FujiFilm HS-10 - Managing dynamic range (DR)

The FujiFilm HS-10 sports a remarkable lens. In 35 mm camera equivalence, it goes from a wide 24 mm, to 720 mm. More about that in a separate article.

It also has a completely different sensor, from it's predecessors. Some argue that this is a backward step, particularly in terms of the amount of DR it can cover.

Where I live (Hua Hin, Thailand), the air is very clear and the light can be brutal. I need cameras with wide DR !

I own three Fuji cameras - The S100 fs, F200 EXR and the HS-10.

This gives me an opportunity to do a controlled comparison of the DR capabilities of the three. Both the F200 EXR, and the S100 fs, are renowned for their ability to control DR.

Of course, some things need to be considered to get the most DR from any camera. I have found that with all three, the best shooting setup for DR is to set the Cameras for DR 200%. Typically, I also apply - 0.33 exposure value (EV).

Still, with the HS-10, you can also revert to the more traditional method and simply control the EV.

The images used in the (many) examples below, use different types of settings to achieve a common goal - Good DR retention.

Whilst I shoot Raw a lot of the time, every image shown in this article is from an original Jpeg file.

Firstly though, what is DR ?

Well, when talking about cameras, a simple explanation is that it is the range of distinctive light gradations which can be captured. In other words, the difference between the minimum and maximum light gradations, and without exceeding those.

Cameras capture images in the RGB (red, green, blue) colour space. These three colours are 'blended' in varying degrees, to achieve the broad range of colour variations which we see. Effectively, each channel (colour) can capture between 0 and 255 (256 values) of light gradation.

When we consider all three (RGB) channels, this equates to about 16.7 million potential colour variations when using a camera which captures 8 bits of information per channel.

A camera which records at 14 bits per channel, will give a much larger range. Most cameras which shoot Raw, work in 14 bits.

A good camera will be able to deliver greater than 9 stops (unit of light measurement). The more the better. As an example, the S100 fs is measured at 9.2 stops.

DPReview - S100 fs Review

In contrast, the human eye can perceive approximately 24 stops of light gradation.

As an aside, it is incorrect to assume that zero is simply black. In the RGB colour space, zero means that nothing has been recorded. Similarly, a value of 255 means that the colour has been 'over' recorded, or 'blown'. Hence the term 'blown highlights'.

If you are submitting images to stock libraries, for example, then the typical acceptable value range is between 4 and 248, for any given colour channel.

Note : This is only a brief and simple explanation. If you wish to understand the topic further, have a look here :

Cambridge In Colour - Dynamic Range article

DPReview - Dynamic Range article

Anyway, back to the HS-10 and managing DR.

To set a base line, let's look at a same scene image taken with all three Fujifilm cameras I own.

For this image comparison, all the cameras were set to ISO 200, DR 200%, Standard film simulation and 0 EV. The images are straight from camera, simply put in a 'box' to show all three.

As I mentioned earlier, I normally also apply an EV value of - 0.33. This helps further to take the edge off any potential highlight blow outs.

So, which is which ?

Doesn't really matter too much as all behave in a fairly similar fashion with those settings. Several comparisons I have performed show similar results.

Now, let's take a look at what happens when shooting the HS-10 without any DR compensation set in the camera.

There are three images in succession.

The first shows the image, as shot, opened in Adobe Camera Raw (ACR). The reason for doing this is that it will clearly show blown highlights (red) and any blocked shadows (blue).

