Digital Outback Photo Workshops

Mastering HDR Challenges

Using HDR and Tonemapping to enrich your Photography

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Dynamic Range (DR)

- Ratio of darkest and brightest element that matter for your photographic view

- The question is DR of what?
  - Scene
  - Capture
  - Output
  - Human Vision

We need to understand all these types of DR.

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DR: Scene

- What are the brightest details and darkest details that you want to portray
- This is an photo design decision
- Highlights are more critical than the shadows
- See next: Matching the Scene DR to the Capture DR
- DR of 1:30000 or more are common in real world scenes. Even more if you photograph a dark room with windows.

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DR: Camera

- Because we talk about photography we need to understand the limits of our capture devices (cameras)
- DR of the camera is measured from brightest details to shadows that have detail well above the noise floor
- Today's normal DSLRs can capture 7-10 f-stops (1:128 to 1:1000). We don't try to be too optimistic here.
- Slide film 6-7 f-stops
- Negative film about 10-12 f-stops
- Highlight recovery in some RAW converters can gain up to +1 f-stop

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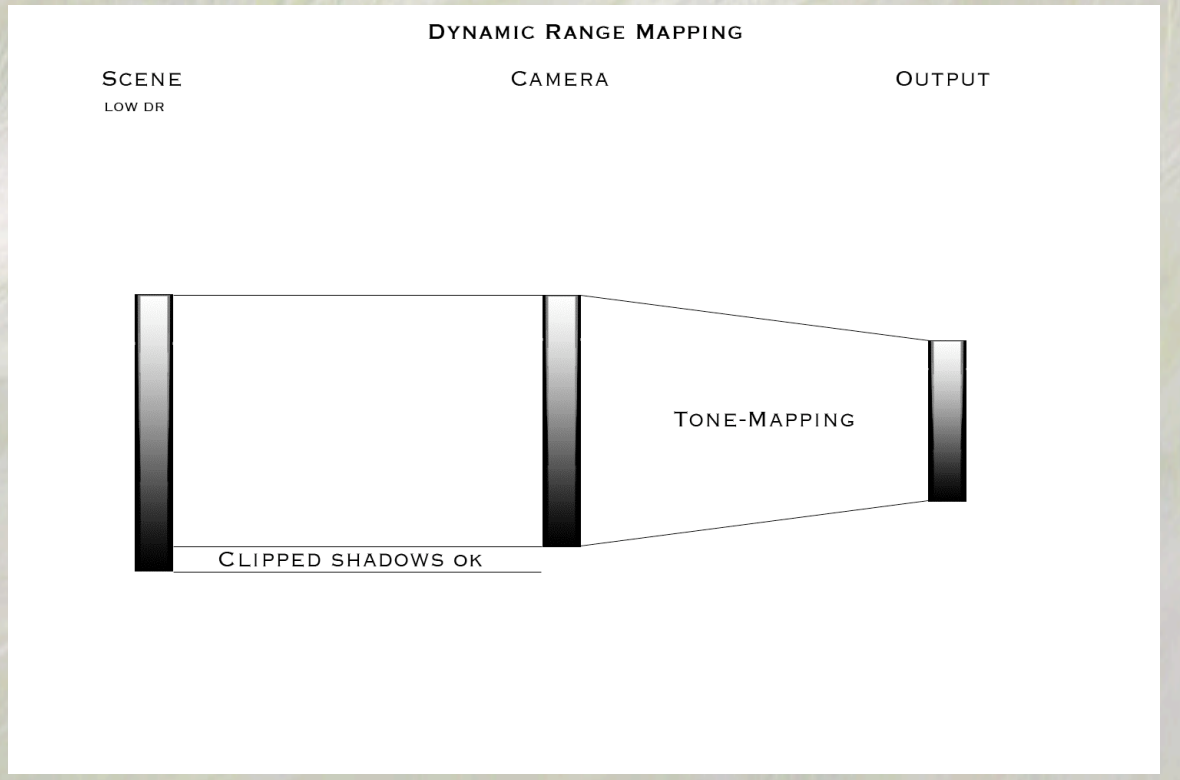
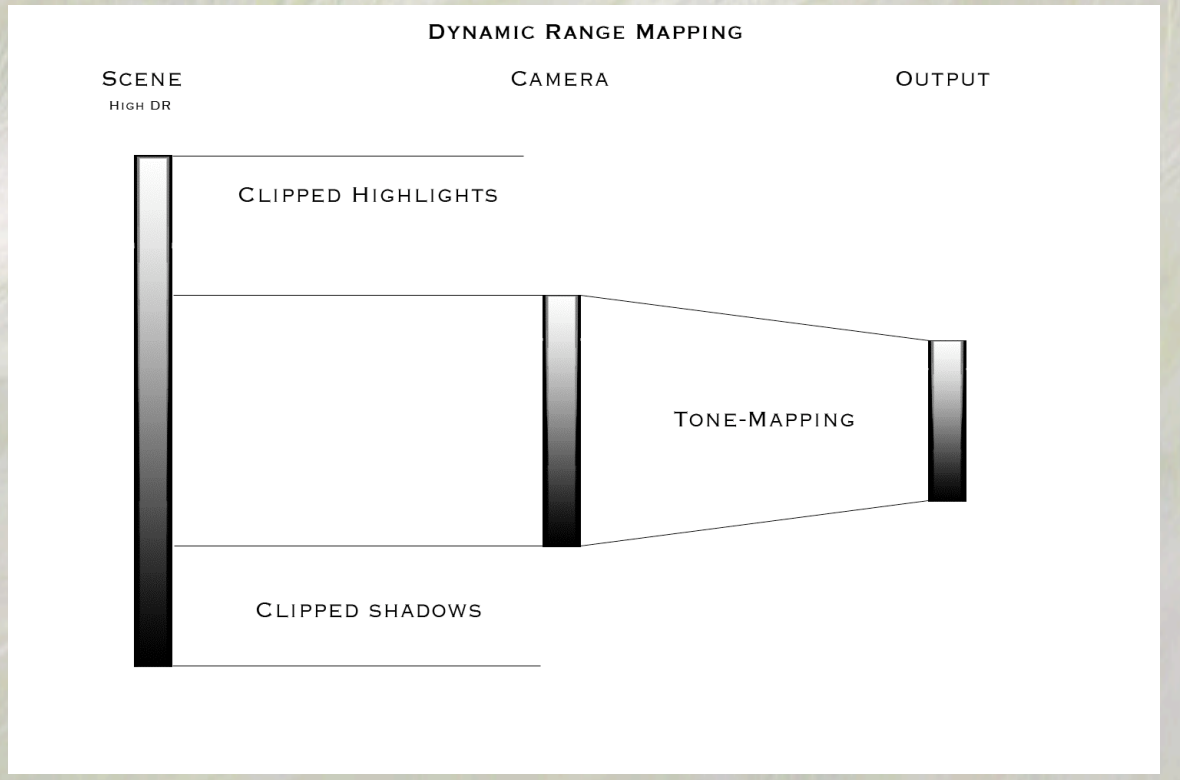
DR: Output (e.g. print)

