LONG EXPOSURE IN LANDSCAPES

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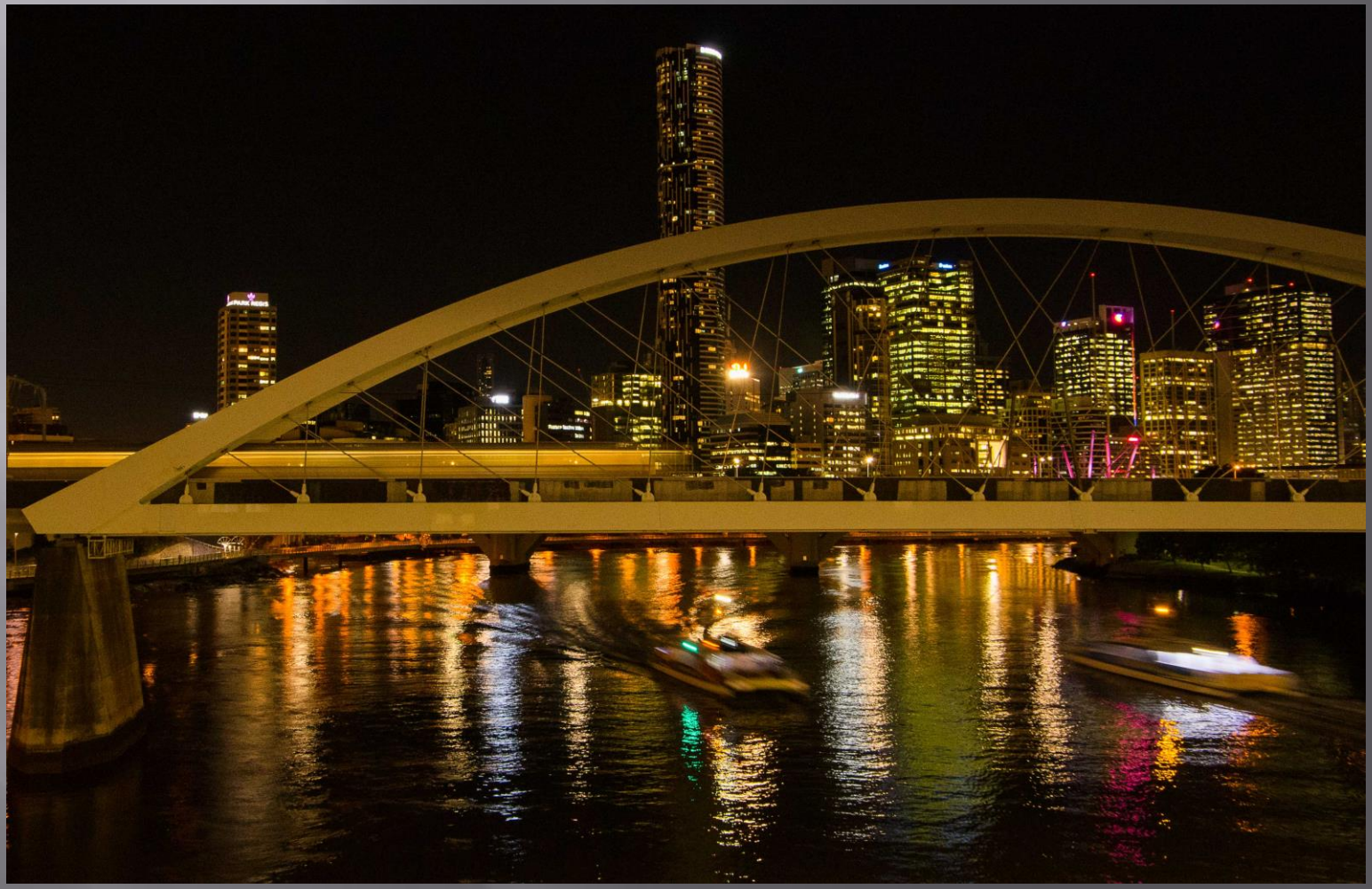
Definition based on intention and effect

1. Record weakly lit scenes
2. Utilize effect of time on a moving object's appearance
3. Eliminate moving objects
4. Paint with light
5. Creating 'abstract' images with camera movement

