

The Sharper Image in Landscape Photography

by Peter Guerard

Who Am I?

- Involved in photography for 45+ years.
- Software instructor and course designer for 16+ years.
- Past president of the Charter Oak Photographic Society in West Hartford.
- Owner of Connecticut Scenics® and sells fine-art prints online.
- Develops and presents lectures on the technical aspects of photography.
- Uses Nikon digital cameras and Gitzo tripods.

Introduction

- This course explores field techniques and workflow used for capturing a sharp image in landscape photography.
- It spans from setting up your tripod to importing your image into Adobe Camera RAW.
- Although biased towards Nikon, much of the material is applicable to other camera systems.

Seminar Topics

- Course Workflow
- Landscape Capture Techniques
- Tripods and Tripod Heads
- Camera and Camera Accessories
- Viewfinder & Live View
- Lens Selection and Depth of Field
- Data Capture – the Sensor
- Using Auto-Focus

The Back Story

- The last thing you want to see is an unsharp image on your monitor after a day of shooting.
- Image sharpness is critical if you plan on submitting an image for competition – think of the size of the screen.
- Image sharpness is also critical if you plan to print your image – especially if the image needs to be cropped.

Course Workflow

- Tripod set-up
- Camera set-up
- Select a lens
- Focus
- Capture
- Import to ACR

Landscape Capture Techniques

- In order of increasing sharpness:
 - Hand-holding
 - Hand-holding with VR or IS
 - *Use a tripod and remote release*
 - *Set aperture for optimum DOF*
- In order of critical sharpness:
 - *Manual focus through the viewfinder with focus confirmation or*
 - *Live View with Hoodman Loupe*
 - *Single point AF*

Essential Gear

- Usually a section on equipment begins with the camera and lens. But given its importance, this lecture starts with the tripod. The routine use of a sturdy tripod almost guarantees quality landscape images.
- Also, if you're looking to upgrade your tripod, or in the market for your first tripod, this section should help.

Essential Gear – the Tripod

- The first basic accessory for a sharper image is a tripod.
- *A tripod eliminates any exposure dependency on ISO or shutter speed.*
- Reduces the need for a fast aperture lens.
- The tripod must be of sturdy construction to support your heaviest camera/lens option.
- A tripod consists of two separate components: the tripod legs and the tripod head.

The Tripod

- Basic features of a good tripod:
 - Carbon fiber construction.
 - 3 - 4 leg segments with twist leg-locks.
 - No center-column.
- Rubber/spike leg tips.
- Expect to spend \$600+ for a tripod alone.
- Recommended brands: Gitzo, Manfrotto, Really Right Stuff (RRS).

Note: If you purchase a center-column make sure it comes with a hook at the bottom.

Tripod Heads

- Tripod head types:
 - 3-way pan-tilt head
 - Ballhead
 - Geared head
- Arca-Swiss quick release system – RRS.
- Built-in spirit levels.
- Expect to spend \$300+ for a tripod head.
- Recommended brands: Manfrotto, RRS

Tripod Head Comparison

- 3-Way Pan-Tilt Head
 - Pro
 - Tripod standard
 - Independent axis adjustment
 - Lease expensive
 - Con
 - Protruding adjustment arms
 - Not suitable for sports or fast-moving subjects
 - Weight restrictions
 - Proprietary quick-release
- Ballhead
 - Pro
 - All-axis adjustment
 - Suitable for sports and fast-moving subjects
 - *Arca-Swiss quick release*
 - Con
 - All-axis adjustment
 - Most expensive
- Geared Head
 - Pro
 - Independent axis adjustment
 - Micrometer-type adjustment
 - Con
 - Not suitable for sports or fast-moving subjects
 - Weight restrictions
 - Proprietary quick-release

Arca-Swiss Quick-Release System

- The Arca-Swiss (A/S) quick-release system is a V-channel dovetail clamp system.
- Uses matching camera and lens plates.
- It allows easy mounting and removal of camera equipment, even in the dark.
- It is the standard quick-release with ballheads.
- Used by most professional photographers.

Arca-Swiss Quick-Release System

- Really Right Stuff (RRS) – a manufacturer of camera and lens plates, A/S clamps, ballheads, tripods, and photographic specialty products – has adopted this quick-release system.
- Non-A/S heads can be easily converted to A/S quick-release system with the attachment of a RRS clamp to the tripod head plate.

