

High Dynamic Range (HDR) Photography

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Light Levels

The human eye can see about 15 f-stops

Slide film can capture 4-5 f-stops

Good color negative film can capture 5-6 f-stops

Newer D-SLRs can capture 8-9 f-stops

How to present more detail in the extremes? Shoot for HDR! When is HDR useful?

Sunrise or sunset with some areas in sunlight and others not

Slot Canyons other than at high noon

Interior shots with windows showing sunlit outside

Static scenes are best, although some scenes with movement can produce interesting results, e.g. night shots of buildings with traffic

Step 1: Take at least three shots, bracketed one or two stops apart.

Unless two stops overexposed will push the exposure too long for the situation or for the camera's easy capabilities, I usually bracket two stops.

Use constant aperture so depth of field is the same for each shot.

A tripod is essential in order to get good alignment of the images.

Remote release is a good idea, but not absolutely necessary unless your exposures include ones in the 1/8 sec to 1/15 sec range where mirror vibration is usually significant. To be on the safe side, use a remote release.

How many shots? Take as many as it takes to capture detail in all areas. Three shots, as metered, ± 1 stop, are a minimum. Since my camera will only go to ± 2 stops automatically, I usually shoot five shots, as metered, ± 1 stop and ± 2 stops. In Antelope Canyon, I usually take six shots at each composition. I set my camera to capture three at ± 1 stop and three at ± 2 stops. This usually captures detail in each area in at least one shot. However, there are a few compositions where I lost detail in the brightest areas at 2 stops underexposed.

Capture in raw format!

Start with the best detail you can. Most DSLRs capture in 12-bit mode. That's 4,096 shades of gray. Even newer cameras (Canon 40D, for example) capture in 14-bit mode to get 16,384 shades of gray.

Can you use jpg's to make HDR images? Yes, but you should capture jpg only if your camera cannot capture in raw format. Three or more jpg files merged to HDR will look better than just one jpg. But it won't be as good as three raw files merged because JPG files have only 256 shades of gray because you can't create detail where none was captured.

Step 2: Select the images in a set that worked best.

I import my shots into Lightroom (LR). However, you can also examine your shots in Bridge. According to CDD, there's a "secret handshake" between Bridge, ACR and Merge to HDR command that negates any adjustments made prior to the HDR command. Since I use and recommend Photomatrix Pro (Pmx), I import the shots into LR with no adjustments applied.

Note which images you want to merge if you're using Pmx or if using Bridge, select them.

Step 3: Merge the images

A: Using Bridge & Photoshop CS2, CS3 or CS4

If you're going into Merge to HDR from Bridge, the images will be merged and aligned automatically.

Alternately, you can be in Photoshop and then select File > Automate > Merge to HDR. You'll be presented with the merged image in a special dialog window titled "Merge to HDR". Remember that no monitor can display all of a 32-bit image, which is what you have at this point. If you want to save the full 32-bit image, set Bit Depth to 32 Bit/Channel (recommended). The graph under "Set White Point Preview" shows how many f-stops of light levels are in the merged image. Moving the slider under the graph will show parts of the image's

light levels, but will not change the contents of the image's file. After clicking "OK" you'll have an "Untitled" image; so you need to save it. When saving, you are offered a choice from several formats. These are explained in detail in "The HDR Handbook". I prefer the Radiance format because it uses a lossless compression scheme. Also, it lets me see at a glance what the bit depth of a file is because I use "psd" and "tif" for 16-bit and 8-bit images, reserving "hdr" (Radiance) for 32-bit images.

Next, I select File > Save as... and save it as a psd file.

Next, I downsample to 16-bits by selecting Image > Mode > 16 bits/channel... because I have established as my standard that only Radiance files are 32-bit.

There are four ways in Photoshop to go from 32 to 16-bits; but only one is usually best. All but "Local Adaptation" are big clubs that usually do not produce acceptable images. Click on the button with a triangle in it to show the histogram.

