Sandstone Photography

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The sandstone formations of southern Utah are unique in the world and offer incredible opportunities for photography. But there are challenges. Lighting conditions are affected by time of year, time of day, and weather. Low-light situations and the wide variation in brightness (called "dynamic range") that often occurs in canyons, slot or otherwise, can be technically daunting. Here two professionals and one amateur will share some tips based on their years of experience in the area.

The most difficult question is: What to photograph? Goals can be diverse. One might want to document a remote backpack trip or day hike, or try for interesting light or an unusual composition at either a famous or little-known scenic location. Or, most exciting when it works, one might have no idea what the goal is, but just hopes to capture something (magical light, a friend in a spectacular setting) that can yield a spectacular image. The sandstone of the Colorado Plateau offers opportunities for all these, but the overall goal does affect the choice of equipment and technique.

Basics The shutter speed must be fast enough to avoid blurring. For hand-held cameras, the rule of thumb with physical film was “one over the focal length”. With higher resolution digital sensors, a better rule is now “one over double the focal length.” For example, with a 50mm lens, use a shutter speed no slower than 1/100 sec. With image stabilized lenses and cameras, slower shutter speeds are often possible. The lens opening — the "f-stop", or aperture— should be small enough to get appropriate depth of field. An f-stop of 16 denotes a small opening and that means much more of the field is in focus. Using f/4 lets in more light (good) but yields a small depth of focus (generally not good). Shallow focus is suitable for some subjects (flowers, portraits), but in landscapes one wants sharpness throughout, and that requires a small f-stop (larger number!). The final exposure variable is "film speed", measured in ISO units. An ISO of 200 will typically produce clean images, but often one has to go faster: a setting of 400, 800, or more. Such a fast setting means that the shutter speed can be faster and the aperture smaller. The downside is that a large ISO introduces more noise in some areas of an image. This is why tripods are considered essential by professionals. They can shoot with ISO 200 and f/16, but with a shutter speed of 2 seconds or more, to allow enough light to enter. Such techniques are critical to getting crisp images in slot canyons.

So the variables mount up: shutter speed, film speed, lens opening, and lens focal length, which determines how much of what one sees will be captured in the image. And there is also the choice of camera: type of sensor and pixel count both play a big role in the quality of the final image.

Fallen Roof Ruin (Stan Wagon)

Equipment

The Choice (Bill) Since you’re reading this article you want to make great photos. Great photos come from the photographer, not from the equipment. Only three things are needed: a great subject, great light, and a great composition. Equipment is not in the equation. To improve your photography, start by finding great subjects, being out at sunrise and sunset, and learning composition. But you'll still want to use the best equipment available to you. There are four major types of cameras. From the lightest to heaviest they are: phone, compact, mirrorless, and traditional digital single-lens reflex (DSLR).

The camera in your phone is a good camera for landscapes and is always with you. In good light with still subjects phones take very good photos. When light levels start to fall, images often become noisy. Most phones have a single lens with a fixed focal length between 25 and 30 mm. This is a major limitation. Phones do allow for digital zooming but you will lose megapixels. For example if you zoom in by a factor of two you lose 75% of your pixels. A 12-megapixel image becomes a 3-megapixel image after zooming. Another big limitation of shooting with your phone is ease of use. It can be difficult to see your phone’s screen in bright light, and there are no dedicated wheels and buttons to set exposure time, aperture, ISO, or white balance. Phones are also difficult to mount on a tripod and to attach filters to.

Compact cameras are the next stage up. Sensors are larger than those in phones, so images are of better quality and have less noise. Compacts have lenses that typically zoom from about 24 to 100 mm. Some superzooms go to 1000 mm or more. Unlike phones, compacts are easily attached to a tripod and have dedicated controls. The compact market used to be the largest segment of the digital camera market, but it is now declining as casual shooters rely more on their phones and serious photographers move up to mirrorless and DSLR cameras.

Traditional DSLRs produce very sharp images and can be used in a wide variety of situations. The user interface is excellent having been refined over many years. Unlike compact cameras, which have fixed lenses, you can select from a wide variety of focal lengths, from ultrawide 10mm lenses and fish-eyes, to 800mm super telephoto lenses that are great for capturing images of birds. Focus is fast and accurate and there is little shutter lag. Disadvantages are few, primarily weight and cost.

