Mastering Wide-Angle

The problem with wide-angle photography is that it's... wide. That is, if you point your camera at a random subject, you'll get a lot of things inside the frame. Some of them will very likely be dark, others will be light, some will be near, some will be far. This introduces all kinds of complications, and in fact turns many of the usual rules, techniques, and even desirable lens characteristics on their heads.

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Relative importance of some lens characteristics at different focal lengths.

With telephoto, depth of field is narrow, the long focal lengths make hand-holding tricky, and you're often shooting subjects that don't stand still. This means that fast and precise focusing is critical, bad bokeh has a really unpleasant effect on most pictures, and you'll be shooting your lens wide-open most of the time, to minimize camera shake. On the other hand, the narrow field of view means that you can use deep hoods to very effectively cut out glare and reduce flare. In other words, when shopping for a telephoto lens, you might want to trade off some optical quality for focusing speed and accuracy -- or pony up the extra for the snappier of two otherwise equal lenses (e.g. Canon 70-200/2.8L vs Sigma EX 70-200/2.8).

With wide-angle, the situation is largely reversed. We will soon see why.

What's so special about wide-angle?

Wide-angle lenses see the world very differently from normal-range or telephoto lenses. The differences have to do mostly with two things: perspective and depth of field. In addition, wide scenes present special challenges for exposure.

A note on terminology

Before we go any further, I'd like to get a pet peeve of mine out of the way: perspective. The fact is that actually lenses have nothing to do with perspective -- it's purely a function of subject distance. That is, if you set your camera on a tripod and photograph the same subject twice at two different focal lengths, then crop the wide one to match the long one, perspective will be identical on the two pictures. However, as a photographer, you're unlikely to do this (other than as an experiment, that is): instead, you'll be thinking in terms of the subject. With the wide lens, you'll move closer to the subject, with the long one, you'll back up. This changes the relation between the subject, background, and foreground. So, in this strictly practical sense, wide-angle lenses will give you a different "perspective" than telephoto ones. When I'll be writing about "lens perspective" in this article, it'll be in this sense. If someone can come up with a better term to preserve the distinction, please let me know!
Another question of terminology relates to expressing width or length of lenses. With the crop-factor DSLR's, this is problematic. I'm going to stick with the convention of using 35 mm equivalent focal lengths for the purpose, even if this risks offending the "35 mm is for tourists" club or other sticklers for accuracy -- simply because these are familiar units. If someone says "a field of view of 86 degrees" to me, it's technically accurate, but leaves me scratching my head until I do the math and realize "ah, he means a 24 mm," So, whenever speaking of focal lengths in general, they'll be the 35 mm equivalents. However, I'll list the corresponding physical focal length for the 1.6x crop factor in [brackets]. (If any Nikon, Fuji, Pentax, or Sigma users make it this far, no discourtesy is intended; I'm sure that if you'd be writing the article you'd use 1.5x or 1.7x. Besides, 1.6x is rather neatly between the two.)

Finally, I'm restricting this discussion to rectilinear wide-angle lenses: that is, lenses that render straight lines as straight (or mean to, anyway). This is because including fisheyes would complicate an already complicated picture even further -- and also because it appears that in the days of Panorama Tools, most people shooting fisheyes end up de-fishing them afterwards anyway, in which case the complications are the same as for rectilinears.

What's a wide-angle?

There's no hard limit between a "normal" lens and a "wide-angle" one, of course. As technology develops, and wider and wider lenses become available, even the soft limits shift. However, to make things clearer, we'll draw a couple of lines in the sand anyway.

We'll draw one line at 35 mm [22 mm]. Anything wider than this is wide-angle. We'll then draw another at 24 mm [15 mm]. Anything wider than that is ultra-wide. By this, I mean that from 35 mm down, you will encounter many of the complications and creative possibilities characteristic of wide-angle photography, and from 24 down, you won't be able to get decent results without being aware of them -- except maybe every once in a while by accident.

It's often said that the 50 mm [32 mm] lens most closely approximates the way we humans perceive the world. While this is certainly controversial and, I think, impossible to demonstrate one way or the other, there is a certain truth to it. Within the normal range of, say, 35 to 90 mm [22 to 56 mm], scenes generally contain about as much stuff as a person can take in at any one time, without moving his head. The relationships between foreground and background objects appear "right" or "natural" (although I suspect that this is more of a learned artistic convention than anything intrinsic to how we experience the world), and objects aren't generally distorted much, except for the usual distortion you get from rendering three-dimensional objects on a flat plane -- perspective.