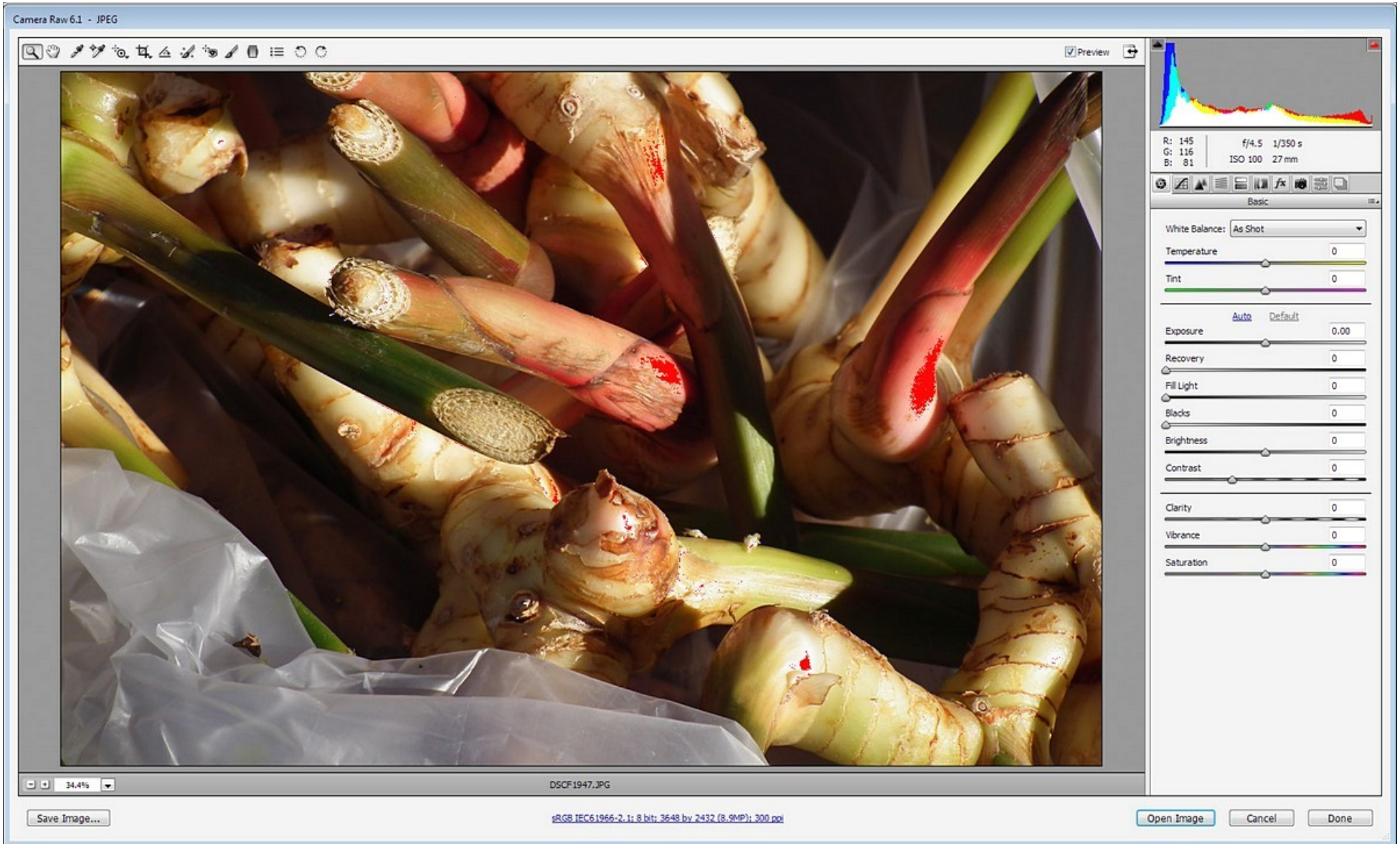
The second shows the image with some adjustments made in ACR. Again, I am using ACR as it will show the effects of those adjustments, with regard to highlight/shadow areas.