- Today's Monitors: 1:300-1:1000
- HDR monitors 1:30000 (watch your eyes, may get stressed)
- Printers on glossy media: about 1:200
- Printers on matte fine art papers: below 1:100

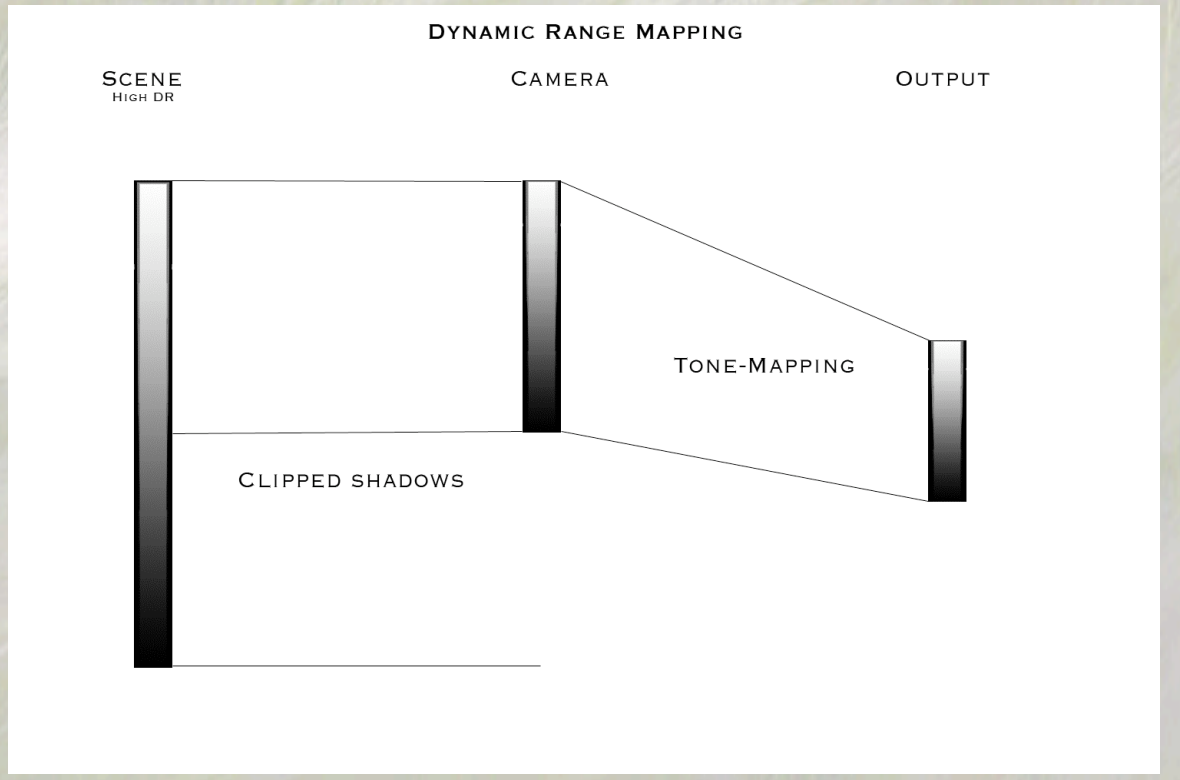
DR types and relations



DR types and relations



DR types and relations



DR: Scene -> Camera

- Why then even bother to photograph scenes with higher DR than your camera's or printer's DR?
  - Good point!
  - Often photographers wait for overcast
  - Use fill flash (does not help with landscapes though)
  - But then you want to capture scenes like these ones

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DR: Camera DR -> Output DR

- Here we avoid clipping and try to compress the DR instead.
- Compression of DR leads to lower contrast
- Often highlights and shadows get more compressed than the midtones (see later)
- The need for dodge & burn
- RAW converters already perform some of this compression
- Can lead to overly compressed highlights and/or blocked shadows
- We call this type of compression Tonemapping (more later)

Tonemapping = Mapping of Tones

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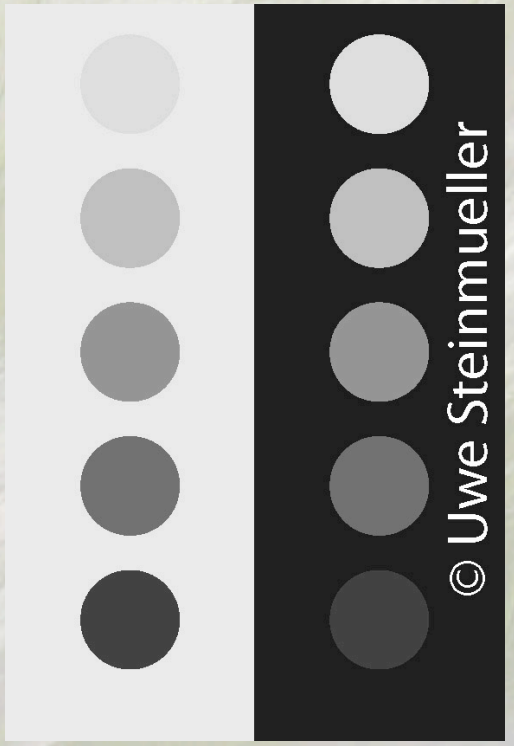
Contrast

- Detail is shown by contrast
- Global contrast
  - Comes down to the DR of the processed image
  - If you have stronger midtone contrast the highlights and shadows have to be more compressed
- Local Contrast
  - Human eyes are very sensitive to differences

Local Contrast



- Conclusion: Local contrast is important, e.g. Sharpening

Tonemapping

- Lets call all methods that change tonality Tonemapping
- The tones are transformed from a source image to the resulting version
- If we have a mismatch in DR from source to the target we need some way of tonemapping and tonal compression.
- Types of tonemapping (also sometimes called operators)
  - Linear global (like Levels, simple compression)
  - Non linear global (curves)
  - Local
- Why is tonemapping so important?
  - Once we use HDR images tonemapping will prove to be essential (see later)

Capturing more DR

- The desire to overcome the DR limitations of the cameras is as old as is photography
- How?
  - Capturing multiple exposures at different EV levels
- What to do with these exposures?
  - Manual blending (today in Photoshop, was done with enlargers)
  - Automatic Blending (e.g. in Photomatix)
  - Creating HDR images (in Photomatix or Photoshop)
- The following parts only deal with HDR images because this allows the most flexibility