Wide-angle scenes are bigger. They correspond to a real-life scene that you have to turn your head to take in. They can contain a large number of things at different distances. This means that wide-angle photography has immensely rich creative possibilities -- it can reveal connections and juxtapositions that aren't obvious to the onlooker; at its best, a wide-angle photograph can "pull in" the viewer in a very special way, quite unlike the feeling of "seeing through the eyes of the photographer" that you can get from a really good normal-range photo.

Perspective

The most obvious characteristic of a wide-angle lens is its "exaggerated" perspective. This means very simply that background objects appear to be further from foreground ones than they actually are. This exaggeration has to happen when a wide scene is projected onto a flat plane, and straight lines are rendered as straight. (Incidentally, the fisheye projection, where straight lines are allowed to bend, is no less "realistic" than a rectilinear projection -- we're just not used to it, and it jumps at us more.) However, this characteristic has some not-so-simple and sometimes counterintuitive consequences.

If your camera is even slightly out of the horizontal, verticals will converge. Buildings will develop leans. Personally, I particularly like this characteristic: it gives all kinds of creative possibilities. However,
there are times when you'll want to photograph a building without this perspective effect. Of course, you can correct the distortion in post-processing, but it's always best to get it right in-camera: the way to go is to place the horizon in the center, shoot, and crop out the extra foreground later. You'll end up with vertical verticals.

*Helsinki Cathedral, Finland. The camera's pointing up, making the verticals converge. (Tokina 17/3.5 with 10D)*

**Flat objects perfectly perpendicular to the camera come out undistorted.** Place a life-size cardboard cut-out of Boba Fett in the corner of your frame, take care to position yourself so that you're exactly perpendicular to Boba, and shoot. Boba will come out looking totally himself. However, if you placed a friend dressed up as Boba Fett in the opposite corner, he would come out seriously stretched. That because he's three-dimensional, while the cut-out isn't.
A building photographed exactly face-on at 19 mm [12 mm]: no perspective distortion. (Sigma 12-24 with 10D.)

**Depth of field**

"Short focal lengths have lots and lots of depth of field." They sure do. However, the other side of the coin is that the attendant wide scenes tend to be very deep, so you're going to need all of it, and more, if you want to keep everything sharp (even if nothing will be really, attractively soft.) Furthermore, people look at wide-angle photos much as they look at the actual scenes -- their eyes move from one part to another. This means that areas that are slightly soft even though they should be sharp are way more annoying than with normal or tele scenes, where the out-of-focus areas are a part of the composition. On balance, it takes way more thought and effort to focus a wide-angle scene than a normal or telephoto one. More about that later.

**Flare**

Flare is particularly problematic for wide-angle photography. Because of the wide field of view, you can't use deep hoods. For the same reason, it's not unusual to get a bright light source either in the frame or just outside it. This results in flare spots and loss of contrast. In other words, a wide-angle lens that handles flare ungracefully is badly crippled in many situations -- and you as the photographer have to take flare into consideration anyway; either work it into the composition or try to minimize it while composing. For example, if you intend to crop, you might as well shade the lens with your hand, even if this puts the hand in the part of the picture you'll crop out.
Phoenician seawall in Batroun, Lebanon. The sun's directly in the frame. There are some flare spots visible, but they're not badly distracting at all. Most lenses would've had a seriously hard time coping with this scene. Note the low-key detail retained in the very dark areas of the wall. (Tokina 17/3.5 with 10D.)

**What's it good for?**

While the "traditional" uses of wide-angle lenses are in landscape and architectural photography (and, in fact, most of the technical tips below will be best applicable to that type of work), wide-angles are by no means limited to this. In particular, WA's are excellent for interior and situational/street photography, and have their uses even in portraiture.

**Landscape**

"Fenland." A bog in Nuukso, southern Finland. (Tokina 17/3.5 with 10D.)

In my opinion, nothing can capture the majesty of a landscape quite as well as a really good wide-angle photograph. Landscape photography is immensely challenging and immensely demanding, both of technique and equipment: landscapes are often best appreciated as large prints, which are merciless with
technique and technical deficiencies. For serious landscape photography, a tripod and cable release (or self-timer) are critical. However, good light and a creative eye for simplifying the complex are even more important: never let the lack of a tripod stop you from shooting a beautiful landscape -- if you take some care, chances are that nobody but you will ever notice the technical trade-offs you had to make. For serious landscape photography, the critical lens characteristic is performance stopped-down: in particular, evenness across the frame, and resolution. For example, the Sigma 15-30 excels at this type of work -- it's razor-sharp, and the greater-than-average barrel distortion won't matter for this application.