Tripod Workflow

- Tripod set-up
- Extend the legs
- Level the tripod
- Re-tighten the legs

Tripods - Field Techniques

- Extend legs until camera viewfinder is at eyelevel height.
- Never raise the center-column.
- Always extend tinner legs segment first.
- Point one tripod leg towards subject so you can 'step into' the tripod.
- Re-tighten all leg locks.
- For additional stability, hang a camera bag around the tripod legs for extra weight (or hang the bag from the center column).
- Purchase a tripod bag with strap to assist in carrying the tripod and protection.
- Stow the tripod feet-first in vehicle with legs collapsed and controls tightened.

Tripod Working Height

- Purchase a tripod tall enough to bring the tripod to plate to eye-level height with the legs fully extended.
- There should be no need to bend over to center your eye in the camera viewfinder.
- Do not use your center-column to attain this working height; this reduces your tripod to a very expensive monopod.

Summary, So Far

- Topics covered in this section:
 - Tripod construction.
 - Tripod heads.
 - Arca-Swiss quick-release system.
 - Tripod workflow and field techniques.
- What's next? Sharpness and the camera.

The Camera

- Any DSLR that supports interchangeable lenses can be used for landscape photography.
- However, there are some desired features that can help in obtaining a sharper image.

Camera Features

- Manual setting of exposure controls
- Viewfinder diopter control
- Manual focus, AF and focus confirmation
- RAW file output
- Tripod thread on camera base plate
- Exposure bracketing
- Provisions for a remote release
- Live View
- Image playback with histogram display

Recommended Camera Settings

- Base ISO (usually *100* or *200*)
- Exposure delay: *1* or *2* seconds
- Rear LCD display: *RGB histograms*
- Focus confirmation: *On*
- Exposure Bracketing: *On*
- Image file type: *uncompressed RAW*
- Colorspace: *Adobe RGB (1998)* for rear LCD display.
- Image bit depth: *12* or *14*
- In-camera sharpening: *0*

Camera Accessories

- RRS L-bracket.
- Double spirit level in hot shoe.
- Remote release w/ timer or intervalometer.
- Spare memory cards (or purchase a camera with a dual card slot).
- Spare rechargeable batteries (or purchase a battery power-pack).

L-Bracket

- Source – Really Right Stuff
- Customized A/S interface between the camera body and the tripod head.
- Provides a rigid connection between the camera and the tripod head.
- Allows for an easy format change from horizontal to vertical without altering the tripod's center of gravity.

Tripod Center of Gravity

- The force of gravity is directed downward through the tripod head and evenly distributed to the tripod legs, resulting in a very stable platform.
- The dashed red line represents the center of gravity for your optical system.
- Without an L-bracket, the weight of the optical system is now shifted away from the center of gravity, resulting in an unstable platform.
- With the L-bracket, vertical orientations are now in line with the center of gravity – a very stable platform.

Leveling the Camera

- Although not a factor in image sharpness, a level horizon adds to the image composition.
- Level the tripod.
- Level the tripod head.
- Attach a double-spirit level to the hot shoe.
- Use viewfinder grid to assist in leveling image (see viewfinder section)

Remote Releases

- Offers hands-free release of the shutter without touching the camera.
 - With or without built-in timer.
- Releases with a programmable timer are called *intervalometers*.
 - Extends the DSLR shutter speed limit from 30 seconds to 99h99m99s.
 - Downside - requires a battery.
- Both use the Bulb shutter speed setting.
- Invaluable for long exposures.

Camera Vibrations

- Cameras are most susceptible to shutter vibrations between 1/15 and 1 second shutter speed.
- Another source of an un-sharp image is the movement of the reflex mirror.
- While you can't suppress shutter vibrations, you can eliminate the issue due to the reflex mirror.
- The shutter is triggered after the reflex mirror has moved out of the image path.
- To eliminate mirror vibrations you can:
 - Use the self-timer.
 - Set exposure delay to 1 or 2 seconds.
 - Switch to Live View.
 - Set release mode to Mup (mirror up).
- Useful if a remote release is not available.

Mirror Lock-Up Workflow

- Set the release mode to Mirror Lock-Up
- Depress the remote release once to position the mirror out of the image path.
- The viewfinder will remain dark during mirror lock-up.
- Depress the remote release again to capture the image – the reflex mirror returns to its normal viewing position.

Memory Cards

- 32Gb CF cards in storage case.
- When cards are full, flip them over in storage case as a signal.
- Always use the camera to format the memory cards.