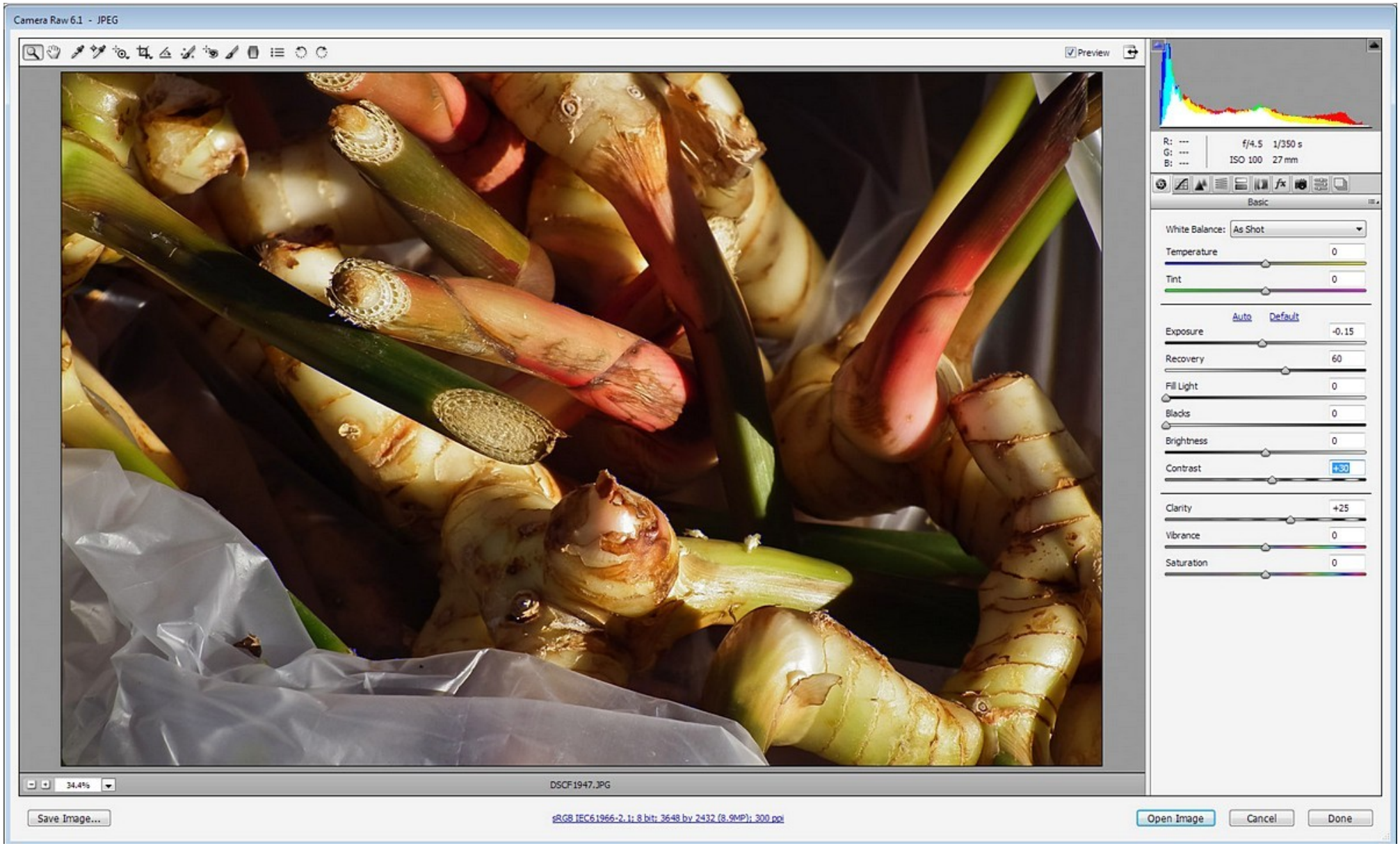
The third image shows the final edit. Once through ACR, I make any further desired adjustments in PhotoShop. Mostly, this involves sharpening, levels adjustment, and cropping/straightening.

The original image was shot at ISO 100, DR 100% (which means no DR compensation), 0 EV.

You can see there is a small amount of blown highlight areas (bright red).

