

Shining a Light on HDR

In This Chapter

- ▶ Understanding the HDR process
- ▶ Diving into a basic workflow
- ▶ Seeing examples of HDR images
- ▶ Becoming infected with excitement

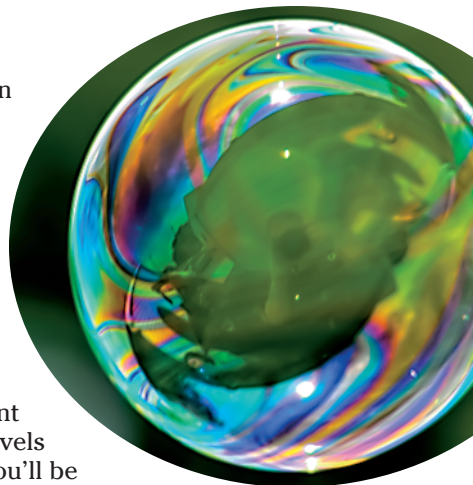
Rather than start this book with a pedantic definition of high dynamic range (HDR) photography followed by a technical treatise on why digital camera sensors don't capture the actual range of light in most scenes, I want you to see it in action. After all, HDR photography is first and foremost about the photos.

Déjà vu alert: HDR photography is about the photos.

The technical information behind why HDR has been developed may or may not be meaningful to you down the road, but you can't be expected to make the decision to jump into HDR photography on the basis of bit depths, contrast ratios, and sensor noise. I haven't left you high and dry though. There are as many HDR images and examples throughout the book that I could fit in to help you see the HDR difference and decide whether or not you want to try it out.

You need to see HDR in action and examine the types of images you can create with it. Afterward, if you want to know why a 12-bit sensor can capture only 4,096 levels of gray and how that's insufficient for most scenes, you'll be able to put that into practical perspective.

This chapter, then, shines the light on HDR with a little bit of show and tell.



Peeking inside the HDR Process

HDR photography is an exercise in capturing more light than your camera wants to. As I show you throughout this chapter, today's digital cameras have a problem with dark darks and bright brights in the same scene. It throws them a bit wacky. "Traditional" pictures often don't tell the whole story.

HDR photography — also called HDR imaging (HDRI) — is a two-tiered process that attempts to

1. Capture as much of the true dynamic range of a scene as practical (or possible, or artistically desirable).
2. Process the result with specialized software to produce an image file that can be printed and viewed using standard graphics, Web, and publishing software.

Figure 1-1 is an example of what you can create with HDR.

HDR photography is not monolithic. A number of caveats, disclaimers, and personal preferences affect the process of HDR in all areas. However, certain established aspects of HDR make it HDR.



Figure 1-1: Turn mundane into amazing.

The twin peaks of HDR

As I just mentioned, HDR photography is a twofold process. You take pictures; you process pictures. Everything revolves around or is a part of these two activities. Each pillar (to continue mixing metaphors) builds a different part of the foundation:

- ✓ **Photography:** HDR photography isn't something you can do from the confines of your office chair or Barcalounger. It begins with photography. Without pictures, you don't have HDR. However, you don't have to

travel to exotic places to shoot. You can exploit HDR to its fullest with landscape, architecture, and everyday subjects easily found in your own backyard and local community.

For more information on setting up your camera and taking pictures, please see Chapters 4–6, plus Chapter 12.

- ✓ **Software processing:** HDR relies on a combination of software; some are specific to HDR, and some serve more general purposes as well as helping you create HDR. Without software processing, you don't have HDR.

For more information on the software aspects of HDR, please see Chapters 7–11.

Going with the (work)flow

HDR photography can be somewhat confusing if you aren't familiar with the basic flow of events. In general, here is what you dutifully do when you do the HDR you do and the order that you do it in.

1. Take the photos.

This is the first, and arguably most important, step in HDR. Don't be content with average photos. Take good or even great photos.

Much of the time, you'll set your camera on a tripod at the scene of your choice and take a series of exposure bracketed photos. *Bracketing* means you take a few pictures with different exposure values without moving the camera, resulting in a series of bracketed photos. The succession of Figure 1-2 shows an example of bracketing. You can see from these three brackets that each one preserves an important part of the overall dynamic range of the scene. This is pretty important. Although the under- and overexposed photos aren't pretty to look at, the HDR application uses the information from all the brackets to sense what each part of the scene actually looks like. HDR software works with all the information you can give it.