Local Adaptation (LA)

LA is the only method that allows adjustment win the histogram in a manner similar to Curves.

Before I started using Photomatix, I usually set the Threshold to 4 px and tweaked the curve as I thought best.

Note that PS by default embeds sRGB profile and sets the image's printing dpi to 240. Neither is acceptable to me. I set the color space to ProPhoto RGB and the printing dpi to 300.

B: Using Photomatix Pro (Pmx) with Photoshop (any version)

Click on "Generate HDR Image" on the shortcuts palette and browse to the raw files you want to use and select them.

I often check "Align source images" using "By correcting horizontal and vertical shifts". If I get ghosting, I try the other option. Sometimes un-checking the align option gives the best result. I always leave the white balance at "As Shot", but set "Color primaries HDR based on" to ProPhoto RGB because it's the largest color space offered. If you find that Pmx does a bad job aligning features, try aligning in Photoshop and saving the result as a radiance (hdr) file. Then open the radiance file with Pmx and do the tonemapping there.

After a while (depending on your processor and RAM), you'll have a 32-bit image. I like to save this as a Radiance file so I can go back to it quickly if I want to try a different approach, either in Pmx or PS. Choose File > Save HDR as... and select Radiance RGBE as the file format.

Now, click on Tonemapping

In the new window:

Select Details Enhancer because Tone Compressor is not as versatile.

The controls are explained in the help file. Help > Photomatix Help

There are a lot of adjustments possible. My recommendation is to set them first with the Default button that lets Pmx analyze the image and give you a starting point. Then, going from top to bottom, adjust the controls, one at a time, first to a minimum and then to the maximum, followed by successive approximation to an initially ideal setting. As you're adjusting a slider, you may want to go back to a previous one and change it to see if a different setting there will be better. Use the Undo and Redo buttons to look at different parts of the image to see the effect of the latest adjustment.

I find it useful to save the settings for an image if I have several that may need similar settings. I did this for my Antelope Canyon sets. However, I usually changed one or more settings for each image. Note that after saving, the Pmx settings can be viewed in the file's metadata. When you're satisfied with your settings and usually saving them, click on Process and wait a while. When Pmx has finished applying your settings, save the 16-bit image by selecting File > Save as... and choosing 16-bit TIFF format.

Now you can open it in Photoshop for further work, such as sharpening, resizing and cropping.

C: Using Photomatix Pro (Pmx) with Lightroom

The plug-in for Lightroom greatly speeds the process. First, choose the images you want to process in Pmx. I don't usually apply any changes before exporting to Pmx; but if I do make changes, I apply the changes to all images identically. Then select File > Plug-in Extras > Export to Photomatix Pro... You'll then see a dialog where you can set the options. I leave them all checked and name the file to indicate the range of images selected and the fact that the file is the result of tonemapping. I always re-import the processed image.

HDRI Resources

Wikipedia on HDRI

<http://en.wikipedia.org/wiki/HDRI>

Wikipedia: Tonemapping

http://en.wikipedia.org/wiki/Tone_mapping

Greg Downing: HDRI

<http://www.gregdowning.com/HDRI/stitched/>

HDRShop

<http://projects.ict.usc.edu/graphics/HDRShop/>

Max Planck Instit.: HDRI

<http://www.mpi-inf.mpg.de/resources/hdr/>

Hyperfocal Design

<http://www.hyperfocaldesign.com/>

Photomatix Pro (Mac & PC) (aka Pmx) <http://www.hdrsoft.com/>

\$99 "List" Get 15% discount using discount code "tonysweet"

NAPP (PhotoshopUser.com) members get a 20% discount.

Pmx is superior to Photoshop CS2, CS3 or CS4 for HDRI work.

See Tony Sweet's blog for more HDR images by a photographic artist

http://web.mac.com/tonysweetphoto/tonysweet_blog/Blog/Blog.html

Tony had an article on HDRI in the July 2008 issue of Shutterbug magazine.

