An Introduction to Depth of Field and Bokeh Photography

SET SUBJECT FOR SEPTEMBER 2019
Understanding Depth of Field Photography
What is depth of field?

Depth of Field is not the distance between you and the subject, but rather the distance between the first point of focus and the last point of focus.

This distance can be increased or decreased to obtain a different affect or perspective of a subject.
What determines Depth of Field in an image

- Light
- The size of your aperture
- The focal length of your lens
- The type of camera sensor
- Distance
The angle of reflection or refraction of light is directly proportional to the way a lens is able to transpose an image.

Light travels in straight lines

A single lens has a set degree of angulation for light to pass to provide a desired field of view

The distance that light must travel is proportional to the magnification of the lens to achieve focus.
Focal length of your lens

Measured by the distance that light is brought back into focus within the lens.

A longer focal length produces higher magnification and a narrower field of view.
A longer focal length has a shorter depth of field

A shorter focal length has less magnification and a wider field of view
A shorter focal length has a longer depth of field
Multiple elements in a lens are used to change the focal length or align and correct the movement of light through the lens.
Think of the way a projector uses a lens to show an image on a screen.

If you move the screen forward or back the image loses focus.

There is a + or – distance either side of focus that will still appear to be focused, this is depth of field.

The lens on a projector will have a very fine or shallow depth of field due to its single lens and focal length.
The focal length is a relationship between the camera and lens and how close the lens sits to the body or focal plane of the camera and the sensor.

- The cross over point in a lens is generally the position the aperture blades are located.
- The primary lens is positioned to redirect the light through the centre axis to fall on the sensor filling the entire surface without vignetting.
- Check on your camera body for the position of the sensor and the plane of focus
Wider Angle Lens

- The wider the lens angle the deeper the depth of field.
- 8mm fish eye lens generally has a focal depth of infinity where every thing in the field of view can be in focus at the same time.
- The edges of the image are bent inward to fill the focal plan whereby distorting the natural sharp of the image.
- A typical phone camera has a very wide angle lens and the depth of field is long therefore the image is in focus from front to back.
The telephoto lens is a prime lens with a set focal length.

The longer the focal length the narrower the field of view and the greater the magnification.

The greater the magnification the ability to focus is reduced by the decreased depth of field form metres down to millimetres.

The use of tele convertors will increase magnification, decrease the depth of field further and reduce the ability to resolve the focus.
Aperture and focus distance

This example uses the same lens and moves it closer to the subject.

Images across the top are taken at 1.5m from the subject with different apertures. At f/3.2 the depth of field is shallow but the subject is in all in focus due to the distance from the camera is longer.

At f/22 the depth of field is greater and the background has more definition although still out of focus.

The images across the bottom are taken at less than half a metre from the subject with different apertures.

Now the depth of field is very shallow with only a small surface area of the subject in focus at f/3.2.

At f/22 the whole subject is only just in focus with the objects close behind out of focus.
1/160 sec 105mm f/7.1 (24-105 f/4 lens)
ISO100

Zoomed in and closer to the subject using a small to medium aperture f/7.1 to ensure the depth of field is not too shallow keeping the subject sharp with the background blurred.

0.4 sec @ 85mm f/22 (24-105 f/4 lens ISO50

Using wider angle with a small aperture f/22 to keep the foreground and background in focus.
Separating the subject from the background

The photo on the left separates the subject from the background with the use of a telephoto zoom (500mm).

The picture below provides information in the background to tell the story using 100-400mm zoom lens at a focal length of 160mm f/5 aperture.
Bokeh (boh-ke) comes from the Japanese word meaning blur or haze. This effect is produced by the out-of-focus areas in your image that are beyond the depth of field.

Bokeh commonly refers but not limited to the pleasing circle shapes caused by the shape of the lens aperture or circles of light that are out of focus. Usually created when shooting with your aperture wide open, such as f/2.8, bokeh can also be created with smaller apertures if the background is distant enough.
It is important to select the right background when creating a Bokeh image.

Look for a background that is not too complicated and busy.

Preferably a uniform structure with contrasting light levels.

Avoid distracting objects that have strong shapes.

Contrast your image so that the background does not blend with your subject too much.

Avoid intersecting the subject with hard lines or brighter highlights.
Strong lines in the background in the image above can be seen as distracting. If the bright line was removed it would be a much better image. Circles or blurred spots of light are less likely to catch the eye and hold the interest of the observer.

1/200sec at f/4.5 ISO 400 400mm

The background in the image below has been softened by the depth of field blurring enough to not be too distracting.

1/640sec f/5.6 ISO 800 500mm Focal length
Using a 500mm telephoto prime lens produces a sharp image and a shallow depth of field. But is this classed as a Bokeh image? Yes it is as the subject is isolated from the foreground and background by depth of field.

f/5.6 @ 1/400sec ISO100
Use of flash

The way light falls away the further it travels can assist with the separation of the subject from the background.

The image on the right is highlighted by the use of a strobe flash or speedlight with a telephoto lens. The flash is strong enough to illuminate the Boobook Owl and branch, but as the light lessens the foliage in the background is left subtly exposed and out of focus.

This still creates a good background maintaining the environment and natural aspect of the story the image is presenting.

When the background is lost or beyond the distance of the flash, there is no Bokeh affect produced even though the black provides a good contrast to the Tawny Frogmouth there is no Bokeh affect produced.
Macro

The use of a macro lens can also produce a Bokeh affect through the depth of field.

This picture is using a slight over exposure of the whites to lose detail in the area around the focus point.
Natural light when broken up by trees will provide a specular affect when blurred. As the background is outside the focal range of the lens, it is softened to lose detail providing a separation the subjects from the background.

This is an extreme example, but there is a bokeh affect produced with the strawberries being out of focus and the condensation on the front of the glass being sharp. Possibly a border line image that would be subjectively viewed by judges.
Bokeh images use the out of focus background as an element to enhance the subject in the foreground.
Bokeh images can also be where the image is out of focus to create an abstract or creative impression. This example has no defined subject and the circular coloured points of light produces a bokeh affect.
Bokeh images can be simple and clean where the whole image tells a story with the depth of field is instrumental yet not over bearing.
Bokeh images use light in a way that highlights a particular perspective. The subject may not be obvious at first glance.
And sometimes the subject can be lost in the affect.

Choose your subject and background carefully to allow contrast and separation, unless the intention is to be creative.

Use aperture priority or a manual setting to widen your aperture and control the light with shutter speed and ISO.

What you see in the viewfinder is not what you will get in your image, so use your live view to help visualise the end result.
Know where your focal point is and how your choice of lens and aperture will work together. Select the right combination to get the result you are looking for.

When the subject is close to the camera the depth of field can be very shallow.

Decide how much of the subject you want to be in focus or if it matters.
Understanding depth of field can help you to improve the way your image looks.

Take your time and learn from experience

But most of all, enjoy your photography
References and Credits

- https://photographylife.com/what-is-depth-of-field
- http://www.trenholm.org/hmmerk/DOFR.html
- https://expertphotography.com/beautiful-bokeh-effect-photography/
- Some photographs by Dan Crowley and Kim Touzel