If your camera is fast enough, you might be able to take bracketed photos without a tripod. This is called *hand-held HDR*.

The exception to bracketing is when you take one Raw photo for use in single-exposure HDR. Raw photos are best to work with, but JPEGs can also produce good results.

2. Do Raw photo preprocessing.

For the highest quality results, convert Raw photos to TIFFs before proceeding with HDR.



Figure 1-2: Bracketed photos capture more light.

3. Generate an HDR image in HDR software.

HDR software merges the bracketed photos into a single HDR image that serves no practical purpose other than to turn into something else.

4. Tone map the HDR image in HDR software.

By itself, the HDR image isn't worth much. Until everyone is using HDR monitors and printers, you have to *tone map* (the process of deciding what data from the original photos is kept in the final image and making sure it fits) the HDR image to convert HDR data into a low dynamic range space.

Yes, you do all these steps to get back where you started — a low dynamic range image — kinda. The key difference is that this image was created from a much wider range of original data, making completely different and beautiful processing options available.

5. Finish with post-HDR processing.

The image you just tone mapped often needs further attention. For example, it might have noise problems, or need straightened or cropped. You might also wish to convert your image to black and white, or otherwise embellish it by adjusting levels, tweaking the contrast, or dodging and burning.

6. Publish the image.

You can see the result in Figure 1-3. The final product was a result of photography and software skills applied to capture and present an interesting view down a major street with traffic barreling down on me just like you were there with me.



Figure 1-3: The final product.

HDR Show and Tell

The most effective way to show you the practical benefits of HDR digital photography is for you to see what photos look like before and after being processed as HDR. You'll discover a little bit of the why along the way, with the rest of the book completing the picture. I chose several types of scenes to illustrate the breadth and depth of HDR, ranging from interiors to sunsets to my son to a soap bubble. Here, let me show you.

Rescuing details from shadows

One of the things HDR is meant to do is bring details out of shadowy areas. The photo in Figure 1-4 looks west at sunset. The sky is reasonably light, and you can make out the clouds and the glow from the sun. These elements also reflect off the water of the river in the foreground.



Figure 1-4: A sunset with a dark foreground.

Unfortunately, the trees, riverbank, and details of the building are all in shadow. The camera can't capture enough *dynamic range* — the total range of light in a scene — to accurately represent it. Standing there, the actual scene was much brighter. The disconnect between reality and the photograph is that digital still cameras do not see scenes the way our eyes do.



The reasons cameras have limited dynamic range are many. Camera manufacturers are currently unable (due to the fact that not everything is possible) or unwilling (they have to stay in business so not everything that is possible is practical) to cross scientific, technical, design, and manufacturing barriers, including

- ✓ The bit depth the sensor uses to store data
- ✓ The inherent noise level of the camera system and how it affects the sensor's ability to measure light
- ✓ How digital systems simply react to light differently than our eyes do

The effect, more often than not, is that a camera compromises when it measures the exposure of a scene. It has to. In this case, rather than make the sky too bright, the camera made it just bright enough and relegated the rest of the scene to the shadows.

Figure 1-5 shows the same scene in HDR. Notice the huge difference across the photo, particularly in the previously dark areas. The trees are now clearly green. The sky and clouds have more definition and the building has discernable details. Much better!

The secret to creating the new look is twofold. First, HDR photography captures a much wider range of exposure information using brackets. This gives the software much more information to use. Highlights that are normally too bright are captured so they aren't overblown. The same goes for shadows. In software, you tone map the source material (which has too wide a range of brightness to display or use as a standard image), squeeze it so it fits in a standard image, and make creative decisions that define the relative brightness of parts of the scene. After this, you can make other adjustments and enhancements (such as brightness, contrast, color, noise, sharpness, recomposing, cropping, and resizing) in a photo editor such as Photoshop Elements.



Figure 1-5: In the same sunset shot, HDR brightens the shadows.



