

Tuesday, October 12, 2010

E.J. Peiker provides helpful insight into polarizers and two ways they can improve our images

Always willing -- as well as qualified -- to discuss the technical challenges serious photographers face, veteran photographer [E.J. Peiker](#) has a lot to say about the importance of polarizers. "My Singh-Ray [LB Neutral Polarizers](#) spend the majority of their time mounted on my landscape photography lenses, and are an important creative and artistic tool in my photographic toolbox. However, in my experience, I've found there are a lot of photographers who don't really understand how polarizers work, when to use them, and how to use them most effectively. Then there are those, unfortunately, who believe they understand, but can't figure out why their polarizer isn't doing what they expect it to. So let's discuss how a polarizer works and the two basic ways it's able to help us produce more beautiful pictures.



Obia Lehua Flower - Maui, Hawaii. Taken just after a rain squall, this image would not have been possible without using a polarizer to block the wet reflections from the petals while still clearly depicting the water inside the flower.

"Let's first take a look at light and how a polarizer affects it. Naturally occurring daylight, as well as most artificial light, is composed of waves that radiate outward in all directions. When these radiating waves are aligned into one or more planes, the light becomes polarized. In a

photograph taken without a polarizer, reflections such as those from a wet leaf are scattered (unpolarized) resulting in a glare that reduces color saturation and hides the structural details of the leaf. Similarly, as the sun shines through all of the particulate in the atmosphere, the light is scattered in all directions resulting in an effect similar to a light fog filter that scatters light and thereby reduces color saturation.

"When we put a polarizer on the front of our lens (or behind it in the case of some super telephoto lenses), we now have a tool that can align the light into a plane and reduce the scatter of light reaching the camera's digital sensor or film plane. A polarizer does this as the result of a chemical compound coating applied on the glass or optical resin that has molecules which are naturally aligned in parallel to each other. This coating allows passage only of the light oriented in the plane that is parallel to the molecules' orientation, thereby eliminating the glare that would be caused by all the light that isn't aligned to that plane. You can see this glare-reducing effect by looking through the filter as you rotate it.

"What I have described above is a 'linear' polarizer similar to the lenses in polarized sunglasses. Linear polarizers work very well at polarizing the light and increasing color saturation, but they can fool the automatic focusing and/or metering systems in many modern cameras that rely on beam splitters which, by their very nature, are polarizing. If the light hitting the beam splitter (usually embedded in the camera's mirror) is not polarized in the same direction as the beam splitter, it sees little or no light and therefore the camera cannot autofocus or meter accurately. The solution is to apply a second polarizing layer onto the filter behind the polarizing layer that essentially cancels out the polarization. Since the offending light from the scene that you are photographing has already been filtered out, this is not an issue and does not significantly degrade the image. This type of filter is called a 'circular' polarizer.



North Cascades Range - North Cascades National Park, Washington. I first photographed this scene with maximum possible polarization (left) which resulted in the overly dark area on the left side of the sky. By backing off the polarization a bit, I was still able to achieve very nice color saturation with a less noticeable darkening of the sky. This scene was shot with the camera pointed about 120 degrees from the sun. The focal length I used resulted in an angle of view of about 60 degrees. So the left edge of the frame was 90 degrees to the sun, the point of maximum polarization. An additional effect of the over polarizing, which is difficult to see at web resolution, is that the added contrast blocked up detail in the shadowed trees a bit more in the over polarized shot. These problems would become more apparent in larger images. [Click to substantially enlarge the image for comparison purposes.](#)

"Now that we have a rudimentary understanding of how a polarizing filter works, we need to consider when and how to use it. Many photographers only have a partial understanding of this, thinking a polarizer exists only to darken a blue sky. Some overlook how effectively a polarizer can remove reflected glare off wet and shiny surfaces, and the important benefits that offers.

"First, let's look at polarizing the light from the open sky to increase saturation of the blue or to darken the sky. Polarizers are most effective at doing this when the camera is pointed 90 degrees away from the sun. For example, with the sun rising in the east, maximum polarization of the open sky will be achieved if the camera is pointed north or south. This can pose a problem when using wide angle lenses, especially those that are 28mm or wider (full frame 35mm equivalent). With these lenses, due to their wide angle of view, the intensity of the blue in different parts of the sky can appear uneven. There are simple solutions to this 'dark-spot' dilemma.