DSLRs fall into two groups based on sensor size, cropped cameras and full-frame cameras. The sensor in a full-frame camera is the same size as classic 35mm film. Cropped camera sensors, also known as APS-C sensors, are much smaller. The sensor area in a cropped camera is typically less than half that in a full frame camera, and sometimes as little as 25%. As a result, cropped cameras are less expensive than full-frame cameras but also have fewer megapixels. The same lenses that work on full frame cameras work on crop cameras though their focal length will be magnified. For example, a Canon 100mm full-frame lens has an effective focal length of 160 mm when used on an APS-C camera. APS-C cameras also have lenses designed only for them. APS-C lenses tend to be cheaper and lighter than those designed for full-frame cameras. Lenses designed for cropped cameras do not work on full frame cameras. If you use a cropped camera but suspect that you will upgrade to a full frame camera in the future you should buy only full-frame lenses. APS-C lenses will not work when you upgrade to full frame.

APS-C cameras have several advantages: they are lighter, cost less, and are great for shooting animals and birds due to the built-in magnification factor. Advantages of full frame cameras are many. They produce higher quality images with more megapixels and less noise. Less noise allows shooting at higher ISOs and faster shutter speeds. Full-frame cameras let in more light so images in the camera's viewfinder are brighter and easier to see. More ultra wide-angle lenses are also available for full-frame cameras. For example, you can get a 10mm ultrawide lens for a full-frame DSLR, but it is hard to find lenses wider than 14 mm for APS-C cameras. And as stated, full-frame cameras lenses are compatible with APS-C cameras, but the reverse is not true.

Mirrorless cameras are quickly becoming the most popular camera segment for the serious shooter. They are lighter than DSLRs. If you are backpacking or doing a long hike, every ounce matters. Mirrorless cameras use electronic viewfinders. These are nearly as sharp as the optical finders available on DSLRS and have the advantage of making a wealth of information about camera settings available right in the viewfinder. Mirrorless cameras are great for video. Because there is no mirror, there is less vibration when the shutter is pressed, so images are slightly sharper. Some mirrorless cameras use electronic shutters so there is no vibration or sound at all. Mirrorless cameras can also shoot at higher frame rates than DSLRs, currently up to 20 frames per second. This is because there is no mirror to move up and down. DSLRs have an inherent advantage in battery life since the viewfinder need not be powered. There is also a greater selection of lenses available for DSLR cameras than for mirrorless cameras, though this gap is closing.

Minimal (Stan) I use a simple DSLR with a crop sensor and 18 mega (million) pixels; this resolution suffices for sharp prints at 20×24 inches. My main lens is a 17–70mm zoom. Because of the crop sensor, the lens is equivalent to 27–112mm in terms of actual field of view. This is indeed not quite wide enough for some locations and I imagine I will upgrade to a full-frame sensor soon (for such a sensor, 17 mm means 17 mm). A small tripod is useful and light enough for long hikes, but when backpacking one will typically not have a tripod. Always make sure your camera is set to maximum resolution (called "Large"). Using jpeg format to record and edit the images is adequate, but pofessionals use the Raw format specific to their camera, as that allows more flexibility in post-processing. At home one typically downloads the images to a generic photo organizer and then moves the good ones to a sophisticated editor such as *Photoshop Elements* for further processing (brightness, contrast, sharpness, noise reduction, color editing, cropping, rotating, spot removal).

So which camera is right for you? Stan has found that his modest DSLR cropped camera works fine when backpacking and is well worth the weight. If you do only day hikes but value high quality photographs, a DSLR is clearly the proper choice, and you should consider a full-frame model.

Tripods (Bill) In my experience every professional landscape and nature photographer uses a tripod. Period. Yet very few amateurs use them. Tripods have many uses.

- They are needed for long exposures, for example when blurring streams or waterfalls, or at seashores. Professional photographers often work in low light conditions present at sunrise and sunset.
- Night photography where exposure times are 30 seconds or more is increasingly common.
- Tripods are great for taking self or group portraits. You do want to be in the picture don't you?
- Tripods force you to think about the image as you make fine adjustments to your composition.
- Videos created using a camera on a tripod look much better than handheld ones.
- Tripods facilitate the combining of several images into one, a technique used with both exposure bracketing and focus bracketing.
- Images taken on a tripod are more accurately aligned than handheld images when creating a panorama. This is especially true when making panoramas containing close subjects.
- Tripods can act as a hiking stick. Though not designed to hold your weight, they can help with balance on sketchy downhills and slopes.

There is an old adage that applies to tripods. You can have one that's light, or inexpensive, or sturdy. Choose two out of three. Keep in mind that any tripod is much better than no tripod, and will allow shots that could not be gotten otherwise. I personally prefer tripods with four leg sections as they fold smaller for travel and are taller than three-legged models. To save your back, you want a tripod that supports your camera at eye level. For landscape photography you want a tripod with either no center column or a removable column, allowing for ground-level shooting. I prefer carbon fiber to aluminum tripods as they are lighter and sturdier. I also prefer tall tripods without a center column. Center columns are very vibration sensitive when extended. Unless you're a sport or wildlife shooter, I do not recommend monopods; while they help manage the weight of heavy long lenses they do little to stabilize images at long shutter speeds. A tripod can always be converted to a monopod by pulling up two legs, but a monopod cannot be converted to a tripod.

