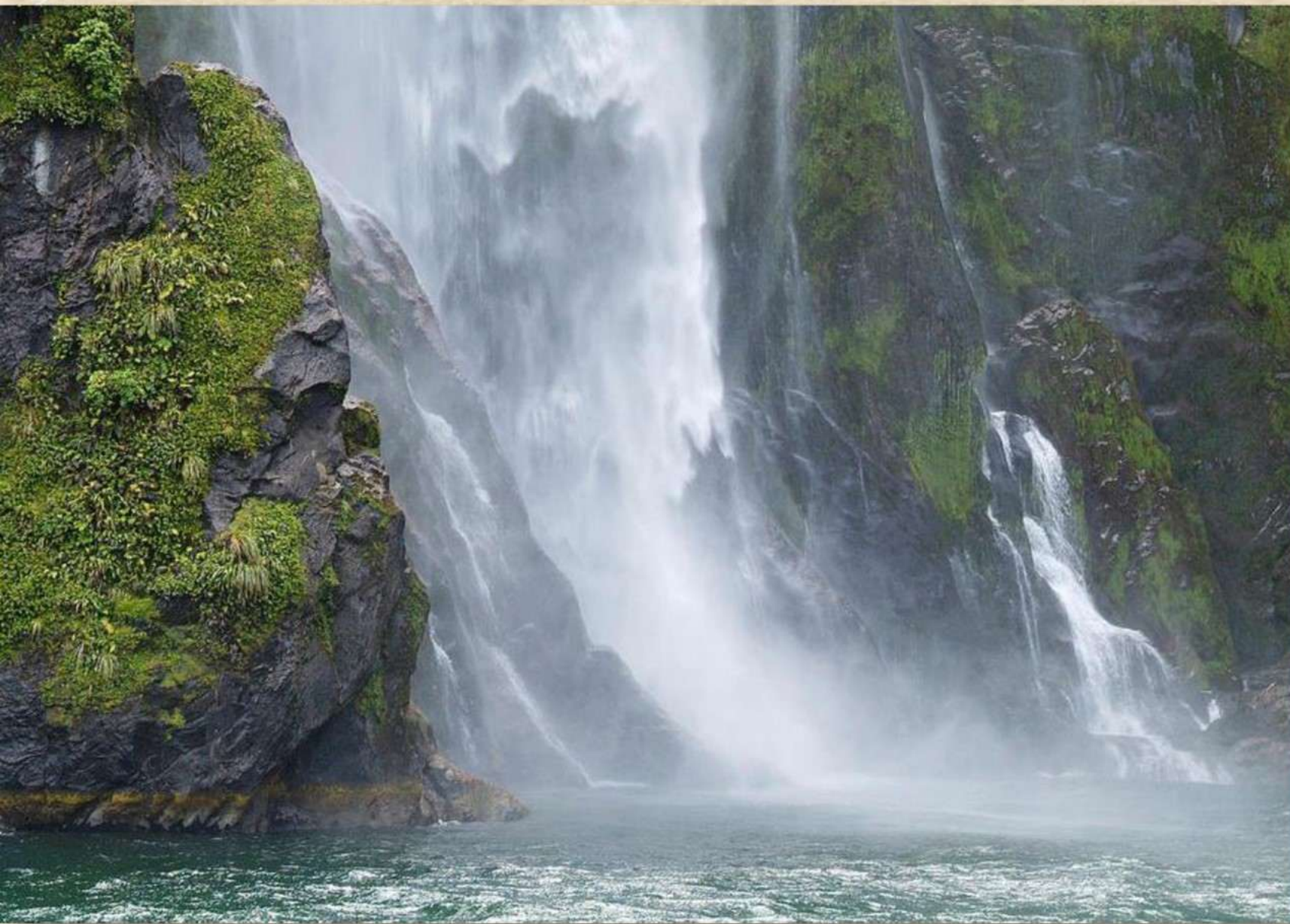
A wider aperture also helps to control the bokeh, or blur, in bright conditions when normally it would be impossible.



# Balanced Landscapes

If scenes are washed out by harsh overhead sun, use an ND2 filter to filter out just a stop of light.

An ND2 will filter out 50% of the light to your sensor, meaning a shutter speed of 1/250 second would become 1/125 or twice as long.