"Some photographers will get frustrated with the uneven effect and just take off the polarizer. A better solution is to rotate the polarizer enough so that the effect is completely gone -- or to turn the polarizer part way to a point where the difference is less noticeable. Many photographers I have worked with believe the proper way to use a polarizer is to look through the viewfinder and turn the polarizer until the sky is as dark as it can be. This is simply not the case. It's wiser to 'tune' the polarizer to get the most desirable effect in the viewfinder or on your Live View screen. By doing this, any obvious dark area can be eliminated and in some cases you can still get some polarization effect before the dark spot is noticeable. At higher elevations, the effect of polarization can be quite dramatic since the sunlight is less scattered by the thinner atmosphere and there are fewer atmospheric pollutants and particulate. This is another time when you will want to back off on the polarization a bit to avoid an overly dark and unnatural looking sky.

"Perhaps my most frequent use of polarization is to remove sheen from vegetation and rocks. It's not just the atmosphere that scatters light. Many wet uneven surfaces also scatter light and thereby reduce color saturation dramatically. Waterfalls, leaves, and just about anything non-metallic that reflects light can scatter the light and reduce color saturation. By using a polarizer whenever you're photographing light-reflecting surfaces, you can really give your photos a nice color pop. And in the case of waterfalls, the 1-1/3 to 2-stop reduction in exposure level can result in a longer shutter speed and a more veiled look to the water. (For an even more dramatic veiling effect, try adding a neutral density filter, but that's another article.) Adjusting the polarizer in these situations is best done visually. Just turn the polarizer until you have the color saturation the way you like it. With wet rocks and vegetation this will generally be at the maximum polarization point. With waterfalls, the temptation to maximize the polarization is always there, but sometimes this can cause some water that is flowing in shallow ponds or over rocks to completely disappear. In such cases, you may want to back off just a little by turning the polarizer down a bit.



Jay Cooke State Park - Minnesota. A cold fall morning along the shores of Lake Superior can create quite a bit of moisture in the air which robs the scene of color saturation. The shot at left is slightly polarized, the right is fully polarized. By polarizing this scene we accomplish three things. First, polarization took glare off of the beautifully colored foliage leaving more deeply saturated yellows and reds. Second, it cut through some of the fog thereby increasing contrast -- this may or not be desirable, depending on the mood you want to achieve. Finally by polarizing the light scatter in the sky, the sky has become a deeper blue. Some of the subtleties are lost at web resolution, but are evident at full resolution. Click to substantially enlarge the image for comparison purposes.

"Another common mistake I see photographers making with polarizers is over-polarizing a scene when the foreground includes a pond or lake that is reflecting the image of mountains, canyon walls, or cloud-filled sky in the background. Imagine sitting in the early morning at the edge of a totally calm alpine lake with a beautiful reflection of the snow-capped mountain in the lake. Too often a photographer in this situation will dial in maximum polarization, which actually has the effect of reducing the reflection in the lake substantially. By backing off a bit on the polarization, one can still get a darkening of the sky and a reduction in reflections off wet rocks without removing too much of the beautiful reflection.

"These examples are all nature photos since this is the main type of work that I do, but the same holds true for other situations. Whether you're shooting buildings, portraits, products, sports, aerials, or just about anything, polarizers can offer similar benefits. For example, try taking some photographs of your car as you vary the polarization -- you will see some dramatic effects, and due to the complex lines of most cars, you'll see there is no one 'right' polarizer setting, but rather that different settings will give different effects. The right setting is whatever yields the most pleasing results, and this applies in any situation."

Widely recognized for his collection of waterfowl photographs, E.J. is currently engaged in creating artistic landscape images of the world's great scenic wonders. You'll find an impressive array of more than 6,000 images of landscapes, wildlife and birds from five continents on his [personal website](#). He is also the co-founder and technical editor for the on-line photo magazine [NatureScapes.net](#).