

A beginners guide to digital

by Peter Rowlands

(Also a beginner)



In this article we'll be looking at basic entry level digital cameras rather than the more expensive digital SLR (single lens reflex) cameras. A lot of the terminology applies to both types of cameras and we'll look at D-SLR's in the next issue of UwP.

Traditional film cameras and modern digital cameras achieve basically the same results but they do so in completely different ways.

As their name implies, digital cameras convert light into data which can be used to generate an electronic photographic image. The light is captured on a small CCD (Charge coupled device) sensor and the data recorded can be either viewed on a computer screen or printed onto paper. Traditional cameras use light sensitive film to record the light levels and chemicals are then used to convert the film into a form which our eyes can recognise i.e. a transparency or print.



File formats

The two main file formats used by digital cameras are TIFF and JPEG. TIFF is an uncompressed format and JPEG is a compressed format. Most cameras use the JPEG file format for storing pictures, and they sometimes offer quality settings (such as low, medium or high). The more an image is compressed the poorer will be the results.

Resolution



When deciding which camera is best for you there are some technical specifications you need to understand. The most important is resolution.



Resolution is measured in 'pixels'. These are tiny light sensitive diodes on the CCD sensor and, quite simply, the more you have, the better your results will be.

How good you want your results to be will depend on what you will use the final images for. For example if you only want images to put on a web site or to send to your friends then even the most basic digital camera will satisfy your needs. However, if you want to produce quality photographic prints, you will need a camera with many times more pixels.

Resolution is usually expressed in two ways. It is either the total number of pixels on the CCD sensor or it is a numerical expression of the same thing. Most CCDs have an aspect ratio (shape) of 4:3 which is like traditional TVs (not widescreen) so for example a CCD with 0.3 million pixels would have a resolution of 640 x 480 i.e 640 multiplied by 480 equals 307200 which is rounded down slightly to 0.3 million pixels. Modern terminology/slang uses "mega" instead of "millions" so the two are interchangeable. Finally, just to complicate things slightly not all of the pixels for image creation. About 5% are used for other purposes.

The amount of megapixels you have determines the maximum size of print you can produce before the image quality becomes noticeably poorer. The relationship is basically

simple maths.

In basic terms the human eye sees images which have 300 dots/pixels per inch (dpi) as being a photographic/real image. This is the resolution which most printed magazines use. So for every square inch of paper you must have 300 pixels. If you have a 1 mega pixel camera it will produce images of 1216x912 pixels. the maximum quality print size would be 4" x 3" (i.e. 1216/300 and 912/300). This is the best quality but there is only a slight loss of quality at 200 dpi which could produce correspondingly larger images.

The following is a "rounded up" simplified chart to show the best quality print sizes related to megapixels:

Megapixels	Resolution	Print size
One	1216 x 912	4" x 3"
Two	1600 x 1200	5.5" x 4"
Three	2048 x 1536	7" x 5"
Five	2560x1920	8.5" x 6.5"

These are very much theoretical suggestions/ maximums. In practice it is possible to reduce the dpi and get a lot larger prints which still look perfectly acceptable.

Picture storage

Most modern digital cameras are supplied with "memory cards". These are removeable thin solid state storage devices which hold your data/pictures in its memory. Their capacity is increasing almost monthly and the prices are falling so you should be able to afford a card which can hold literally hundreds of shots.

There are two main types of memory cards -



CompactFlash and Smartmedia. The former have been able to develop much higher memory capacities than the latter which is wafer thin. Because of their greater capacity, CompactFlash cards are the most popular and widely used.

Another widely used storage card is the same size and compatible with CompactFlash and these are incredibly small hard drives (microdrives) with moving parts as opposed to solid state circuitry. My personal preference is for the reliability of the solid state cards.

Camera manufacturers provide you with a basic memory card of about 32mb which would only hold 10 x 3mb photos so I would advise spending extra on a higher capacity card such as a 512mb or even 1gig which will allow you to take hundreds of photos at a time.