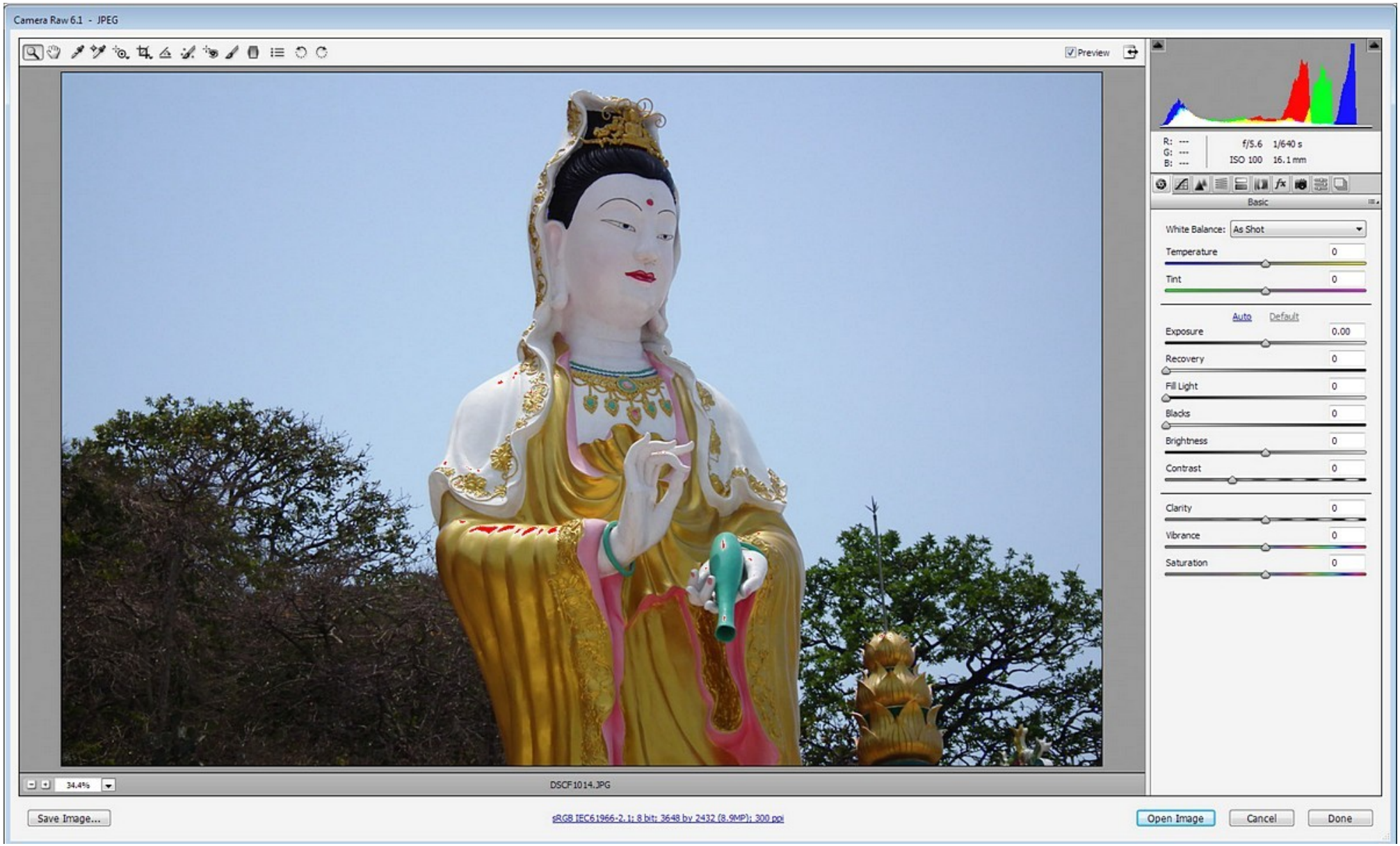
Note : The HS-10 supplied Raw File Converter (RFC) software can also display shadow/highlight warnings, and the requisite adjustments made to correct them. RFC can be used for adjusting Raw and also Jpeg images.