Camera Recommendations

- Purchase a custom A/S base plate or L-bracket from RRS.
- Purchase a battery pack and extra batteries.
- Purchase spare memory cards and case.
- Instead of mirror lock-up use exposure delay and set it to 2 seconds.
- Remove camera strap from the body.
- Do not carry your tripod in the field with the camera mounted on the tripod head.

Viewing the Image

- This next section discusses two ways to view an image with the camera:
 - The traditional way with the viewfinder.
 - The digital way with Live View.
- Each method has its advantages and disadvantages.
- Each method has its own set of accessories.

The Viewfinder

- The standard method for viewing an image.
- Uses TTL viewing and a glass pentaprism for a bright image.
- Allows for a variety of attachments.
- Has a diopter control for a sharp image
- Displays exposure and camera settings
- Viewfinder shutter curtain available on some cameras.

Note: Always adjust the diopter control before focusing the lens.

In-Camera Grid

- Active via a menu selection, it overlays the image with a horizontal and vertical grid.
- Useful as an assist in leveling the horizon.
- The grid is not an actual 'rule of thirds', but a close approximation for compositions.

Viewfinder Accessories

- Most of the following accessories are available for many camera models and brands:
 - Correctional eyepieces.
 - Eyepiece magnifier.
 - Eyecup.
 - Right-angle finder.

Correctional Eyepieces

- Replaces the neutral lens in the viewfinder eyepiece.
- Comes in a variety of positive and negative strengths.
- Extends the range of the viewfinder diopter control.
- Eliminates the need for glasses when viewing the image through the viewfinder.

Note: Always adjust the diopter control prior to focusing your lens.

The Eyepiece Magnifier

- Attaches to the viewfinder.
- Magnifies the central portion of the viewfinder image.
- Has a built-in diopter control.
- Employs its own eyecup for image isolation.
- Hinged to allow normal viewing through the viewfinder, but you lose the advantages of an eyecup.
- Downside – exhibits extreme tunnel-vision.

The Eyecup

- Replaces the viewfinder eyepiece rubber ring guard.
- Prevents extraneous light from interfering with the image – invaluable for DOF preview.
- As a compositional aid, allows for isolation of the image.
- Rubber construction acts as a soft surface for eyeglass wearers.
- Folds back against the camera for storage.
- Allows the use of correctional eyepiece lenses.

Right-Angle Finder

- Attaches to the viewfinder
- Allows for viewing and focusing of subjects directly above you.
 - No need to raise the center column.
 - No need to bend over to view the image in the viewfinder.
- Has a built-in diopter control.
- Employs its own eyecup for image isolation.

Focusing

- Accurate focus obviously impacts the sharpness of your image. The assumption in this lecture is the use of *manual focus* to achieve a sharp landscape image.
- This section explores which focusing method, Viewfinder or Live View, is best suited for your workflow. Then continuing with a quick dive into AF basics as a focusing aid.

Live View (LV)

- Compositional alternative to the viewfinder.
- Enables a direct view of sensor output.
- Simulates exposure settings.
- Available as a focusing aid using the zoom function.
- Allows viewing of depth of field.
- Automatically employs mirror lock-up.
- However...the downside of using LV:
 - Displays JPEG version of RAW image.
 - Moderate drain on the batteries.
 - Not usable in bright environments.
 - Not suitable for color evaluation.
 - Unlike the viewfinder, there is only one major accessory: the Hoodman Loupe.

The Hoodman Loupe

- Used in conjunction with Live View:
 - Size variations for different LCD diagonals.
 - Isolates LV image from external light.
 - Contains a built-in image magnifier with adjustable diopter.
 - Newer versions are collapsible.
 - Comes with a lanyard and a case.
 - However *not a hands-free operation*.
 - Pressure on rear LCD introduces vibrations which compromises accurate focusing.
- Hoodman offers two solutions:
 - Hoodman Crane:
 - A hot shoe mounted accessory that allows a magnified view of the LCD, yet swings out of the way for normal camera operation.
 - Hands-free and vibrationless process

Rear LCD - Image Playback

- The display on the rear LCD screen is a JPEG representation of the captured RAW image.
- The displayed image is used to confirm composition and focus only.
- Use the luminosity histogram to evaluate exposure or...
- For better color exposure analysis, chose the three-color histogram or RGB option.
- Benefits of RGB histogram:
 - Indicates clipping, or loss of detail in the highlights or shadows of all three color channels.
 - The 'highlight warning' option, or 'blinkies', only refers to highlight clipping.
 - Use bracketed exposures to eliminate clipping (more later).

