Using the Olympus C4000 **REV. 04/2006**

In the digital photographic world, information is captured and stored as data not as pictures. The input device (camera) converts light to a series of 1's and 0's and stores it on a disk or memory card. Output devices (printers and monitors) then convert this digital information back into pictures.

There are some real advantages to having the photo converted into digital information. It can be copied over and over with no loss of information. It can be easily manipulated or enhanced using computer software and it is easily transported or e-mailed.

Sharpness (Resolution and Compression)

Unlike a conventional camera that captures images on film, a digital camera uses tiny light-sensitive diodes which convert light into electrical charges. The image is recorded as squares or "pixels." A digital photograph is made up of millions of these pixels. Each one contains only information about its color and brightness. When viewed from a distance the individual pixels are seen as a single image or picture. This process of painting a picture with individual pixels is called bit-mapping.

The number of pixels in an image determines its resolution. Resolution is one of the key aspects of an image's sharpness. More pixels means higher resolution and higher resolutions means sharper pictures.

Though most cameras are advertised by the mega-pixel they produce, this does not clearly indicate the resolution of a particular camera or image. A more accurate way of stating resolution is by the number of pixels the camera produces on the horizontal and vertical edges of the photo. Early cameras produced images with resolution of 640 pixels by 480 pixels (640X480). Modern cameras are more likely to produce images that are 2288 pixels by 1712 pixels (2288X1712). Most cameras display resolution in this manner where you are given the option to change it.

File Size

It would seem logical then to have as many pixels as you can. However, high resolution comes with a price--file size. Storing all the information for millions of pixels can require considerable storage space. Files over 10 MB in size are not uncommon. Given the limited storage space on most cameras' storage devices, this can considerably reduce the number of pictures that can be stored.

Compression

There is a solution. By compressing the file size, resolution can be retained in a smaller file. Compressing a photo has its drawbacks. In order to make the file smaller, information is thrown away. The compression process attempts to save space by finding areas with like pixels and giving one set of values to all those pixels. This can result in the subtle loss of detail. The more you compress a file the more information is lost. Even though the resolution is still the same, the loss of detail will give an image the appearance of being less sharp. The compression process can also create unusual patterns or grouping of pixel that may make the photo look spotty or dirty. This is referred to as noise. Compressed files are saved in a JPG format.

In the Olympus C-4000 five compression levels are offered; TIF, SHQ, HQ, SQ1, and SQ2. Ideally, photos should be taken at the highest resolution with no compression. These files are saved in the TIF format. This however, may not be practical. This option should only be considered when shooting images that may be used to produce sizeable enlargements or for high-quality images, such as those used in GPO printed products. The best working solution is to choose the highest resolution and select the minimal amount of compression allowed.

The SHQ setting will allow 5 times the images to be placed on the memory card as with the TIF setting. The HQ setting will allow 3 times more than the SHQ setting. The factory default setting is HQ. If needed, remember to reset you resolution before shooting.

Unless the image is needed for a GPO printed publication or CD, the HQ record mode is adequate and produces a quality image for a 5 x 7 inch print or computer application. If the image is to be used only for computer applications, if may be converted to a resolution of 72 ppi and an appropriate image size. This will significantly reduce the file size.

Only in extreme cases where memory card space is a serious issue or where quality is of little concern should either of the SQ settings be used.

Image Size

In a previous section, resolution was measured by pixels on the horizontal and vertical edge. But pixels have no set dimensions; in fact they have no dimension at all. The image size is the measurement of the output the file will produce.

Monitors

A frequent complaint of digital images is that the entire image won't fit on a monitor. The viewer must scroll in order to see different parts of the image. Monitors are output devices and have their own resolution which affects the ability to view the digital image.

Most monitors are set for a resolution of 1024X768, though they can be set to a variety of resolutions both higher and lower than the often used 1024X768. These means you have 1,024 pixels along the monitor's horizontal axis and 768 pixels along the monitor's vertical axis. A digital image is laid onto the monitor pixel for pixel. One pixel of digital image takes one pixel on the monitor. If a digital image is 2200X1800 and your monitor is 1024X768, about half of your digital image will not be viewed on the monitor screen. It is not lost or dropped, there just aren't enough pixels on the monitor to view the entire document at one time.

Viewing an Image

Most images created with a digital camera are saved in a JPG format. The web browser can read this format and the computer is set that when a JPG file is read it defaults to the web browser to open and view the file. Web browsers give you no control over the photo. Other software on your computer will allow you to zoom in and out of an image as well as actually resize the image. Each CCE computer comes loaded with Microsoft Photo Editor. It can be found at:

Start>all programs>Microsoft Office Tools>Microsoft Photo Editor

The desired image for viewing will need to be saved to the computers hard drive and then opened in the Microsoft Photo Editor. In Editor, you can zoom in or out by using the zoom control. Changing the size of the image with the zoom control does not change the size of the file. To change the actual file size you have to use Editor's resize command.

Printers

The other primary output device for digital images is the printer. Just as with the monitor being unable to view an entire image, sometimes the image sent to a printer is larger than the page it is being printed on. Using Microsoft Photo Editor you can change the size of the image to be printed in the File>Print command. Also when an image is inserted or pasted into a MS Word or PowerPoint file you can resize the image once on the page by grabbing a corner and pulling the image to the size you want. Be careful not to distort the image by grapping a side instead of a corner.