This example illustrates a few interesting points:

- ✓ **Losing the low end of dynamic range:** Digital cameras often lose details in shadows. This is caused by the camera's inability to capture the full range of light in a scene. This range is called *dynamic range*.
- ✓ **Compromises:** Cameras make compromises on what to expose well and what to let go. You can help the situation by metering the scene and subject correctly — but scenes with a wide dynamic range can't be faithfully captured by today's cameras.
- ✓ **Rescuing details from shadows:** HDR photography allows you to pull meaningful information out of shadows so the areas are brighter.

Taming highlights

Another strength of HDR is the ability to tame highlights, which are often *blown out* in traditional photos — that is, the camera ran out of room to store brightness information. When that happens, the camera sensor throws its hands up in the air and exclaims, “¡No más!” The blown areas have very little detail and may be completely white, as in the sky of the left image in Figure 1-6.



Figure 1-6: Lucy in the sky, with brightness.

In the left image, the street, bridge, and lamppost in the foreground are all decently exposed although not perfectly — they are, along with the trees, a bit dark. The sky is the bigger problem: It suffers from being mostly dead — that is, blown out. It's too light to see many details, especially over the building to the right.

The camera got caught in the middle. It ended up favoring the foreground (although imperfectly) and therefore blew out the sky.

However, the same scene shot and processed as HDR is shown on the right side of Figure 1-6. It is overwhelmingly better. In particular, the sky has many more details and is no longer washed out. The brackets provide the information and the HDR application uses them to access and manipulate the data. The clouds are dramatic, and the contrast between clouds and sky is much more interesting. This particular look — somewhat dramatic with plenty of surface details — was achieved during tone mapping, which is covered in Chapters 8 and 9. The trees are nice and bright, and the texture of the concrete bridge has been enhanced. The latter points used many of the editing techniques shown in Chapters 10 and 11. In particular, the tree line was dodged — a process that selectively lightens an area.

This shot reveals



- ✓ **The high end of dynamic range:** Normal photos often lose information to blown highlights. When the camera exposes the shadows brighter, highlights get blown out. It's a no-win situation.
- ✓ **Rescuing details from blown highlights:** HDR tames highlights and preserves important information. It allows you to emphasize details and contrast while preserving the entire scene. The entire photo looks better.

Making the most of interior spaces

HDR is perfectly suited for interior spaces — and the larger the better. Figure 1-7 illustrates the sanctuary of a large church lit with overhead room chandeliers, a few spots on the stage, and ambient light coming in from the windows.

This is a great example of a compromised exposure. The camera is doing the best it can, but it is stuck in the middle. The result is a dark looking room that should be brighter and bright areas around the lights and windows that should be the same or darker. It is the worst of both worlds.

And neither of the following two courses of action, illustrated in Figure 1-8, are attractive:

- ✓ **Dinged if you do:** Raising the ISO or slowing the shutter speed to make the room brighter (raising the exposure) only serves to blow out the highlights even more, as you can see in the left side of Figure 1-8. Rigging

additional lighting to brighten the room would either be too expensive or cumbersome, not to mention that you couldn't possibly hide the lighting gear from this vantage point.

- ✓ **Donked if you don't:** Protecting the highlights around the chandeliers and windows requires decreasing the exposure. The problem is that everything that already looks a bit on the dark side slides further into darkness if you do that. Check out the right side of Figure 1-8. You are left with a picture of a few bright spots in a dark room.



Figure 1-7: Inside a large space with no extra lighting.



Figure 1-8: Two exposures show the horns of the dilemma.

Tone whating?

It's impossible to talk about HDR without touching on tone mapping, because that's what gives each HDR image a unique look. In HDR, you create an HDR image from bracketed photos first (see Chapter 7). Much more brightness data is stored (you know, what's in the shadows and what's in the highlights) in an HDR image than is possible in standard image formats like JPEG or TIFF (even a 16-bit per channel TIFF). That makes an HDR image impractical to use. You can't view it properly on your monitor or

print it out. So, you have to tone map it (see Chapters 8 and 9).

Tone mapping occurs in HDR software. Different applications handle it differently, but the general principle is that you control how data from the HDR image gets put into a low dynamic range format. You get to choose specific tone mapping settings that can create entirely different looks in different images. The end result is a TIFF or JPEG — something you can continue to edit in a graphics program, publish, or print.