Viewfinder vs. Live View

Attribute	Viewfinder	Live View
Manual Focus	Yes	Yes
TTL Viewing	Yes	Yes
Exposure Simulation	No	Yes
Light Meter	Yes	Yes
Luminosity Histogram	No	Yes
Zoom Control	No	Yes
Active Sensor Display	Yes	No
LCD Playback	n/a	Yes
RGB Histogram	n/a	Yes

In the Field LV Notes

- Working with LV usually requires both hands, which necessitates using a tripod.
- When using the Hoodman Loupe, one hand holds the loupe against the rear LCD while the other hand adjusts the camera controls or focuses the lens.
- Hoodman offers a one-hand alternative – the Hoodman Crane.
- For simplicity in the field, I prefer using the viewfinder.

Summary, So Far

- Tripod usage in landscape photography.
- Camera settings and accessories.
- The viewfinder vs. Live View.

- What's next? Lenses.

Landscape Lenses

- From a cost and weight point of view, zooms are preferable to equivalent prime lenses.
- Desirable zoom characteristics:
 - Separate zoom and focusing controls preferred.
 - VR or IS not necessary since you are using a tripod.
 - Relatively fast aperture - f/2.8.
 - Constant aperture throughout the zoom range.
 - Prosumer rather than consumer kit zoom.

Alternative Lens Characteristics

- Most landscape are shot at f/8 or f/11.
- Constant and fast aperture zoom is not critical to your imaging needs.
- However, a fast aperture zoom means:
 - Easier to focus – shallow DOF.
 - A brighter image in the viewfinder.
 - Allows for a lower ISO in dim light.
 - But.. An f/2.8 zoom is usually heavier, more expensive, with a possible larger filter size.

Choosing a Lens

- Other lenses to consider for extending your focal length range:
 - Wider-angle zoom: 12-24, 14-24, 16-35
 - Longer telephoto zoom: 70-300, 80-400
 - 1.4x Tele-converter.

Note: Always use the recommended converter for your zoom. Opt for a 1.4x versus a 2x converter, and never stack your converters.

Long Lens Brace for Telephotos

- Manufactured by Bogen (Manfrotto):
 - Connects from camera to center column or tripod leg.
 - Vertical compositions difficult.
 - Restricted movement of camera/lens.
- Manufactured by Really Right Stuff (RRS):
 - Cradles camera/lens with a rail.
 - Uses tripod collar for vertical compositions.
 - Unrestricted movement of camera/lens.
- Not for fast moving subjects.

Choosing a Lens – Summary

- Always try to use the manufacturer's lens.
 - Ensures electronic compatibility.
- If there is a choice between consumer and pro lenses always choose the pro version.
- Purchase new from an authorized dealer with a manufacturer's extended warranty, if offered.
- Never purchase gray market or from eBay.
- *Wait three months after the lens is released.*
- Some third-party lenses are excellent – Sigma.
- Consider buying used: KEH

Lens Apertures

- All lenses are viewed wide-open.
- This is called TTL (through the lens) viewing.
- Along with shutter speed, lens apertures control exposure.
- Lens apertures also control what's in focus, called Depth of Field or DOF.

Depth of Field (DOF)

- All landscape images are expected to be sharp from the foreground to the background, with the foreground taking priority.
- DOF is the range of sharp focus at a given lens aperture and focal length.
- DOF increases as the aperture decreases, but be aware of image-softening diffraction effects at the smaller apertures.

DOF Lens Markers

- One way to estimate adequate DOF, is to use the DOF markers on the lens' index ring.
- The markers show the various apertures as demarcation lines on both sides of the index point.
- Objects between similar aperture lines will be in sharp focus.

DOF Viewing

- Because you are viewing your TTL images at the widest aperture, it is difficult to perceive the DOF.
- You could turn on LV and try to see the DOF effect as you stop your lens down to f/8.
- Or you could use either of two photography standards:
 - *f/8 and be there!* or
 - *Focus 1/3 of the way from the bottom of the frame* and set your aperture to f/8 – the sweet part of the lens.