Picture taking



The beauty of these entry level digital cameras is that most have a small LCD screen on the back for you to see the picture before you actually take it. Admittedly these are quite small which makes judging focus accuracy a bit tricky but that is a minor drawback compared to the advantages. Screens can be difficult to view in bright sunlight but some manufacturers provide shading hoods to improve viewing considerably.

So far we have discussed the computer-like performance of these digital cameras and they do seem to be amazing machines but they do have a couple of drawbacks which you should be aware of.

The first is shutter delay. This is the time the camera takes to focus on the subject and activate the 'electronic' shutter. This delay or lag is being reduced as new cameras are developed but it is probably one of the main reasons why experienced

underwater photographers choose the more expensive D-SLR cameras which have virtually no delay.

In practice the delay is not a problem with static subjects but it makes taking shots of moving fish a real nightmare!

In addition to the shutter delay there can be a delay during which the camera processes the information after you have taken a shot. This delay will depend on the resolution at which you are capturing the images. Most cameras offer you the choice of Full, Medium or Low resolution and the higher the resolution, the more time it will take to process the image. In practice this is rarely a problem unless you are trying to shoot fast action.

The beauty of these digital cameras is that you can not only take pictures and get immediate results but you can also delete the bad ones and free up memory space for more shots. Personally I have never filled up a 512mb memory card with these level cameras so have never needed to delete to get more space but these cameras do give me the option if I needed it!

I prefer to look at the images on a larger computer screen before deciding what is good and what is not. (See Viewing and storing images below).

The top end of these entry level cameras allows you to change the camera settings manually (aperture and shutter speed) but in the ones I have used it can be quite fiddly to achieve this so, initially, I would recommend you use the camera's automatic settings and only revert to manual if you are not happy with the shots you are getting.

Lenses



Most digital cameras have built in zoom lenses which are very versatile and some offer additional 'digital' zoom performance for increased focal length but the image quality drops off considerably using a digital zoom.

The wide angle end of the zoom on most cameras is a bit limited but for general purpose shots they are adequate. Fortunately most have an ability to focus very close and you will be able to get some excellent close up shots of coral and the like using just the built-in flash on the camera.



If you want very wide pictures there are additional wide angle supplementary lenses which can be added to the front of the lens but be warned that they will probably cost more than the housing!

Colour correcting filters



The other amazing feature of these digital cameras is the ability for their electronics to adjust the colours to give better colour balance. Admittedly these are designed primarily for land use but they still do a pretty good job underwater.

However, to get even better shots by available light I would strongly recommend you purchase a colour correcting filter such as UR Pro. They produce a version for blue/tropical water and another for green/temperate water. These filters may seem expensive but the increase in the quality of your images will be well worth it.

External lighting

Whilst the internal flash is capable of taking some amazingly colourful images there may be times when you want extra power to light up



subjects further away. Until the advent of the PT-020 with its flash sync bulkhead connector, most digital housings could not physically fire external flashguns. However some ingenious manufacturers have developed fibre optic triggering so an external flash can be triggered by the camera's built-in flash. This is both simple and very effective but be warned again, they don't come cheap!

Viewing and storing your images

Once your memory card is full of images you will need to transfer them to another storage device such as your desktop/laptop computer hard drive. This then frees up your memory card to record more new images. Inexpensive 'card readers' are

available to let you make the link between the memory card and computer and these usually use the USB port on your computer.

With the images saved on your computer you can view them at a much larger size to check the detail and composition and you also have the ability to use image enhancement software such as Photoshop to further improve the images if you feel they need it.

Finally, if you have an inkjet printer, you can output your best shots onto photo quality paper for passing round or mounting on your wall.

Conclusion

There is no doubt that digital cameras have revolutionised underwater photography and allowed more people to get much better shots than they would have with film.

Their small size and the availability of excellent value housings, most of which will operate down to 40 metres, makes them one of the hottest selling dive accessories on the market today.

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