Architecture

Courtyard of the palace of Emir Amin, Beiteddin, Lebanon. (Tokina 17/3.5 with 10D.)

An architectural photograph is a joint creation by the architect and the photographer. Wide-angle is indispensable for the purpose: nothing else can capture an architectural whole. As for landscape, stopped-down performance is critical. However, because of the "larger" detail in architecture, contrast becomes more important than resolution, and because of the abundance of straight lines, lack of distortion is highly important. (However, this has become a good deal less critical now that we have utilities like DeBarrelizer and Panorama Tools to correct this out-of-camera.) Even more than for landscapes, nothing is too wide for architecture: the Sigma 12-24 would suggest itself for this application, at least for the crop-factor cameras.

Situational

Wide-angle lenses have two major advantages in situational photography. One, they can encompass enough of the scene to make the picture about interactions between people or their environment, even when you as the photographer are participating in the scene. And two, by putting your subject off-center (which you would probably do anyway), your subject won't realize s/he's being photographed. Don't try to be sneaky about it, though; it's not nice and could get you into trouble. For situational photography, many of the "wide-angle specific" rules don't really apply: you'll be shooting much as you'd shoot with any lens. However, wide-open corner performance still isn't such a big deal, as in a situation like this you won't have time to tweak focus to perfection, and in a real, three-dimensional scene, the corners will almost certainly be at a different distance than your subject anyway -- that is, out of focus.

Wide-angle situational photography means available-light photography, almost inevitably. You need a quite an elaborate flash set-up to give even illumination to a scene much wider than 28 mm [17 mm]. Without this, a flash will only make things worse.
Therefore, for situational photography, lens brightness is very valuable. My pick for this purpose would be the Sigma EX 20/1.8. However, lens darkness isn’t as much of a limitation as it may initially appear: you can effectively hand-hold short focal lengths much better than long ones, and the excellent high-ISO performance of most DSLR’s can make up for a lot. Maximal technical quality isn’t as critical for situationals anyway, and properly treated, noise can even add to the atmosphere. I’ve gotten quite nice results with my fairly slow wide-angle lenses even in very low light levels. Not that I’d mind having a faster one...

Street artist in Helsinki, Finland. (Tokina 17/3.5 on Tri-X 400 pushed to 3200.)

Portraits

The normal recommendation for a portrait lens is something between 80 mm [50 mm] and 135 mm [85 mm] or so. This is, in fact, good advice -- if you want a classical head-and-shoulders shot, with natural-looking features, nice background blur, and so on. However, that’s not the only kind of portrait, and for some of these, wide-angles come in very handy.

One thing you need to take into account when shooting WA portraits is distortion. If you shoot it like you would with an 80 mm [50 mm], you’ll get a Dr. Evil-like forehead and Pinocchio-like nose. This can actually be quite effective for a humorous portrait, assuming your subject has a sense of humor, but may
not be quite what you're looking for.

The trick is to step back and treat your subject as an element in the scene. This can make for unusual, original, and extremely evocative portraits: a picture of a craftsman in his shop, with a good deal of the shop left in, can convey far more of his character than just a picture of the craftsman. Use your imagination and make use of context, and you'll get very memorable pictures. And if you do step back, the distortion will mostly go away.

Farmhand in the Camargue, France. (Tokina 17/3.5 with 10D.)

**Technique**

With normal-range or tele photography, exposure and focus is pretty straightforward: basically, you point your camera at the subject, meter and focus on it, then recompose and shoot. If you have to deal with backlight, an unusually light-colored or dark subject, bright subject on dark background or vice versa, multiple subjects etc. it's pretty easy to know what to do -- dial in exposure compensation, expose for the subject and allow the background to blow out, pick which subject to focus on and allow the secondary one to go out of focus, recompose slightly to leave a hot spot out of the frame, and so on. In fact, creative use of background or foreground blur is one of the most fun things to do in this range.

With wide-angle, things get considerably trickier, both technically and composition-wise. Because the scene is so "big," you're going to have to juggle a large number of variables -- there's going to be a lot more going on in it than you'll notice while shooting. Technically, the two main concerns are exposure and focus.