DOF Preview Button

- All these rules of thumb do not guarantee sharp focus from foreground to background.
- One way to actually see the DOF is to use the DOF Preview button on the camera.
 - It stops the lens down to the taking aperture as long as you maintain pressure on the preview button.
 - The image in the viewfinder dims – give your eyes about 5 seconds to adapt.
 - An eyecup helps to adjust to the dim image.

Depth of Field (DOF)

- If your camera doesn't have a DOF preview button, then another option is to use Live View and hyperfocal distance imaging (HFDI) to determine your optimum focus point.
- HFDI is useful if you are using a wide-angle lens of 40mm or less and there is a foreground area you wish to have in sharp focus; otherwise just use f/8 or f/11.

Hyperfocal Distance Imaging

- HFDI guarantees everything will be in sharp focus from foreground to background as long as your lens is set to the optimum focusing distance for a given aperture.
- This optimum focusing distance can be obtained from DOF charts or a DOF app on your iPad.

Double the Front

- DOF becomes an issue only when there is a foreground object you wish to have in focus.
- Called Double the Front, you focus on your foreground object, then double that distance.
- The double distance becomes your HFD.
 - Focus at 8-feet for a foreground at 4-feet.
- Select an f/11 or f/16 aperture and everything from front-to-back will be in focus.

Summary So Far...

- Choose a zoom over a prime lens.
- Use the optical properties of DOF to obtain optimum focus and sharpness of the lens.
 - Using the sweet spot of the lens – f/8.
 - Focusing 1/3 of the way into the image.
 - DOF Preview button.
 - Utilize DOF apps or HFDI chart.
 - Employ the Double the Front method.

Lens Accessories

- Use the recommended lens shade.
- Front and rear lens caps on all lenses.
- RRS lens plate on lenses with a tripod collar.
- Replace manufacturer's tripod collar with RRS tripod collar:
 - Smoother operation when changing from horizontal to vertical orientation.
 - Provides a more solid connection to the tripod head.
 - Has its own A/S lens plate.

Filters

- Polarizing filter on each lens.
 - Polarizer characteristics:
 - Maximum polarization occurs 90° from the sun's position in the sky.
 - The width of sky polarization is 30°.
- Neutral Density – ND 3.0 filter (10 stops).
 - Recommendation: B+W – no color cast.
- Refrain from stacking filters.
- Remove unnecessary filters such as UV or skylight filters.

Lens Flare

- Wide-angle lenses are susceptible to lens flare from bright light sources, like the sun, that are hitting the front element.
- Some remedies:
 - Find a better camera angle and/or choose a less wide lens.
 - Select a smaller aperture.
 - Use your hand, hat or gray card to block the light source.
 - Remove it in LR or PS (difficult at best).

Lens Usage Summary

- Avoid small apertures: f/16, f/22...
- Determine the sharpest aperture for each lens.
 - For a zoom, at major focal lengths.
- Turn off the camera before changing lenses.
- VR control set to Off.
- Beware of lens flare with wide-angle lenses.
- Keep lens caps on lenses when not in use and store face-down in camera bag.
- Clean and inspect lenses and filters after use.

Lens Cleaning

- Cleaning techniques (in order of impact):
 - Air blower with brush.
 - Compressed air.
 - Micro-fiber cloth or Visible Dust Butterfly.
 - Breath on the lens then wipe clean.
 - Lens cleaning solution (last resort).

Cleaning Your Equipment

- It's a fact of life: dust and dirt is everywhere.
- Simple preventive maintenance will help in the longevity of your equipment.
- Do not be afraid of cleaning your sensor.
- When not using your equipment, always store it with body caps and lens caps.
- I recommend the Visible Dust system for cleaning your sensor.

The Sensor

- Digital photography is an information game – *the more data you can capture, the more information is available for imaging.*
- The sensor is a complex device that captures the light as data.
- Each sensor is divided up into photosites where light collection takes place. The more photosites, the more captured data.
- Most camera sensors require an anti-aliasing filter to reduce digital effects:
 - This filter slightly blurs the image.
 - Sharpness settings in ARC are used to restore this inherent softness.

- Some cameras no longer have an anti-aliasing filter in front of the sensor, which results in a sharper image.
- A second filter used in sensors is called a Bayer filter and is located below the anti-aliasing filter.
- It is a colored filter array (CFA) that assigns an RGB color value to each photosite.
 - This is called *demosaicing*.

Two Important Definitions

- *Tonal Range* – the difference in f/stops between the highlights and the shadows of a scene.
- *Dynamic Range* - the difference in f/stops between the highlights and shadows captured by the sensor.
- One way to determine the tonal range of a scene is to inspect the histogram.