It is better not to use the Resize command the Microsoft Photo Editor provides under the Image command. This will actually change the file size and possibly lose details you might need at a later time.

Sharing Images via E-Mail

If you know the party you want to share an image with only wants to view the image, you can place the image in a MS Word document and then attach the word document to an e-mail. This allows you to control the image size and provide possible captions for the photos. This is a good way to share images with review teams.

However, if the party you want to share the image with intends to use the image in another application do not insert it in a MS Word document. Attach the file in its original format. Local newspapers or your state Public Affairs Specialist will want all images sent to them in the original format.

Another concern with sharing photos through e-mail is file size. NRCS's mail system may not deliver large attachments (over 5 MB). Non-NRCS recipients may have even smaller limits on receiving e-mail attachments. Also when sending a photo to a group of people, especially all employees or all field office distributions, large attachments can cause the e-mail system to slow down.

NRCS Requirements

For most of the work NRCS does, the HQ setting (on the Olympus C-4000) will do an adequate job. <u>However, for soil survey publications (web-based and for CDs), the SHQ setting using the [3:2] 2288x1520 mode works well</u>. (one sentence was deleted here) HJF

Printed soil surveys are gradually being phased out. However, if an image is to be used in a USDA publication that is printed by the Government Printing Office (GPO), the image must be in a non-compressed format (TIF) at a resolution of 300 ppi.
If the printed product is produced using the "print-on-demand" format published at NCGC, a resolution of 150 ppi is sufficient.

For example, a standard soil survey cover is typically printed in a 7.0 x 6.0 inch format. At 300 ppi the image would contain about 4 million pixels [(7 x 300) x (6 x 300] = 3,780,000 pixels. At 150 ppi, the image is about 1,000,000 pixels. The following charts provide a comparison of image type, resolution requirements, average file size, and recording modes.

Resolution Guide:

Image Type	Print Resolution Requirements	Average Publication Dimensions	Pixel Requirements	Avg. TIFF File Size	Avg. JPEG File Size*
Cover	300 ppi	7.0 x 6.0	3.8 mp	11+ mb	500+ kb
Soil Profiles (2/page)	300 ppi	6.0 x 3.5	1.9 mp	5+ mb	200+ kb
Soil Profiles (1/page)	300 ppi	8.0 x 5.75	4.2 mp	12+ mb	350+ kb
Landscapes/cover	150 ppi	7.0 x 6.9	1.0 mp		200+ kb
Landscapes-B&W	150 ppi	7.0 x 6.0	1.0 mp		200+ kb

* Medium compression.

Record Modes:

Record Mode	*Setting**	*File size (kb)*	*Image size @ --72 PPI*	*Image size @ --300 PPI*	*Images/16 Mb*
TIFF	2288 x 1712	11,490	31.78 x 23.78 in.	7.63 x 5.71 in.	1
SHQ	2288 x 1712	1,823	31.78 x 23.78 in.	7.63 x 5.71 in.	5
SHQ [3.2]	**2288 x 1520**	**1,620**	**31.78 x 21.11 in.**	**7.63 x 5.06 in.**	**6**
HQ	2288 x 1712	642	31.78 x 23.78 in.	7.63 x 5.71 in.	16
SQ1	1600 x 1200	340	22.22 x 16.67 in.	5.33 x 4.00 in.	40
SQ2	640 x 480	74	8.89 x 6.67 in.	2.13 x 1.60 in.	150

** There are several sub-settings within each mode that will vary the image size.*

Tech Tips

Digital Zoom:
Most digital cameras with a zoom lens offer two forms of zooming – optical and digital. Optical zooming uses the lens on the camera to zoom in or out on a subject. Digital zooming groups pixels to give the appearance of zooming. Even though digital zoom offers what appears to be an extended range beyond that which the optical zoom can achieve, digital zooming comes with a price. Both sharpness and tonal range are reduced when digital zooming is used. The same affect, often with better results, can be achieved with photo software at your computer. Only in the most extreme cases should digital zooming be used. It is better to move physically closer to your subject or crop the image tighter using photo software.

With the Olympus C-4000 there is a slight pause in the zooming when the camera switches between optical and digital zoom. You can turn the digital zoom feature off, as well. This is done through the camera's menu.

Fill-flash:

Probably the most underused feature on digital cameras is fill-flash. Fill-flash does just what the name implies. It uses the camera's flash to fill or lighten shadows in your picture. Digital cameras tend to be contrasty and not reproduce details in the photographs shadows. With digital cameras shadows often are entirely black. The most common example of this is when a farmer is taken wearing a cap. The background is properly lit but the farmer's face is lost in the shadows created by the cap's bill. Using fill flash will lighten the farmers face without changing the background.

With the Olympus C-4000 the camera will automatically pop up the flash if fill light is needed. However, if the need does not appear to the camera you can force fill-flash by selecting the lightning bolt symbol button near the camera's eyepiece and pushing it until the lightning bolt image, by itself, appears on the screen. This will force the camera to use the flash in doors or out.

It is strongly recommended that you use fill-flash anytime you are shooting people outside on a sunny day.

ISO:
ISO adjusts the camera's sensitivity to light. The higher the number the more sensitive it is. The use of this control can improve photos under low light conditions. However, increasing the ISO does come at a price. Photos with a high ISO can look grainy and have slight color shifts. It is recommended that the ISO only be increase under very difficult lighting conditions. The ISO is changed through the cameras menu program.