The Devil in the Cathedral (Ricki Brown)

Shooting

Subjects (Stan) Be opportunistic. Carry the gear and always think about whether there is a nice shot to be had. If yes, think about the background, angle of the shot, and direction of light. My favorite example of such a serendipitous image is *Devil in the Cathedral* by Ricki Brown of Escalante. He and his wife Sandy had hiked down to the bottom of the Golden Cathedral in Neon Canyon, where the light and symmetry of the water reflection made an amazing face in the rock. This shot would be difficult, if not impossible, to repeat. Ricki had the presence of mind to set up a great composition and the fact that he had only a point-and-shoot camera was irrelevant; it worked fine.

A portrait shot that fell into my lap was the *Sandstone Saddle*. This image has been printed over a million times in calculus books because the sandstone curves form perfect contour lines for a saddle shape. But the impact is much enhanced by the concentration of my climbing friend, Phil Hage. Even the pink color of his cap contributes. This spot is just behind Phipps Arch between Escalante and Boulder.

Sandstone Saddle (Stan Wagon)

Exposure compensation is useful and easy to set in digital cameras: take three shots, one being 1 stop underexposed, one being normal, and one being 1 stop overexposed (the "1" can vary). It seems that underexposing a little often leads to richer colors. But be aware that the way the image looks in the camera's LCD viewfinder might not match how it looks on a computer screen or paper. One can also set the camera to use *bracketing*, where it automatically takes, say, three shots of a subject using different exposures. If a tripod is used, then the shots can sometimes be combined using the HDR (high dynamic range) method. The same principles apply to focus stacking, where the shots are taken with different focus and combined in post-processing.

Composition (Elaine) There is always the desire to document a hiking adventure, to record the landscape that you encountered. But if you take the time to think about the composition, you might get an image worthy of mounting and displaying. A well-composed image does not just happen to you; it comes from you. It pulls the viewer in and keeps him there. Composition refers to the elements you choose to include in a photograph, and where you decide to place them in the frame. Before you lift your camera and hit the shutter button, consider the following:

- What is the subject? It is not necessary to include every rock and tree you see. Keep your composition simple.
- Try to include both foreground and background elements.
- Does the subject lend itself to a horizontal or vertical orientation?
- Shooting wider, 24mm lens or wider, or getting closer to your subject will enlarge and emphasize the foreground; shooting longer, 100mm or longer, or moving back, will even out the size of the foreground and background.
- Moving the camera will change the relative position of elements. “Shop” through the viewfinder. Try a low vantage point. Move from side to side. If possible, walk completely around your subject.
- Imagine a tic-tac-toe grid in the viewfinder. Some cameras can display such a grid in the viewfinder or screen. Place the important elements along the lines or better yet, at their intersections. The center of an image is not the best place for the viewer's eye to rest.
- Look for the geometry of the scene. There will be natural lines and shapes. Diagonal lines are more dynamic than horizontal ones and can be used to lead the eye from a corner into the image.

West Clark Bench Arch (Elaine Belvin)

The *West Clark Bench Arch* image was taken about 20 minutes before sunset when the angle of the light lit up the rocks and the structure of the sandstone formed useful shadows. Note the diagonal lines that bring the eye from both corners into the image and up to the arch, which is placed off center. The camera was positioned so that the smaller hoodoo was separate from the arch and provided additional off-center weight. It was shot at 12mm, an ultra-wide setting that emphasized the arch compared to the background hoodoo. Clouds come in many shapes and often enhance an image, as they do in this one and the shot of Studhorse Point.

Weathering Pit Ridge Blue Hour (Elaine Belvin)

Weathering Pit Ridge Blue Hour was taken with a tripod 20 minutes after sunset, during the "blue hour" when the sky turns blue or purple. Shooting without a tripod requires strict attention to exposure time at this time of day. Note the foreground and background elements, with the horizon placed above center. The patterns of the sandstone are important compositional elements that keep the eye moving throughout the image and contrast with the angular formations on the horizon.