HDR solves both these problems nicely, as shown in Figure 1-9. The entire room looks brighter and more vibrant, and the light from the windows has not overpowered the photo. In other words, the best parts of each of the bracketed photos contributes to the final image. The decisions you make that control how this occurs is what tone mapping (Chapters 8 and 9) is all about. Although some post-HDR processing techniques helped achieve this effect, tone mapping is the single greatest contributor to the overall appearance of this image.



Figure 1-9: HDR solves this exposure problem.

This photo shows you



- ✓ **Flexibility:** HDR can work in situations where extra lighting is needed to achieve a better exposure. This is especially helpful for large buildings (which are impossible to light without owning a movie company), landscapes, cityscapes, and large interiors.
- ✓ **Color:** When more of the scene's dynamic range is present, brought to you by HDR, its true colors are free to come out. This is far preferable to the dull original.
- ✓ **Post-HDR processing:** It's often important to continue to edit a tone mapped HDR image to create a finished product. Even with bracketing and tone mapping, the windows were still a bit too bright. An under-exposed bracket was used to tone down the windows even more. That option would not be available without the brackets.

Enhancing details

HDR works well for large scenes, but it also enhances smaller subjects that have lots of detail. Figure 1-10 shows the ceiling in the lobby of the historic Tower Bank in Fort Wayne, Indiana. You can see potential here. The top part of the figure hints that underneath the dullness, there promises to be an interesting work of art. Hints of color and detail are tantalizingly close to the surface, yet the local details are ill-defined, and the texture and colors are monotonous.

What often gets lost in the rush to say how much more dynamic range is captured by HDR is the fact that it accentuates textures so beautifully. You'll find it works wonders on wood, brick, stone, rust, gravel, and yes, even animal fur.

HDR brings out the subtlety and small nuances with a sledgehammer, as seen in the bottom part of Figure 1-10. It's fascinating, intriguing, compelling, and telling. It's shocking, I tell you. Shocking.

HDR uses exposure information gathered from a range of photos to enhance the local contrast so you can see the true details. These details aren't made up. This isn't a visual or processing trick. They are actually there, but traditional digital photography has a hard time finding them.



- ✓ **Details:** Poorly exposed photos lacking in dynamic range hide details that are often visible with the naked eye.
- ✓ **Details!:** HDR removes the "haze" from the original photo by capturing more light than the original. This brings out intricate and fascinating details. Contrast enhancements accentuate texture differences.
- ✓ **Details!!:** Colors shine when let loose by HDR. Tonal variations are much more visible.