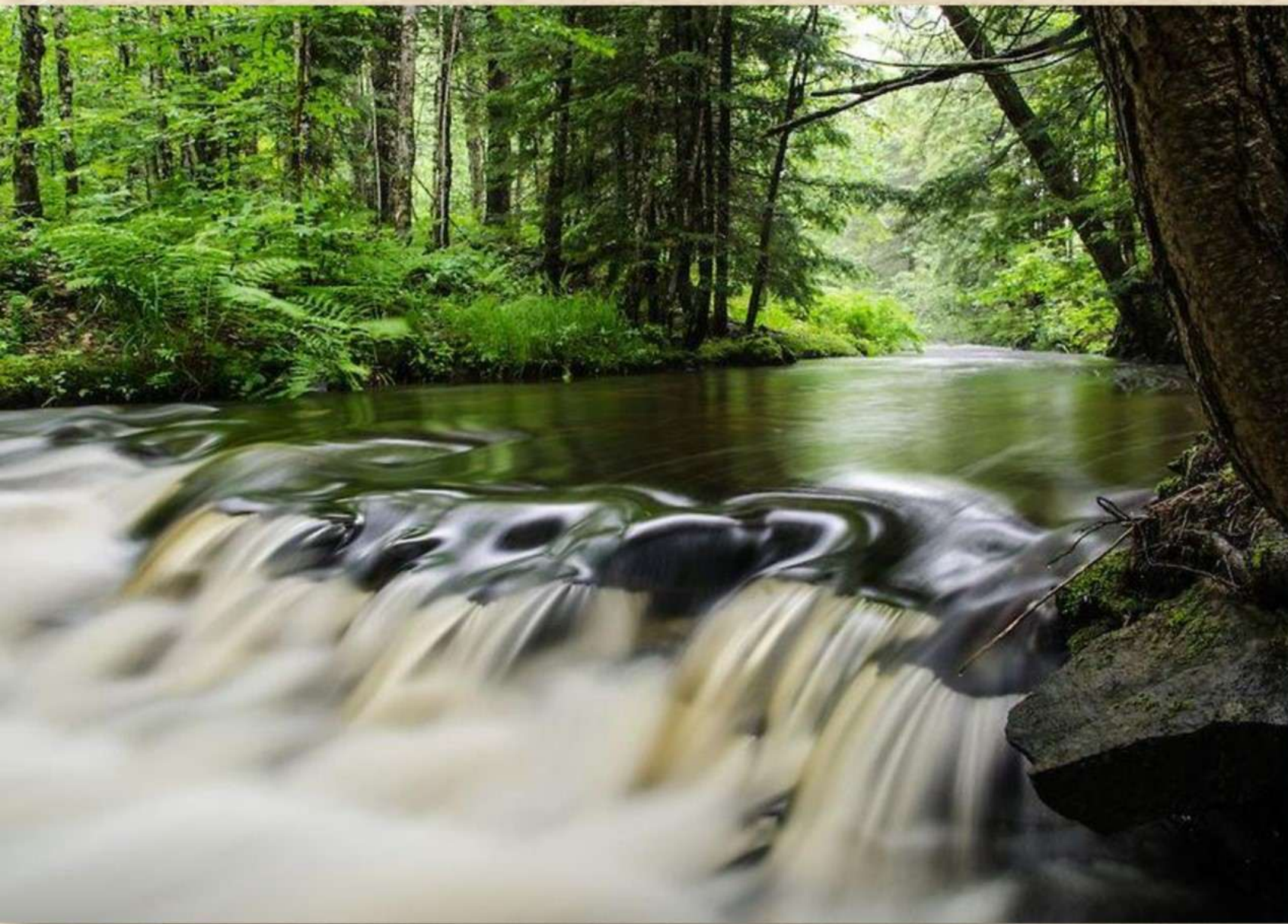


# Shooting Waterfalls

For the definitive blurred waterfall shot, keep your exposure between 1/4sec to a full second to record the water's motion that will still preserve some detail.

If it's the middle of a sunny day use a strong ND filter like the ND1000 with a 10 stop reduction.

An ISO of 100 and small aperture of around f/16 would be a good starting point.



# Smooth Rivers & Lakes

The long exposure gives flowing water a silky smooth look, making a tranquil looking photo out of even the most raging rivers.

For rivers and streams, a shutter of 1/2sec is ideal.

The longer the shutter, the more blurred the effect.



# Make Waves

A Variable Neutral Density Filter is perfect for capturing more abstract shots of waves.

The effects give the photo an almost physical feel of movement and speed especially with a surfer riding the wave!

1/2sec will include some white cap motion, while several seconds will render waves smooth and milky.



# Streaking Clouds

Streaking clouds look pretty incredible with the use of an ND filter and can really add intensity to an otherwise mundane sky.

You'll need an ND1000 filter, and exposures of around 30 seconds, depending on how fast the clouds are moving.



# Shoot the Sun

Taking photos directly at the Sun is never going to be simple.

But it may be possible by using at least an ND1000 filter, and manual settings for the lowest ISO (100), a maximum shutter speed (1/1800) and the largest aperture (f2.8) that your camera allows.

Also, by adding two ND1000 filters together, giving a 20 f-stop reduction, will block more light and make it easier to shoot the sun.

*Make sure to compose your photo using live view, and never look at the sun through the viewfinder!*



# Darken Skies

On adventurous days in the outdoors, ever-changing light conditions can limit your creative options.

To save buying multiple filters, a Variable Neutral Density Filter is a great solution.

With 1 to 8 f-stops of light control, you can twist it around until you've chosen your degree of density and shoot with the effect you require without changing your filter!



# Slow Time

Combining the alluring colours of twilight with the motion of water and anchoring it with the scene of the coastlines sand and rocks leads to mesmerizing photos.

By using an ND1000 and a shutter speed of a few minutes, using Bulb mode. Select a narrow aperture and low ISO, to capture the surreal movement of the sea.



# Sultry Sunsets and Sunrises

It's not just moving subjects like clouds or water that ND filters are made for.

Shooting a distant mountain range at sunset or sunrise with an Neutral Density Filter filter will reap rewards.

The long exposure of upto 4 seconds allows the changing colours of the sunset or sunrise to be exposed as a mixture of colours in your photo.

Using a filter greater than ND64 will need too long an exposure and the mix of changing colours will be missed.



## Just an observation

Throughout these examples of using Neutral Density Filters to create amazing scenes, it was noted that there was a lot of use of either an ND1000 filter or a Variable Neutral Density Filter.

It would seem that these are the only filters you need in your pocket.

However, there will be times when it is necessary to attach a combination of different filters to get the desired effect.



Well that's Neutral Density  
Filters in a nutshell

THANK YOU FOR WATCHING