What Is a Histogram?

- A graphical representation of the tonal range of a scene; it is the sensor's light meter.
- The number of tones displayed on the rear LCD range from 0 (black) to 255 (white) -- 256 tones.
- Each histogram peak represents the amount of light captured with that tonal value. This is called *tone-mapping*.
- Why 0 - 255? Why 256 levels or tones?
- The image displayed on the rear LCD is a JPEG representation of the RAW capture.
- JPEGs are usually 8-bit files.
- 8-bit means $2^8 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ which equals 256 (0 - 255) tones.
- In LR and PS, even 16-bit TIFF images are displayed as an 8-bit, or 256-level, histogram.
- If you over-expose a scene, the highlight peaks will appear next to the right wall of the histogram. This is called *highlight clipping*.
- If you under-expose a scene, the shadow peaks will appear next to the left wall of the histogram. This is called *shadow clipping*.
- If you have the option, display all three RGB histograms.

Tonal Range Measurement

- Another way to determine the tonal range of a scene is to switch your camera to spotmeter mode and meter the brightest and darkest areas of the scene.
- This might mean removing your camera from the tripod and performing hand-held metering of the scene.

Dynamic Range of the Camera

- A camera has a dynamic range of 10-14 stops.
- Usually this information is available from the camera manufacturer specifications.
- You can also find the dynamic range of your camera on the DxOMark website.
- Note: The higher the ISO setting, the smaller the dynamic range of your camera.

So What Do We Know?

- The tonal range of the scene can be judged from the histogram or directly measured by using the in-camera spotmeter.
- The dynamic range of your camera can be found on the DxOMark website, but tends to be somewhat aggressive.
- Highlight or shadow clipping represent lost image data.

Tonal Range Compression Options

- One way to compress the tonal range of a scene is to use Graduated Neutral Density filters in the field.
- The second way is to shoot bracketed exposures and process them using HDR software.
- The next section will compare the two options.

Graduated Neutral Density Filters

- Designed to hold back the light in a portion of your image to compress the tonal range.
- Usually square or rectangular in shape and requires a filter holder with adapter ring.
- They are half clear and half neutral density in construction.
- Comes in two versions: hard and soft transitions.
- Available in multiple densities from 0.3 (1 stop) to 1.2 (4 stops) and different colors.

HDR vs. GND Filters: Pros & Cons

- GND Filters - *Pro*
 - Does not impact your memory card.
 - In-field use without post-processing.
 - Graduation of light to dark isn't obvious in most cases.
 - Tends to give realistic results; local contrast is maintained.
 - Able to capture motion.
 - Can be used in horizontal or vertical orientations.

HDR vs. GND Filters: Pros & Cons

- GND Filters - *Con*
 - Scratch easily; dirt and moisture a problem.
 - Need to carry a variety of filter densities.
 - Lens flare is common.
 - Does not work well with irregular horizons.
 - Can't use a lens hood.
 - Wide-angle lenses can vignette; not usable with fisheye lenses.

HDR vs. GND Filters: Pros & Cons

- HDR Filters - *Pro*
 - Usage not dependent on scene composition.
 - Works well with irregular horizons.
 - No front filter to cause flare.
 - Advantageous for capturing large tonal range scenes.
 - Unlimited focal lengths apply; even fisheye.
 - Polarizers can be used.

HDR vs. GND Filters: Pros & Cons

- HDR Filters - *Con*
 - Not good for subjects that are moving.
 - Uses more memory - storage card and the computer.
 - More computer processing time.
 - Tone-mapping results can be unrealistic.
 - Requires software: Photomatix, Photoshop, or Nik HDR Efex Pro2.
- My recommendation: HDR.

Tonal Range vs. Dynamic Range

- Best-case scenario: The camera's dynamic range exceeds the tonal range of the scene. Zero the meter and capture the image.
- Worse-case scenario. The tonal range of the scene exceeds the dynamic range of the camera. You will need to perform an exposure bracket to capture the highlights and the shadows.

Exposure Bracketing

- By shooting a sequence of exposures, this solves a lot of the tonal contrast / dynamic range issues you may encounter.
- Once the lens aperture has been set, the bracketing is done by varying the shutter speed – never vary the aperture or ISO.
- The exposure range of the bracket is based on the tonal range of the scene.
- The range of the bracket and the exposure increments are set by a camera control or a menu setting.
- A typical exposure bracket: -2, -1, 0, +1, +2
- In a bright scene, your bracket may be biased towards the shadows to tame the highlights; -3, -2, -1, 0, +1.
- The opposite will be true in a dark scene; -1, 0, +1, +2, +3.

