THE USE OF FILTERS IN PHOTOGRAPHY

- a basic introduction -

* Why use filters and when?

Filters reduce the light captured through the lens, causing the exposure time (shutterspeed) to be lengthened in order to achieve effects that cannot be reproduced by post-processing alone.
The effects desired can be: smoothing of watersurfaces, reducing bright sunlight, darkening skies, bring out the natural colours, create traces of moving clouds etc.
These effects can be created:
by **Neutral Density (ND) filters**, darkened glass looking grey or black, depending strength.
These filters can be **circular**: can be screwed directly onto the lens.
They can also be **square**, fitting into a holder screwed onto the lens.
Combined with the ND filters, or by its own, is the use of:
the **Circular Polarising Filter (CPL)** this filter cuts out reflections and deepens the natural colours of a scene - when used perpendicular to the lightsource it creates a beautiful sky.

In general, most photographers using filters carry **three types** in their kit:
- **ND filters, of varying strength,** circular or square.
- **GND (Graduated Neutral Density) filters**, square shape, with only part of the glasss darkened (e.g. to darken the sky only and leave other areas unchanged), these filters can have a 'hard' transition (e.g. a straight horizon) or 'soft' (e.g. hills or objects giving an irregular horizon), or even 'semi' (in between).
- **CPL filter**, which can be used with ND and GND filters.

Depending on desired effects, all three types can be used combined on the lens, via the attached Filter Holder!

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* What strength of filter(s) to use? A few examples:

- **2 or 3 stops**: smoothes dynamic water but keeps the texture: waterfalls, seascapes. Exposure time usually 0.3 - 2 seconds.
- **6 stops**: often used during Golden Hour: smoothes water and clouds. Exposure time usually 30 seconds - 2 mins.
- **10 stops**: during the day, bright light. Exposure time may be upto 5 mins.

Note: for each 'stop' of light blocked, the exposure time doubles!

To illustrate this I attached a usable, handy **exposure table.**

The 10 stops could be achieved e.g. using a CPL (2 stops), a GND (2 stops) together with a ND (6 stops) - many variations are possible.

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* What is the Filter Holder System?

To use the square filters as described (a common size for the filters is 100mm x 100mm), you need the following items, attached in this order to your lens:

- an **ADAPTOR RING**, diameter pending the lens diameter (to fit standard lens sizes: e.g. 58, 62, 67, 72, 77, 82mm.)
- a **SET UP RING**, screwed onto the adaptor ring, this set up ring holds the CPL, if needed.
- a **FILTER HOLDER**, in which one or more square filters are inserted, connected to the set up ring. A storage box for all the above items is usually included.

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Additional filters for creating other effects are available, but just using the above will be satisfying in almost all situations.

I have a 6 and a 10 stopper ND, a hard and a semi hard GND plus a CPL filter, which for me is enough for most situations.

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* Points to remember:

- You must compose your scene and note the exposure time before placing dense ND filter(s) in the holder, as you will see hardly anything through the viewfinder once the filter(s) are inserted!
- When using GND filters ensure the transition point from light to dark is correctly lined up - using 'live view' may help you.
- Filters can be 'stacked', some holders hold three filters!
- A suggestion: cut out the attached EXPOSURE TABLE and laminate it as protection (I strap it sometimes to my tripod as a quick reference).
- A sturdy waterproof tripod is a must!
- A remote control or shutter release cable is also needed
- Shutter setting at 'bulb' is needed for exposures over 30 secs.
- And ENJOY YOURSELF! Take extra time to set up your tripod and filter system
- Never give up! Just keep practising with different filters/combinations in varying circumstances and situations.
- It is a great investment: you may change your camera but you've got the filters 'for life', with a little TLC...

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* THE EXPOSURE TABLE:

I limited the F.stop reductions to 11 - it is easy to work out the stops over that (remember: just double the exposure time for every stop).
Example from the exposure table:
if my correct shutter speed is 1/125 secs., and I use a 2 stop CPL plus a 6 stop ND (always in front of a CPL), giving a total of 8 stops, the table shows you a shutter speed setting required of 2 secs.

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optical density	0.6	0.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.3
F.stop reduct.	2	3	4	5	6	7	8	9	10	11
1/2000	1/500	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1s
1/1000	1/250	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1s	2s
1/500	1/125	1/60	1/30	1/15	1/8	1/4	1/2	1s	2s	4s
1/250	1/60	1/30	1/15	1/8	1/4	1/2	1s	2s	4s	8s
1/125	1/30	1/15	1/8	1/4	1/2	1s	2s	4s	8s	16s
1/60	1/15	1/8	1/4	1/2	1s	2s	4s	8s	16s	32s
1/30	1/8	1/4	1/2	1s	2s	4s	8s	16s	32s	1m
1/15	1/4	1/2	1s	2s	4s	8s	16s	32s	1m	2m
1/8	1/2	1s	2s	4s	8s	16s	32s	1m	2m	4m
1/4	1s	2s	4s	8s	16s	32s	1m	2m	4m	8m
1/2	2s	4s	8s	16s	32s	1m	2m	4m	8m	16m
1s	4s	8s	16s	32s	1m	2m	4m	8m	16m	32m
2s	8s	16s	32s	1m	2m	4m	8m	16m	32m	48m
3s	16s	32s	1m	2m	4m	8m	16m	32m	48m	1h

CPL = 2 stops
Hard GND = 3 "
ND = 6 "