He doesn't have a book that covers HDRI; but he has a DVD called "HDR Photography Made Easy". It's available from Amazon for \$22.49. All of his books are excellent learning tools. Since he lives near Baltimore, MD, most of his workshops are on or near the East Coast. If you want to travel, I highly recommend any of his workshops. He calls them "Visual Artistry Workshops" with good reason. Tony coined the term "Visual Rhythm" to describe one characteristic of a great photograph.

Alain Briot, <http://beautiful-landscape.com/>

Alain is working on an essay on HDRI that will be published soon on either his site or on The Luminous Landscape, <http://luminous-landscape.com/>

All of Alain's essays are good reading for any landscape photographer at any level.

Alain's workshops are expensive, but worthwhile.

OutbackPhoto.com <http://www.outbackphoto.com/>

Outback Photo HDR & Tonemapping Index

Outback Print Advanced HDR

Outback Print High Speed HDR

http://www.outbackphoto.com/CONTENT_2007_01/section_hdr_and_tonemapping/20071227_Photo_matix_30_beta/index.html

Outback Photo: Photomatix Exposure Blending

Ben Willmore

Digital Mastery - DVD • High Dynamic Range (HDR) Mastery

\$49 DVD of his 4-session online course

Ben's site is good to visit: <http://www.digitalmastery.com/> His courses and workshops are excellent.

The HDRI Handbook by Christian Bloch

ISBN: 978-1-933952-05-5 List: \$49.95, Amazon price: \$32.97(DVD included)

HDRI News—Web site for HDRI Handbook

<http://www.hdrilabs.com/news/index.php>

HDRI E-Mail List

<http://www.hdr-photography.com/mailman/listinfo/hdr-photo>

Christian Bloch and other prominent photographers contribute to this list.

Mastering HDR Photography by Michael Freeman

ISBN: 0-8174-9999-7 List: \$24.95, Amazon price: \$16.47. The emphasis in this book is on image quality and natural tonemapping.

Complete Guide to High Dynamic Range Digital Photography by Ferrell McCollough

ISBN: 1-60059-196-5 List: \$24.95, Amazon: \$16.47. The emphasis in this book is on the creative side of HDR photography.

The Creative Digital Darkroom by Katrin Eismann

ISBN: 978-0-596-10047-6 List: \$49.99, Amazon price: \$31.49

There's only one chapter on HDRI; but the entire book is highly recommended for intermediate-advanced Photoshop users, as are all of Katrin's books. The web site for this book is

<http://www.creativedigitaldarkroom.com/>

Complete Digital Photography, Fourth Edition by Ben Long (aka CDP)

ISBN: 978-1-58450-520-4 List: \$39.99, Amazon price: \$23.99

After two and a half pages on HDRI using Photoshop CS3, Ben suggests that Photomatix provides an easier HDR merge solution with extra benefits.

CDP is an excellent book on digital photography for beginning-intermediate digital photographers.

RealViz on HDR

<http://stitcher.realviz.com/panorama-software-products/stitcher/hdr-images-technology.html>

Information about HDR images.

FDR Tools

http://www.fdrtools.com/front_e.php

Jim Austin on HDR

Part 1: http://www.apogeephoto.com/feb2007/jaustin22007_1.shtml

Part 2: <http://www.apogeephoto.com/march2007/jaustin032007.shtml>

Part 3: <http://www.apogeephoto.com/june2007/jaustin62007.shtml>

How to take HDR: <http://www.apogeephoto.com/dec2007/jaustin122007.shtml>

HDR Tutorial (Photomatix)

<http://www.profiphotos.com/blog/en/2009/02/hdr-photo-tutorial-using-photomatix-pro-in-lightroom/>

35 HDR Photos

<http://www.smashingmagazine.com/2008/03/10/35-fantastic-hdr-pictures/>

With more links

Outdoor Photography article on HDR for Landscape Photography

<http://www.outdoorphotographer.com/how-to/photoshop-and-other-software/hdr-for-the-landscape.html>