Exposure Bracketing

- Some cameras allow a 7- or 9- stop bracket, in full stops, half stops, or third stops.
- Given the capabilities of today's DSLRs, some photographers employ a large bracketing increment: -2, 0, +2.
- Always confirm your bracketing scheme by viewing the exposure metering while bracketing.

Exposure Recommendations

- For all practical purposes, I don't worry about the tonal range of the scene or the dynamic range of my camera.
- The simplest solution is to always shoot an exposure bracket.
- ETTR is automatically being performed with the over-exposed bracketed images.
- If necessary I then used HDR software to blend the images to achieve tonal range capture.

The Sensor & Noise

- Sensor noise is the results of three factors:
 - High ISO.
 - Underexposure.
 - Sensor heating due to long exposures.
- Most noise is apparent in the shadows as color noise or luminance noise – it gives the appearance of an unsharp image.
- Use HDR bracketing where possible.

Data Capture & Bit Depth

- Bit depth refers to the amount of data in each RGB color channel.
- Each bit has two values: 0 and 1.
- Bit depth is usually shown as a power of 2.
- 2^8 means $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 256$.
- Because there are three color channels, an 8-bit device or file type can accommodate $256 \times 256 \times 256$ or 16,777,216 color combinations.

- Cameras capture either 12 or 14 bits of data *per color channel*.
- A bit depth of 14 means 2^{14} or 4.398 trillion color combinations.
- After processing the RAW file in ARC, the bit depth is changed to 16, based on an ARC preference.
- A bit-depth of 16 means: $2^{16} = 65,536$ colors and 218 trillion color combinations.

Color Space

- sRGB: small gamut designed for image competition, email, ProShow, PowerPoint and most consumer monitors.
- Adobe RGB (1998): medium gamut; standard for most consumer applications, printers and some professional monitors.
- ProPhoto RGB: very large color gamut for TIFF files. No devices currently support this color space.

Data Capture & Bit Depth

- Not all color spaces (or file types) can accommodate 218 trillion color combinations.
- By comparison, if sRGB is a pint, then Adobe RGB is a quart, and ProPhoto RGB is a gallon.
- Set ARC preference to ProPhoto RGB to maximize the captured data of the RAW file.

RAW vs. JPEG

Characteristic	JPEG	RAW
Bit Depth	8	8, 16, 32
Color Space	sRGB, Adobe RGB	All
Non-Destructive Editing	No	Yes
RAW Converter	No	Yes
File Contents	Image	Data
Hard Drive Storage Impact	Low	High
Rear LCD Display	Yes	No
Camera Color Controls	Yes	No

File Recommendations

- Shoot RAW!
- Set camera bit depth to 12 or 14.
- Set ARC color space to Pro Photo RGB.
- Convert to 16-bit in Adobe RAW Converter.
- Save output as 16-bit TIFF file.

Note: The larger the bit depth, the more data, more detail and greater apparent sharpness when the image is later cropped or printed.

Using Auto-Focus

AF and the Sharper Image

- This section discusses the use of AF in landscape photography.
- It is important that you understand how AF works in your camera as it will impact your workflow and image sharpness in the field.
- Sit down with your camera and thoroughly read your camera manual or a book written by a third-party; it is time well spent.
- See the references at the end of the lecture notes.

- Because of the static nature of landscape photography, Single-Point AF is recommended.
- With the camera meter active, you can move your sensor area to any location within the sensor pattern using the multi-selector on the back of your camera.
 - It functions as a joy-stick.
- This helps in reducing the need to recompose the image after focus is achieved.

AF and Landscape Photography

- Three things are necessary for AF to work:
 - Sufficient light
 - Subject contrast
 - Distinct lines
- Your camera should be set to lock focus at the time you partially depress the shutter release. This is called AF-S or Single Servo AF.

Viewfinder vs. Live View

Attribute	Viewfinder	Live View
AF Type	Phase Detect	Contrast Detect
Single Point AF	Yes	Yes
Active Area Indicator	Yes	Yes
Available Area	Sensor Pattern	Full Screen
AF Confirmation	Green Dot	Green Box
Zoom Control	No	Yes
Light Shield	Eyecup	Hoodman Loupe
Exposure Information	Direct View	Info Button Toggle
Focus	Remote Cable	AF Back-Button
Capture	Remote Cable	Remote Cable

Note: Attribute function may differ for non-Nikon cameras.