This image of Studhorse Point on the Arizona–Utah border was shot 45 minutes after sunrise. The natural symmetries really enhance the composition, with the closest hoodoo providing a frame for the background one. It draws your attention to the farther one and the two together add a feeling of depth, as does Lake Powell in the distance. Early morning fog off the lake adds drama, as does the spectacular sky, which mirrors the slope of the foreground caprocks. When you have a great sky include it in your image; when the sky is clear or lacks detail include very little of it, or exclude it completely. The mind's eye will naturally fill in the missing sky.

Studhorse Point (Bill Belvin)

Photography is all about light. Midday light is harsh and provides very few shadows; everything appears flat and washed out. Sunrise and sunset provide the best light. Although they are equivalent in terms of light quality, there are some practical differences. Sunrise shots require you to set up in the dark which works only if you have done some advance scouting. Sometimes the terrain or clouds at the horizon block the light from your subject so that you miss the first warm rays. Sunrise colors tend to be more focused around the sun. It is easier to compose at sunset because you can see what you are doing. There is also more dust that can scatter light over a broader region of the sky. Both sunrise and sunset shots require some hiking in the dark; on this point backpackers have a definite advantage.

The most important thing is the position of the sun in relation to what you are photographing. It is usually best to have the sun at an angle to your subject. It is difficult to get proper exposure when shooting into the sun. With the sun behind you, there will be fewer helpful shadows on

the subject and your own shadow can get in the way. Cellphone apps such as *PhotoPills* and *The Photographer's Ephemeris* can help you decide which time of day is best at a specific location.

Slot Canyons (Bill) The narrow slots of southern Utah and northwest Arizona are high on every photographer's to-do list, but even the nontechnical slots present many challenges. The best slots are dark, so a tripod is a must; they are also narrow and often crowded making it hard to position yourself and your equipment. My *Rattlesnake Canyon* image is from a tributary of Upper Antelope Wash near Page. Like all the best slots, Rattlesnake is cut through Navajo sandstone and presents light colors, fine lines, cross-bedding, and embedded Moqui marbles. This location is in the Navajo Nation and can be visited only with a guide.

The image was shot with an ultra wide-angle lens at f/11 to bring everything into sharp focus; exposure was 0.8 seconds at ISO 100. No sky is included because it would have been all white at this exposure. The floor was not shown since there were many footprints in the sand.

Rattlesnake Canyon (Bill Belvin)

Here are some tips for shooting in slot canyons.

- Think portrait. Vertical features like slots are normally best captured in portrait mode.
- Shoot towards the top of the slot but do not include sky. You want a mix of light and dark colors in your composition. Angling up also keeps people which walk by out of your picture.
- Bring a tall tripod. You will often be shooting upwards and a tall tripod will help you compose. A tripod with a center column that moves in any direction may be of help.
- On windy days bring a rain cover for your camera to protect it from sand floating in from above.
- Expose for the highlights.
- Exposure bracket heavily; if you are including the brightest areas near the top of the slot exposure could vary by more than ten stops.
- Turn off image stabilization unless you know that your lens supports the use of IS on a tripod. IS on older lenses and long exposure times (more than a half-seconds) guarantees very soft pictures.
- Flash is useless; it will wash out the colors and cast harsh shadows.
- Bring a scoop or cup to throw sand. Sand and dust in the air emphasize light beams and can also be used to create "sand falls".
- Have both wide and normal lenses and a way to store them compactly.
- Use a small aperture to get needed depth of field, or focus bracket. Bring a depth of field calculator which shows you where to focus and what aperture to use.
- Work the geometry. The camera angle doesn't matter; that is, the camera does not need to be level.
- Watch for flare.

- And most important, stay calm. Things will go wrong. Expect that people will walk through at just the wrong time or bump against your tripod leg.

Panoramas (Stan) A useful trick is to shoot panorama-style: take three or more vertical (i.e., "portrait") images side-by-side, with overlap, so that they can be stitched together to form a single horizontal ("landscape") image. It can be tricky to capture all that is necessary. Practice! On a recent trip to Coyote Buttes near Page, Arizona, and Cedar Mesa near Blanding, I had good results. *The Wave* is a composite of eight frames, while *Fallen Roof Ruin* is made up of 17. The *Photomerge* feature in *Photoshop Elements* stitched these together perfectly and the resulting very high pixel count means that the final images are very crisp. An 18 by 36 inch metal print of the Wave came out very well. At the ruin, this technique allowed me to simulate a very wide-angle lens.

The Wave (Stan Wagon)

Conclusion. Every photography project has slightly different needs. One can learn a huge amount from other photographers and there are many resources on the web. The reference list includes some sites by people who have excelled in the area discussed in this article. Waddington's site has great images and if you click on the info icon by any image you will get more detail; his Underground gallery is excellent, especially the story behind *Chapel of Light*.

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