Issues of light and motion may harmonise…



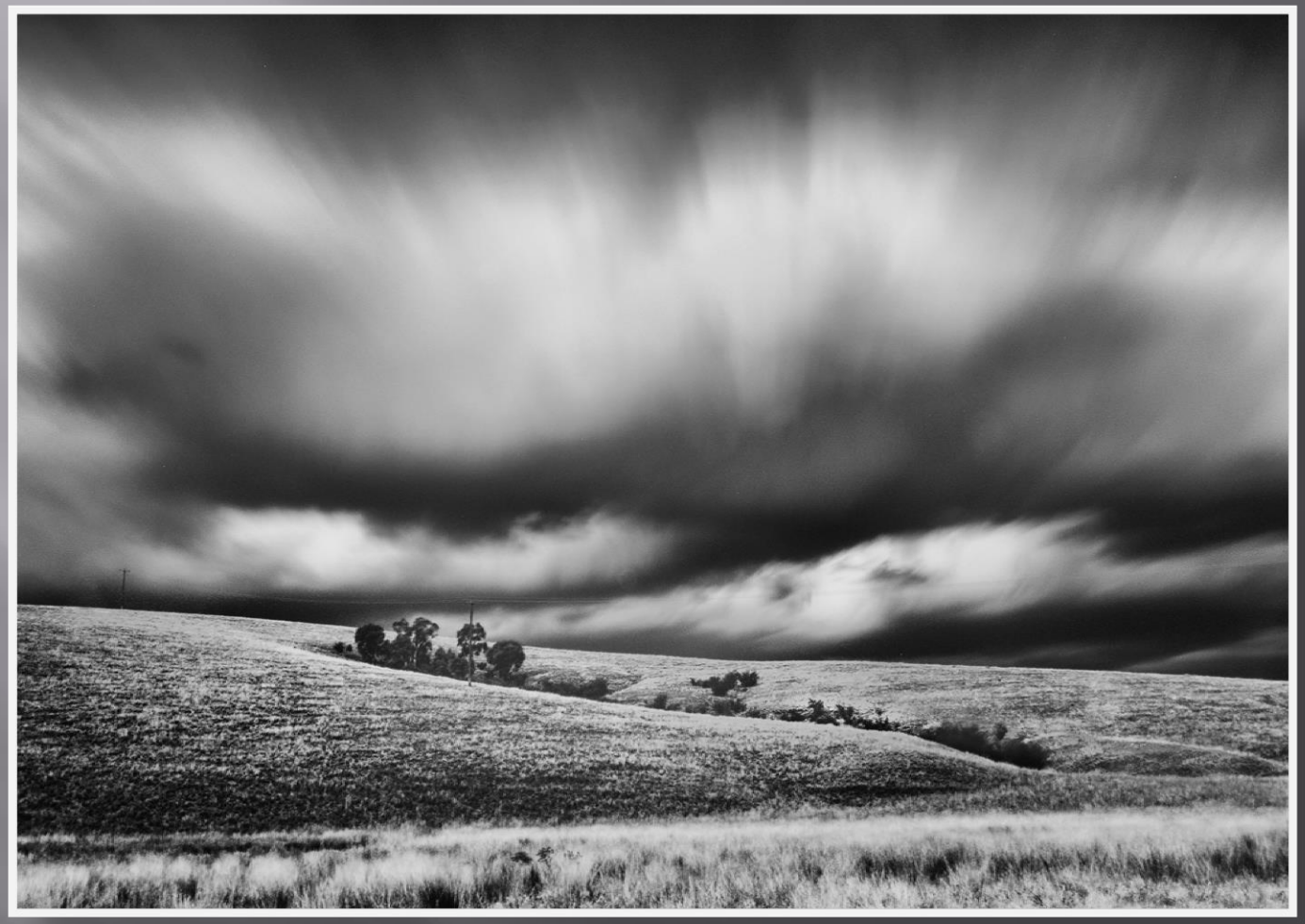
0.6 sec

…or conflict

13 sec

Time and motion

Emphasise motion



30 sec

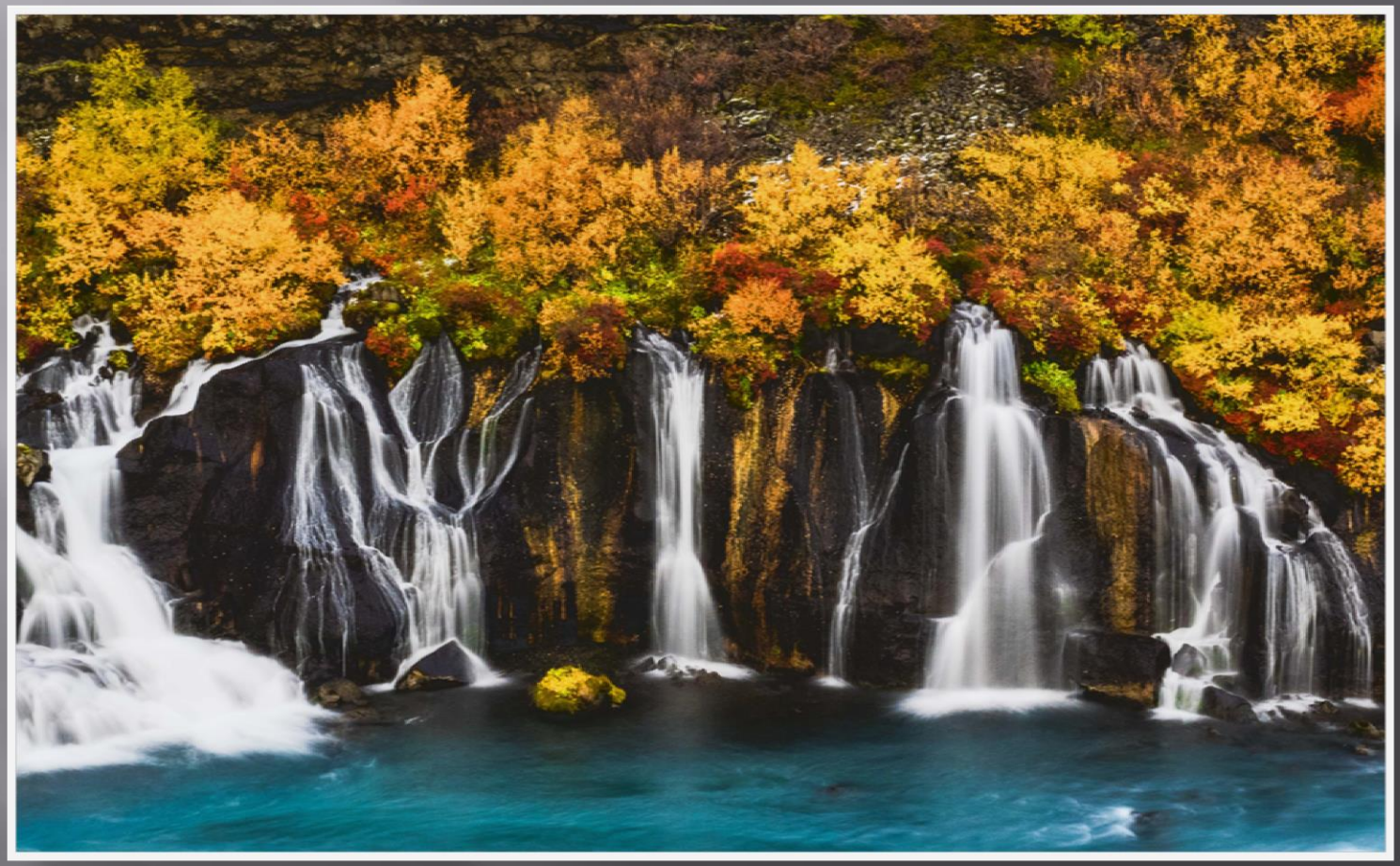
Time and motion

Dampen motion

123 sec

Time and structure

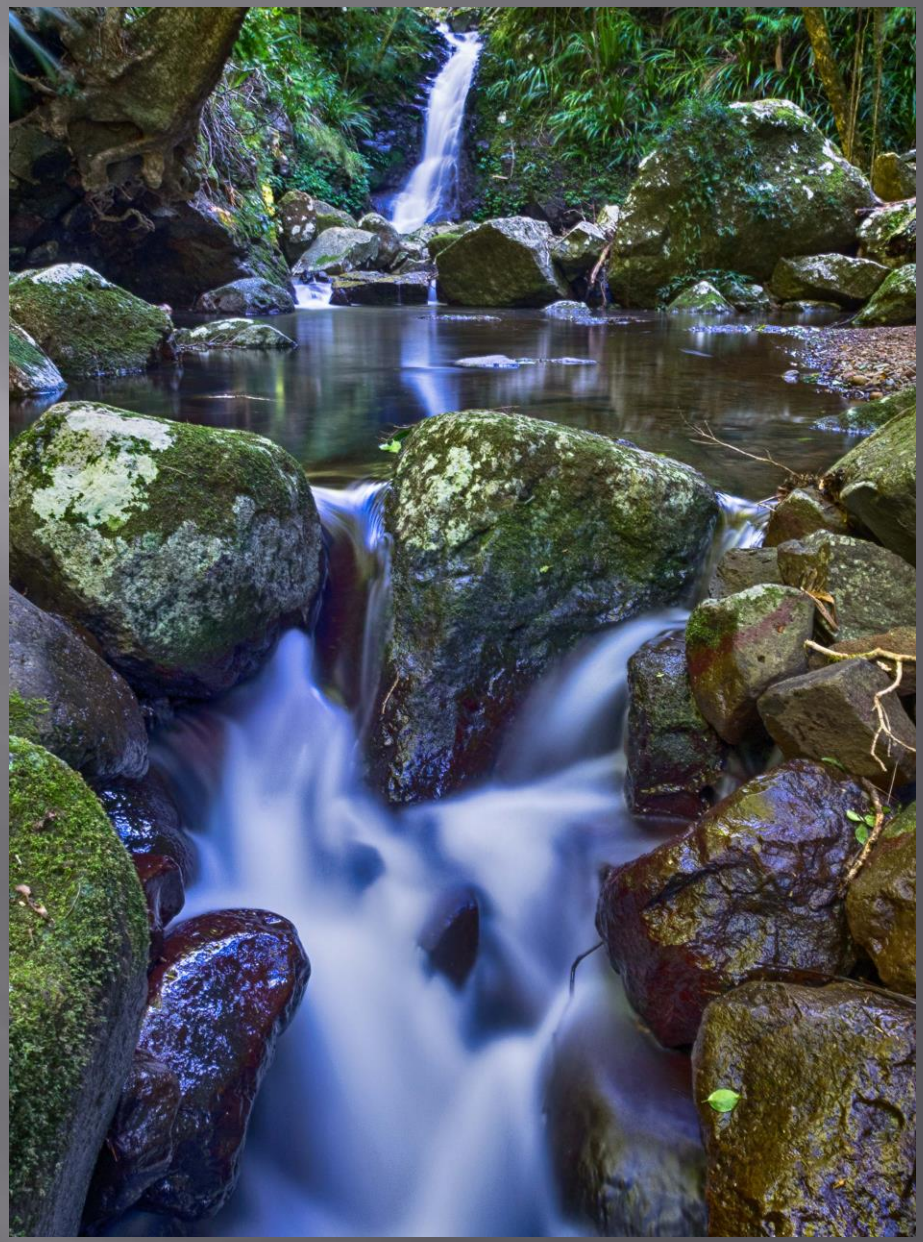
Emphasise structure



3 sec

Time and structure

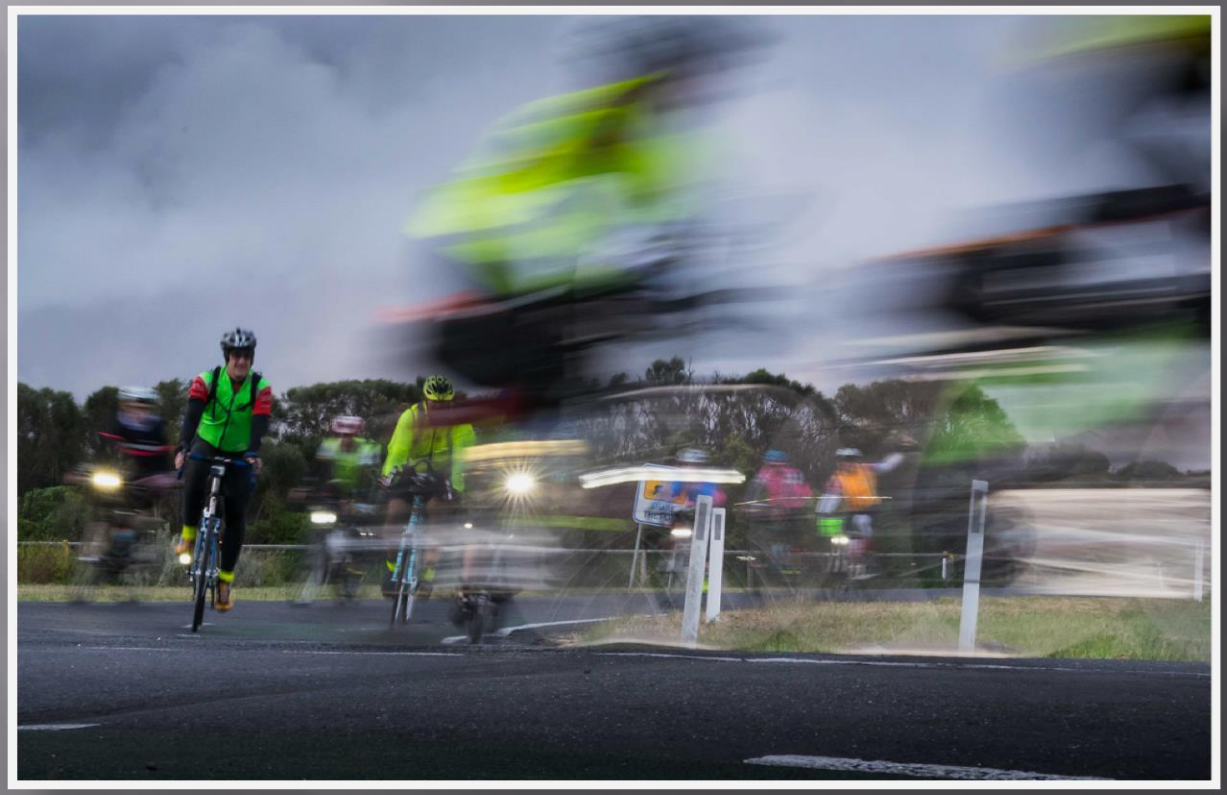
Smooth structure



20 sec

Effect of different shutter speeds

Varies with size, speed, distance and orientation of object



1/13 sec

Equipment

Camera

Risk of hot pixel noise increases beyond 30 sec exposure

- not necessarily evident on camera's LCD
- in camera noise reduction is slow and may soften image