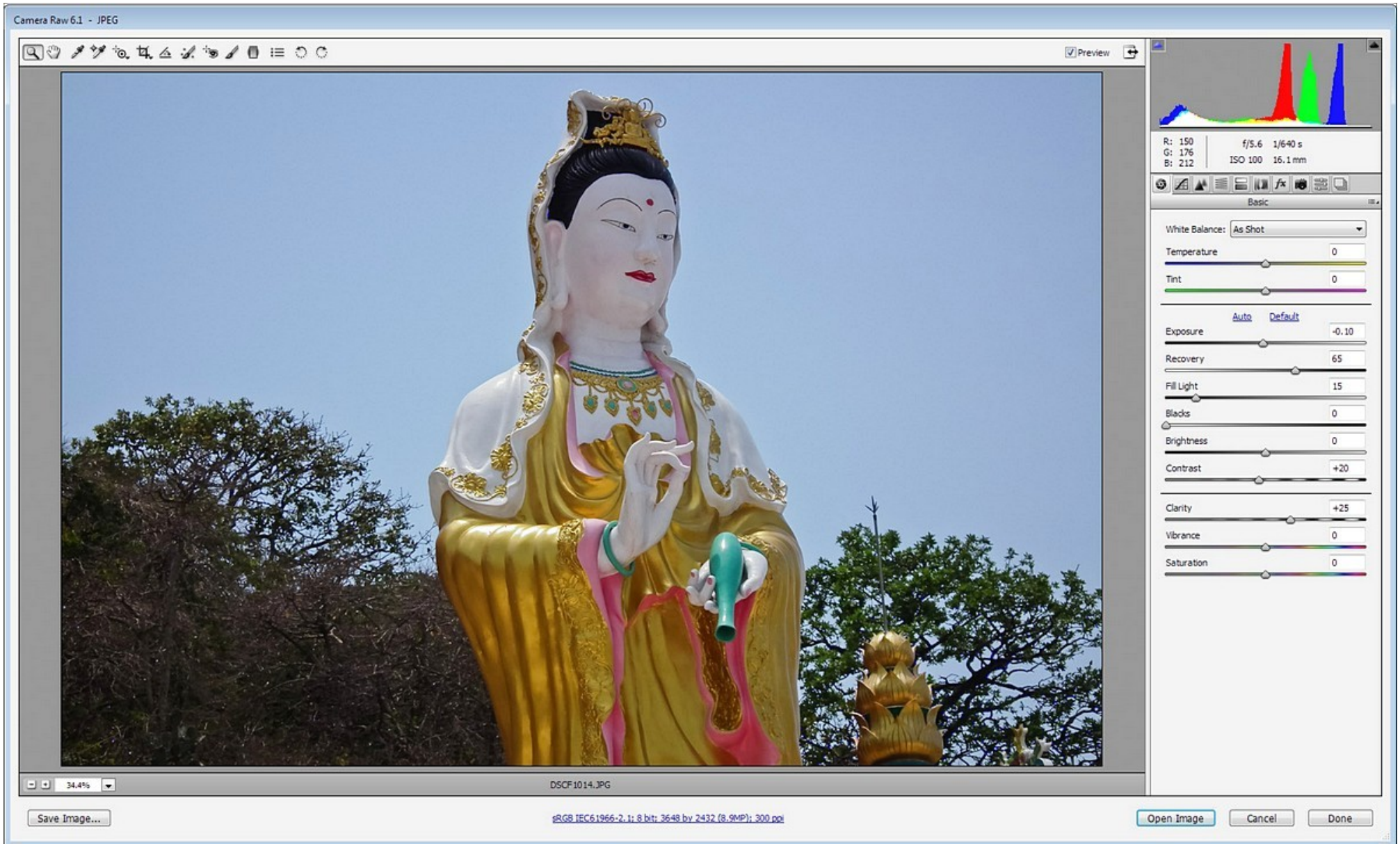

Camera Raw 6.1 - JPEG
Preview
R: 145
G: 116
B: 81
f/4.5 1/350 s
ISO 100 27 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
34.4%
DSCF1947.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/4.5 1/350 s
ISO 100 27 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure -0.15
Recovery 60
Fill Light 0
Blacks 0
Brightness 0
Contrast +30
Clarity +25
Vibrance 0
Saturation 0
34.4%
DSCF1947.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done

A second example, again shot at ISO 100, DR 100% and 0 EV. There is a small amount of highlight blow out on the arm and shoulder.