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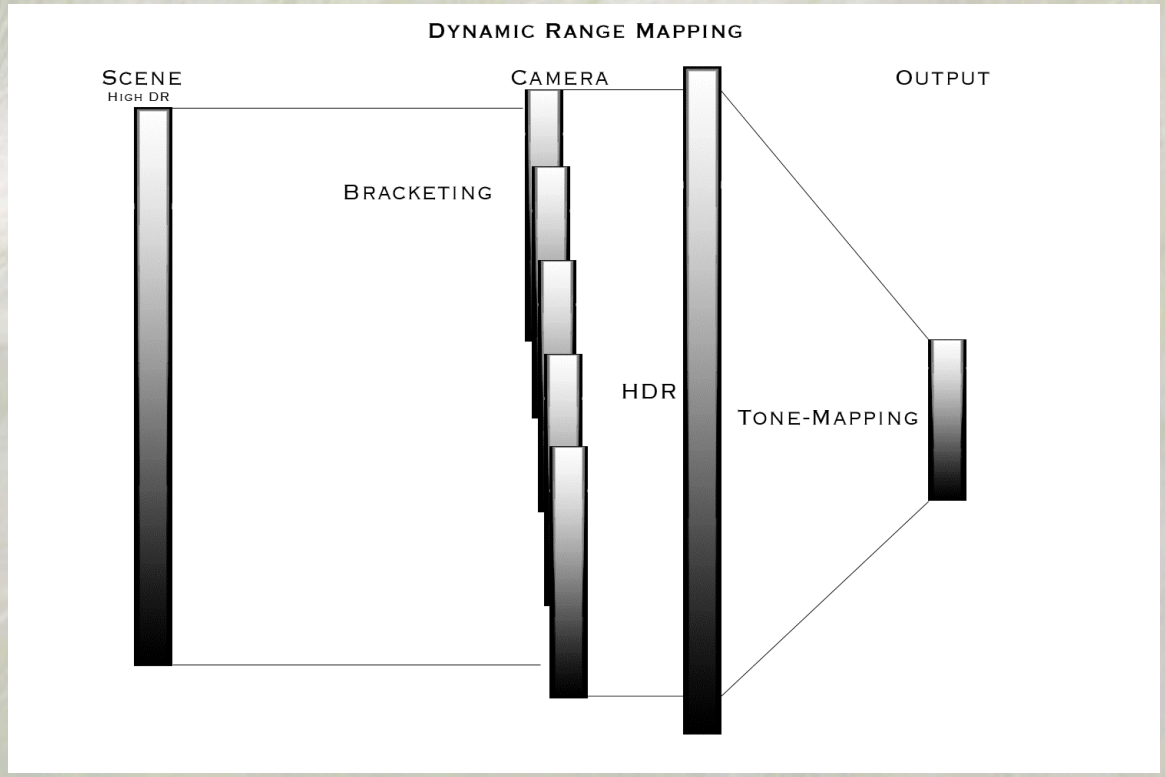
HDR Process


DYNAMIC RANGE MAPPING
SCENE
HIGH DR
CAMERA
OUTPUT
BRACKETING
HDR
TONE-MAPPING

Movement

- Camera movement (tripod, freehand, Mirror lockup, ..)
- Scene movements
- Shutter speed
- High speed HDR (fast freehand sequences)

- Not all movement must be bad: e.g. people in the distance
- Not all motion blur is bad

- A HDR photographer needs to be aware of all these sorts of movements
- The good news is that there are very good tools to align your images. But this does not help with all sorts of movements.

Many things move

- People, Animals
- Foliage
- Birds, Butterflies
- Flags
- Clouds (not too much a problem)
- Water
- Camera

Exposure/ Bracketing

- As always a great exposure is the best start
- With Bracketing we “Capture more Light”
- EV spacing
  - Different schools (1-2 EV, Nikon cameras mostly support 1EV steps)
- Number of shots (depends on the Scene DR)
  - More shots gives you more to chose from at the price of more storage. If you take 7 shots that does not mean you need to use all of them. But you can! Think of HDR as an enabling technology.
- Also have the single best shot in mind as a fallback or if HDR is not really needed. Here 1EV steps have a major advantage.
- If shooting freehand watch for the longest exposure

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Alignment Methods

- Shifting: works from sturdy tripod
- Matching Features: can be very complex up to image morphing, can degrade image quality

- Watch moving scene objects
- Watch motion blur at longer exposures (mainly freehand)
- Watch wind from tripod (mirror lockup, live view)

- Demo: Alignment in CS4 and HDR in Photomatix

HDR Artifacts

- Pulls out all sorts of artifacts
- Lens distortions
- CA (Chromatic Aberrations, the main issue with HDR here)
  - Solutions with ACR/Lightroom, DxO and Photomatix
- Watch for Halos (all tools with Radius)
- Ghosting handling by different tools