- post-processing software is often preferable

Equipment

Tripod

Extra weight may be needed for stability, **however**:

Moving water and wind may shake tripod

Vehicles and even people may vibrate tripod on bridges, viewing platforms etc

Equipment

Remote Shutter Control

Camera's timer can be used instead but

Remote control is essential if 'the moment' is critical or for 'bulb' exposures

Equipment

Neutral Density (ND) Filters

Round screw-mount filters

- simple, easy to use
- stacking 2+ filters may produce vignette

Square slide-mount filters

- set-up is complicated, awkward esp in dim light
- but filters more easily changed and stacked
- more susceptible to condensation, dust etc
- danger of extreme colour cast, esp with resin filters

Dark optical viewfinder!

- compose and focus before mounting filters
- then switch focus to manual?

ND Filter Values

F Stop	Optical Density	Filter Factor
1	0.3	2
2	0.6	4
3	0.9	8
4	1.2	16
5	1.5	32
6	1.8	64
7	2.1	128
8	2.4	256
9	2.7	512
10	3.0	1024

Determining shutter speeds with ND filters

Element of trial and error

Camera's exposure metre up to 'bulb' ceiling
'composite exposure' with some cameras

For bulb exposures take reading with desired aperture value without ND filter then:

- Formula: $S_{nd} = S \times 2^{nd}$ (*nd* is f stop value)
- Mobile App
- Chart

Chart for Use of ND Filters

(Marc Koegel , 'Bulb Exposures')

ND Filter:	3 stops	6 stops	9 stops	10 stops	13 stops
Exposure with no Filter:					
1/1000s	1/125s	1/15s	½s	1s	8s
1/500s	1/60s	1/8s	1s	2s	16s
1/250s	1/30s	¼s	2s	4s	32s
1/125s	1/15s	½s	4s	8s	1m
1/60s	1/8s	1s	8s	16s	2m
1/30s	¼s	2s	16s	32s	4m
1/15s	½s	4s	32s	1m	8m
1/8s	1s	8s	1m	2m	16m
1/4s	2s	16s	2m	4m	32m
½s	4s	32s	4m	8m	1h
1s	8s	1m	8m	16m	2h

References

Complete Guide to long Exposure Photography, Black and White Vision. Jan Tjintjelaar
http://www.bwvision.com/complete-guide-long-exposure-photography-2016-edition/

Calculating Exposure Times. Vassilis Tangoulis
http://www.vassilistangoulis.com/gr/?p=4958

Long Exposure Tutorial, Bulb Exposures. Marc Koegel
http://bulbexposures.com/free-long-exposure-tutorial/

"Digeo" at Ephotozine