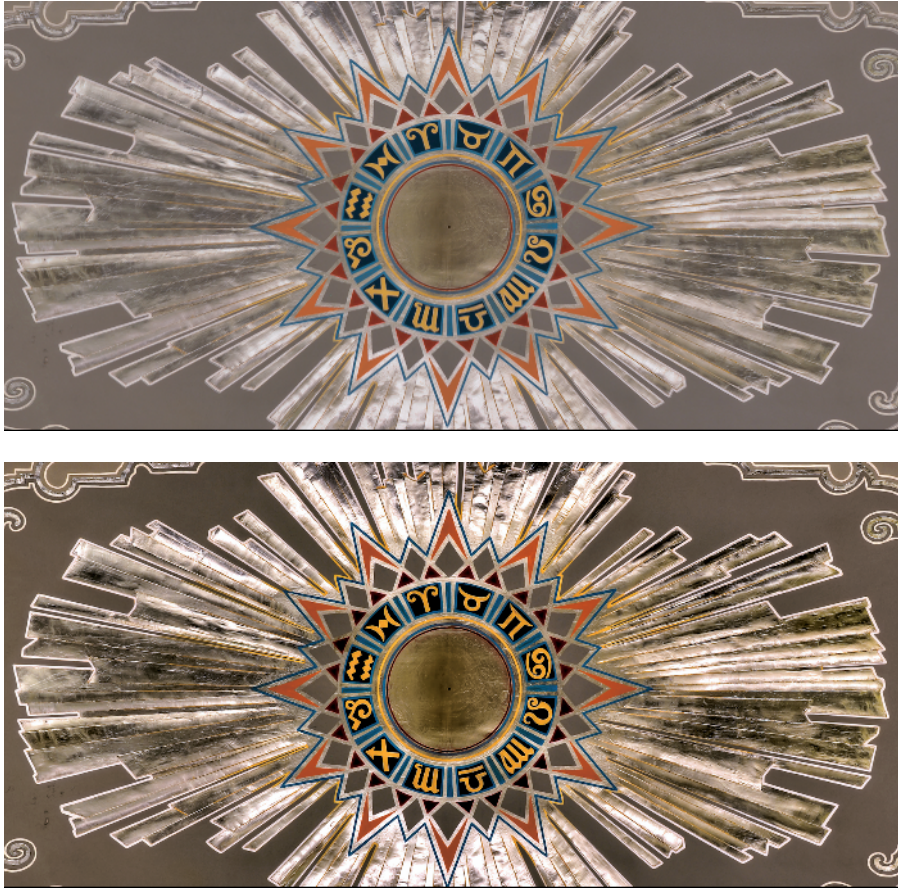


Figure 1-10: Details explode out of HDR.

Working wonders with people

Most people think of landscapes, cityscapes, and other photos of inanimate objects when they think of HDR. I want to challenge you to try it with people as your subject(s).

It's not the same as traditional HDR because you don't capture a series of photos. You shoot a single Raw photo. This is because it is impractical or impossible to get people to sit motionless. My kids barely stay in one spot for 1/500 of a second without moving!



What makes this possible are Raw photos and a little bit of trickery. Take a good photo in Raw (not JPEG) and send that through your HDR software as if it were a bracketed set and then tone map the result. You can create

your own brackets from the single Raw photo and send those to your HDR application if you like. (Flip over to Chapters 6 and 7 for information on this.)



In the end, you're not increasing the dynamic range of your camera by shooting multiple shots. However, you do end up with something that looks very close to HDR.

This process has alternatively been called *pseudo-HDR*, *single-exposure HDR*, or simply *tone mapping a low dynamic range image*. Whatever you call it, here's an example. The left side of Figure 1-11 illustrates a reasonably good JPEG of one of my sons, straight out of the camera. It's a good portrait, but the sun is shining on his face from the left side. It's a classic case of the dreaded face shadow.



The original Raw exposure was processed through the Sony Image Data Converter five times to create five images with different exposures, from dark to light. This Raw converter enables you to save Sony Raw photos as JPEGs or TIFFs after you make adjustments to lighting, contrast, color, sharpness, and noise — see Chapter 7 for more information on Raw conversion. This process squeezes every bit of dynamic range in the photo to the surface.



Figure 1-11: Harsh shadows often plague portraits.

Converting single exposures to brackets doesn't increase the dynamic range of the original, but it does bring out the entire range of exposure information more for you to see it better.

Those images were processed as HDR and tone mapped. The result is shown in the right side of Figure 1-11. Apart from the entire photo looking better and more vibrant, the shadows on the face are less distracting.

This example illustrates



- ✓ **People problems:** Cameras often have a hard time photographing people without a flash or additional lighting. This normally results in backlit subjects or shadows that cross the face. If you use a flash, you pay for it with harsh shadows and blazingly bright foreheads such as the nearby figure (and yes, I've got all sorts of bad shots in my photo archives waiting to be published).
- ✓ **HDR and people:** HDR can work with people. If you let the tone mapping controls like Strength and Smoothing (you'll get to them in Chapters 8 and 9) get out of hand, the person may look horrible. A fine touch, however, will reward you with a more vibrant photo than the original.
- ✓ **Single-exposure HDR:** Although not technically HDR (because you're only shooting one limited dynamic range photo), you can use single Raw exposures as source images for pseudo-HDR.



Within and without

During a nice, brightly lit day, take your camera and go to a room where you work or live that has a window in it. Without using a flash or any other exposure aids, try to take a photograph where the inside and the outside are both properly exposed. Turn the inside lights off and on to see whether it makes a difference. Put the camera in Auto mode or use different metering and exposure strategies if you like.

You're not going to have much success, especially if you don't use some serious interior lighting to balance the brightness of the interior with the outside. The problem is again dynamic range, pure and simple. Today's digital cameras can't capture a dim interior and a bright exterior without messing something up, as shown in Figure 1-12.

In this case, both areas suffer. As you can see on the left side of Figure 1-12, the outside is blown out with details barely visible. The inside is completely dark. You would think I was standing in a dark room photographing the surface of the sun through the revolving door! Nothing could be further from the truth.