Auto-Focus Modes

- The Viewfinder uses *Phase Detect* and a partially-depressed shutter release button to achieve focus.
 - Image capture is by further depressing the shutter release button on the remote cable.
- Live View uses *Contrast Detect* and the AF back-button to achieve focus.
 - Image capture is through the shutter release on the remote cable.
- Inherent problems:
 - AF focusing systems rely on detecting lines and textures.
 - Grass and leaves pop right into focus while it searches for a focus point if pointed at a blue sky.
 - Because a minimum amount of light is necessary to achieve focus, alternative lighting methods are needed for night photography.

Single Point AF

- The active sensor is where exposure and focus will be determined.
- With the viewfinder, you can move the active sensor to any location within the sensor pattern.
- With Live View you can move the active sensor to any location on the screen.
- This helps in reducing the need to recompose the image after focus is achieved.

- The risk with single point AF is that not all sensor areas, or focus points, determine subject focus in the same manner.
- Some focus points use horizontal and vertical lines to find focus, others only horizontal lines, still others only vertical lines.
- Availability of using certain focus points will be restricted based on effective aperture of the lens.

- Because not all focus points are created equal, this can become a serious issue under two conditions:
 - Shallow depth of field, for example, macro or telephoto imaging.
 - Recomposing after focusing.
- In your imaging workflow, final focusing is the last step before releasing the shutter and capturing the image.

Spotmetering and AF

- Most landscape photographers will leave their meters set to matrix or evaluative.
- However, in the spotmeter mode, you can move the metering area, as you can the focus point, to determine the exposure for that area.
- The spot that's being metered is a little larger than the active sensor but still gives you an approximate 1° spotmeter.

The Sensor – Summary

- Shoot RAW images.
- Shoot at the camera's optimal ISO.
- Set ARC bit depth to 16.
- Set color space in ARC to ProPhoto RGB.
- Compare the contrast range of the scene to the dynamic range of the camera.
- Expose using ETTR or HDR strategy.
- Purchase a camera without an anti-aliasing filter.

In the Field Workflow

- Stabilize the camera/lens system using a quality tripod and tripod head.
- Optimize the camera and lens settings for exposure; bracket if necessary.
- Use HFDDI to ensure foreground to background sharpness.
- Compose your image.
- Use Focus Confirmation and Single-Point AF.
- Release the shutter with a remote cable and use exposure delay.

Seminar Topics

- Tripods and Tripod Heads
- Viewfinder & Live View
- Depth of Field and Hyperfocal Distance
- Data Capture – the Sensor
- AF and Focus Confirmation
- In the Field Workflow

Some Abbreviations

- ARC: Adobe Camera Raw
- AF: Auto-Focus
- A/S: Arca-Swiss
- CF: Compact Flash Memory Card
- CFA: Colored Filter Array
- DOF: Depth of Field
- DSLR: Digital Single-Lens Reflex (camera)
- ETTR: Expose to the Right
- GND: Graduated Neutral Density
- HDR: High Dynamic Range
- HFDI: Hyperfocal Distance Imaging
- IS: Image Stabilization (Canon)
- LCD: Liquid Crystal Display
- LV: Live View
- MF: Manual Focus
- ND: Neutral Density
- PS, LR, BR: Photoshop, Lightroom, Bridge
- RRS: Really Right Stuff
- TTL: Through the Lens
- VR: Vibration Reduction (Nikon)

Equipment Resources

- Tripods & Tripod Heads: Manfrotto (Bogen & Gitzo) and Really Right Stuff (RRS)
- Cameras & Lenses: B&H, Hunt's
- Live View Loupe and Crane: Hoodman
- Arca-Swiss (A/S) Accessories: RRS
- Camera L-Bracket: RRS
- Remote Cable & Intervalometer: B&H, Hunt's
- Double-Spirit Level: B&H, Hunt's
- Tripod Leg Wraps: B&H, Hunt's

References

- Your camera manual – download PDF copy from the manufacturer.
- Specific camera reference books published by Rocky Nook.
- Specific Nikon camera reference books authored by Thom Hogan (PDF).
- *The Nikon Autofocus System* by Mike Hagen.