**Exposure and post-processing**

The problem (especially with digital) is that because there's so much in your scene, the dynamic range will often exceed the DR of your capture medium. Of course, ideally you should look for scenes where this isn't the case, yet the light has a nice quality to it -- the "magic hour" rules.
Unfortunately, having to sacrifice some of the dynamic range, especially in the highlights, usually makes for pretty boring pictures. I don't think I have any real keepers among my WA pictures where this is the case... except maybe a few "people pictures".

There are a number of ways to approach the problem.

- **Look for scenes with low dynamic range.** "Magic hour light" and other "interesting weather light" is best, of course, but wide-angle works surprisingly well for "boring light" -- for example overcast, noonday or front-lit sunlight: the inherent richness of the scene can greatly make up for the lack of interest in the lighting. Wide-angle is great for winter photography: snow cancels out (sometimes reverses) the usual brightness difference between sky and ground.

- **Expose for maximal dynamic range, then correct in post-processing.** Use as low ISO as you can, if shooting in JPG, use the low-contrast setting, shoot in RAW if you're up to it, and expose just below the point where you lose the highlights. Then restore tonal balance in post-processing. If you shot at ISO100 or ISO200, there are at least two or three stops of room to pull up the tones without boosting noise badly enough for it to be distracting in even quite large prints or introducing other major gremlins. If you shot in RAW, you'll have a few aces up your sleeve in post-processing: more about that below.
• **Bracket.** Shoot two (or sometimes more) frames at different exposure values off a tripod and merge
them in post-processing. Below, I'll describe a ridiculously simple way to do this that usually looks
much more natural than complicated and labor-intensive masking techniques (like the one that I
describe in my Layers and Masks post-processing lesson).

**The Simulated GND Filter**

The graduated neutral-density filter is (used to be?) an important tool for serious landscape photographers.
It's basically like those 1980's sunglasses where the top is dark and the bottom is clear. This will
effectively and, if used with skill, naturally reduce the contrast between sky and ground. Unfortunately,
it's very tricky to get just right, and if done badly, it'll look really artificial. And, of course, messing with
the filter just as the light is fading may not be your idea of a good time.

Digital post-processing has changed all this. In my opinion, GND's can be consigned to the dustbin of
history, as you can achieve exactly the same effect far more easily and with far greater control in the
digital darkroom.

To start with, you need two variants of the same scene, one exposed for the highlights, one for the
shadows. There are two ways to get them:

1. **Bracket.** Use a tripod and shoot two exposures of the same scene, one for the highlights, one for the
   shadows.

2. **Shoot RAW and convert twice with digital exposure compensation.** If the dynamic range isn't *that*
huge, you can just expose for the highlights, and then convert it to 8-bit twice: once for the shadows,
one for the highlights. At ISO100, there's about 2-3 stops of latitude there.

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*I wanted to get a picture of this courtyard at the Mir Amin palace in Beiteddin, but the light was very
problematic. I exposed for the light-colored wall and the sky, causing the shadows to go to dark. Above is
the shot converted according to camera settings.*
Here's the same shot, converted from RAW with about +1.5 stops digital exposure compensation.

Once you have the variants, you'll want to merge them. Here's how:

1. **Copy and paste the exposures into different layers on the same image.** If you bracketed, you may have to nudge them into alignment: to do this, switch blending mode to Difference -- when the "relief" effect vanishes, they're perfectly aligned.

2. **Create a quick mask for the top layer.** In Photoshop 6, that's the dashed circle at the bottom of the Layers palette.

3. **Select the graduated fill tool.** That's a mode of the paint bucket tool.

4. **Reset swatches to black and white.**

5. **Put a graduated fill into the mask layer, to fade the bright parts into the dark parts.** Experiment a few times to get it right. I find that gentle transitions work best.

6. **Touch up with the eraser or airbrush tools.** I use wide-radius brushes (200 to 300 px for this).

And here are the two frames blended. I used a linear, graduated mask, and touched up the center a bit with the airbrush. Not as good as waiting about 18 hours for the light to improve, but pretty serviceable.
There are a few variants:

1. **Use circular graduated fills instead of linear ones.** These work especially well for situations like photographing through a gateway or a window. You can also use this (with the variant below) to correct vignetting (light fall-off).

2. **Use a levels/curves adjustment layer instead of a second exposure.** If the correction you want to make isn't too huge, you might as well dispense with the trouble of merging two variants of the scene: instead, just use a Curves or Levels adjustment layer to adjust "exposure" in the problem area, then use the above graded mask technique to blend with the area that was originally correct. In fact, this is the variant I use most often.