Figure 1-12: Seeing inside and out with HDR.

Your eyes don't see this, of course. What you see in person is a well-balanced scene with a high dynamic range. If you were standing there, the room would look normally lit. The outside would look normal. Or, to put it another way, you see something like the right side of Figure 1-12, which is the scene in HDR. (It is perhaps artistically embellished a smidgen, but not so much as to make it unrecognizable.)

I hope you can see that



- ✓ **Cameras struggle with inside-out shots.** The dynamic range in this example, from a darker but well-lit interior to a very bright exterior, is huge. It's impossible to capture the entire range of this scene in one digital photograph.
- ✓ **Reality is not always well represented.** Traditional photographs aren't necessarily a good indicator of reality, despite what some people will tell you. If you doubt that, find a location like this and compare what you see with your eyes to a photograph.

Feeding your starving inner artist

HDR excels at many things and certainly solves a great number of common exposure and dynamic range problems. That satisfies those people who think with the right side of their brains. Another group (they often cross over), however, shoot HDR just because it looks cool. These people aren't constrained by a rigid set of rules or procedures: They're artists.

The left image in Figure 1-13 is a photograph of a bubble, floating in the breeze. The camera wasn't set up on a tripod, and bracketed exposures weren't taken. It's not necessarily the greatest scene for HDR.

What this base photo has going for it, though, is that it's an interesting picture. Even as a traditional photo, it pulls you in. The problem is, you want more.



Figure 1-13: A bubble shot in Raw format and transformed.

The right image of Figure 1-13 is the “more.” The result illustrates how captivating HDR can be — even when relying on a single exposure.

This photo benefits from parts of the HDR process just like the other examples in this chapter. The details of the bubble are clean and clear because the software accentuates the contrast between different bands of the bubble. In addition, the colors are much more vibrant.

This example shows

- ✓ **Left brain:** HDR doesn't always have to be the solution to a problem. Sometimes it can just be artistic.
- ✓ **Right brain:** There are important technical facets of HDR, and even an artistic expression can serve a logical purpose.
- ✓ **All skate:** There's room for us all. It's a big tent. Come on in!

Getting Excited about HDR Photography

There's a lot to HDR photography. One of the things that makes it most interesting is that it has elements that appeal to whatever side of your brain you use most, or both. If you're a technically minded photographer, HDR offers you a serious tool to pursue all the dynamic range you can shake a stick at. If you want to shoot HDR because it looks cool, you're in good company, too. HDR also has the depth to interest artists and craftsmen, dreamers and realists.

As you continue to discover HDR photography, consider where you want to take it and how to get there. These topics are a good place to start:

- ✔ **Deciding what you want to create:** Think about what you like to shoot, how much effort you want to put into it, and what generally floats your boat. Let your passion for photography guide you into HDR, and don't be afraid to diversify your interests.
- ✔ **Discovering your comfort level:** HDR photography should fit within the boundaries of your life. That doesn't mean you should take it easy and not push yourself. It means you don't have to let it take over your life.

Given certain adjustments, HDR should fit within the time and money parameters that you set. Decide what level of effort makes you happy, and then get out there and do it!
- ✔ **Costing it out:** Taking digital photos costs very little. Compared with yе olden days, you don't have to buy rolls of film and pay to have the photos developed. That alone makes today's pursuit of photography very enjoyable. Take 2,000 photos over a weekend if you want to!

You do, however, have to buy a camera, memory cards, batteries, other gear, and have a computer and the software to make HDR work.
- ✔ **Defining your workflow:** Workflow is a buzzword in the digital photo world, and for good reason. It just buzzes. Bzzzzz. Bzzzz. There is a distinct workflow to HDR (shown in this chapter and in the basic organization of this book), but within the overall framework, there are plenty of options (details of which are contained throughout). Find what is comfortable for you.
- ✔ **Experimenting:** Don't get yourself too tied down to a particular way of doing things to the exclusion of all others. Experiment. Try different lenses, approaches, techniques, styles. Stay fresh!
- ✔ **Growing:** Did you know that growth is a growth industry? Yeah, it's fun to grow. It exercises your brain and keeps you happy. Whether you're picking up HDR at 9 or 90, you can grow with HDR.