**Focusing technique**

The second problematic area in wide-angle technique is focusing. The trouble is that while there's lots of DOF, the scenes are very deep, and wide-angle scenes tend to draw the eye to "wander" around the frame, which means it'll eventually land on something that's not critically sharp. So, it pays to be extremely careful about deciding where to focus: which part of the scene is the spot where the eye is drawn to and "rests." If it's near infinity, then focus on infinity and let the foreground go slightly soft. If it's in the foreground, then make that sharp and let infinity go. Again, because the scene is complex and often based on a figure-ground juxtaposition, this can be a difficult decision. Which is the "subject" here -- the tractor (foreground) or the church (background)? Which should I let go soft? And what can I do to avoid having to make the choice?

!” Helsinki Cathedral with tractor. (Sigma 12-24 with 10D.)

A second complication is that auto-focus really doesn't work that well with wide-angle. Especially with the shorter, darker lenses hyperfocal distance wide-open is really quite close. Moreover, objects even a few meters away may be quite small in the frame, while the AF sensors are quite large. This means that AF will have real trouble latching onto anything more than a few meters away. (Top-end cameras with high-precision AF sensors are probably noticeably better at this, but even they can't solve the problem; only mitigate it.)

In practice, this means that while you'll have no trouble focusing on subjects up to, say, 2 meters distant, beyond that, the AF will take something of a wild guess. You, however, know more than the camera: by estimating subject distance and focusing manually according to the distance scale on the lens, you can get much closer to ideal -- and the great depth of field will mask any small inaccuracy, especially stopped-down. So, here's what to do:

1. **Auto-focus for close-up situationals, zone focus for the rest.**

2. **Stop down as far as you can.** Use a tripod whenever possible: this means you'll be able to stop down
to f/11 or below. Often it's better to go all the way to f/22, despite the slight diffraction-caused softening this causes. The wider the lens, the less you'll need to stop down -- but even on the widest rectilinear currently available, f/16 isn't overkill. If you don't have a tripod, use a monopod. If you don't have that, bump up the ISO up to 800 (exposure constraints permitting). The extra noise will matter far less than the better overall sharpness. If you still can't stop down, shoot the picture anyway: if the composition works, nobody will care about the technical trade-offs.

3. **Identify the visual center, and focus on that.** That'll be whatever the eye settles on after wandering around in the frame -- and if it's soft, the picture won't look right.

4. **If you want infinity to be sharp, focus on infinity.** If you're stopped down to f/16 or f/22, you have some room to pull back, but otherwise, don't trust hyperfocal shooting. Even though the calculated hyperfocal distance for the Sigma 12-24 wide-open at 12 mm is about 2 meters, that will leave infinity noticeably soggy.

5. **If you have to choose, focus behind rather than in front of the subject.** If you have enough resolution to outline an object, it'll be perceived as sharp. This means that you can get away with more softness in the foreground, where detail is generally bigger, than the background, where detail is small -- sometimes "infinitely" small.

**Composition**

Composing wide-angle scenes presents a whole new set of difficulties, challenges -- and vast creative possibilities. This is no realm for "rules" -- only suggestions and observations.

The challenge with composing WA pictures is simplifying the complexity: a random scene will be just chaotic. The picture very easily becomes a mess of competing and conflicting detail with no overall composition emerging. There are lots of ways of approaching this. Some that have worked for me are:

**Figure-ground juxtaposition**

Especially with WA, the background is more than half the picture. With a bold "phony subject" close in the foreground, the main interest of the picture (which can be the background) gets put into relief. For example, of these two pictures, I by far prefer the one with the Volvo:
Incidentally, I also think these pictures demonstrate how WA can work better for days when the light is boring.

**Run with the perspective**

One of the most striking characteristics of WA lenses is the "exaggerated perspective:" by finding the converging and receding lines and curves and composing the picture around them, you can organize the discrete elements of the picture into a coherent whole.


Play with the distortion

Another interesting characteristic is that things near the edges of the frame tend to get stretched more than ones near the center. By taking control of this characteristic, you can do some fun, creative stuff, especially when photographing people.

On the other hand, because there's less distortion near the center of the frame, you can get quite nice "naturalistic" portraits with lots of context, too:
A jeweller in Jbeil, Lebanon. His face is actually fairly near the center -- I cropped out the edges of the picture for a squarer format. (Tokina 17/3.5 with 10D)

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