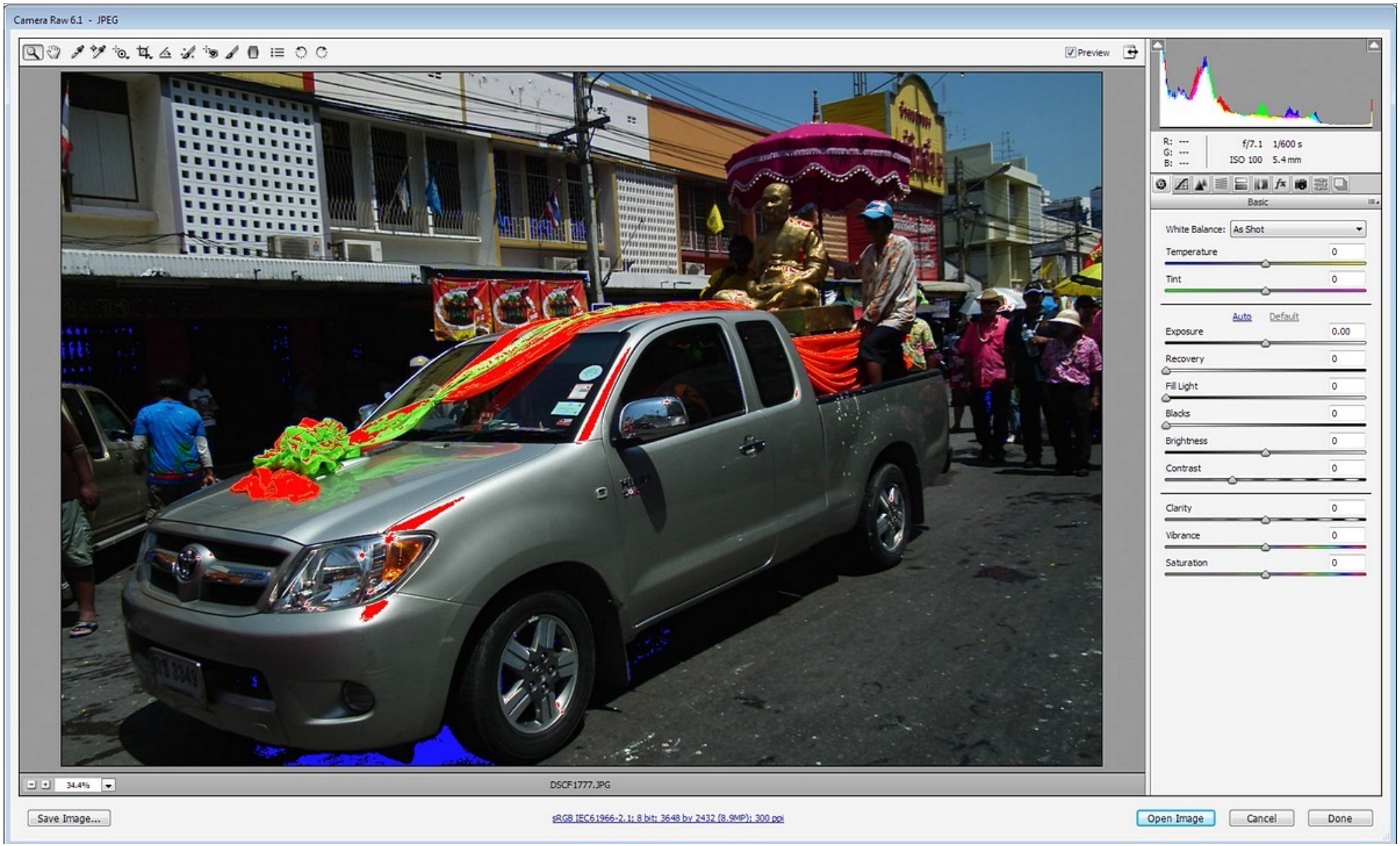
Note : As before, I am showing a succession of three images. As shot, as adjusted and as edited. I will continue this format through the rest of the article.

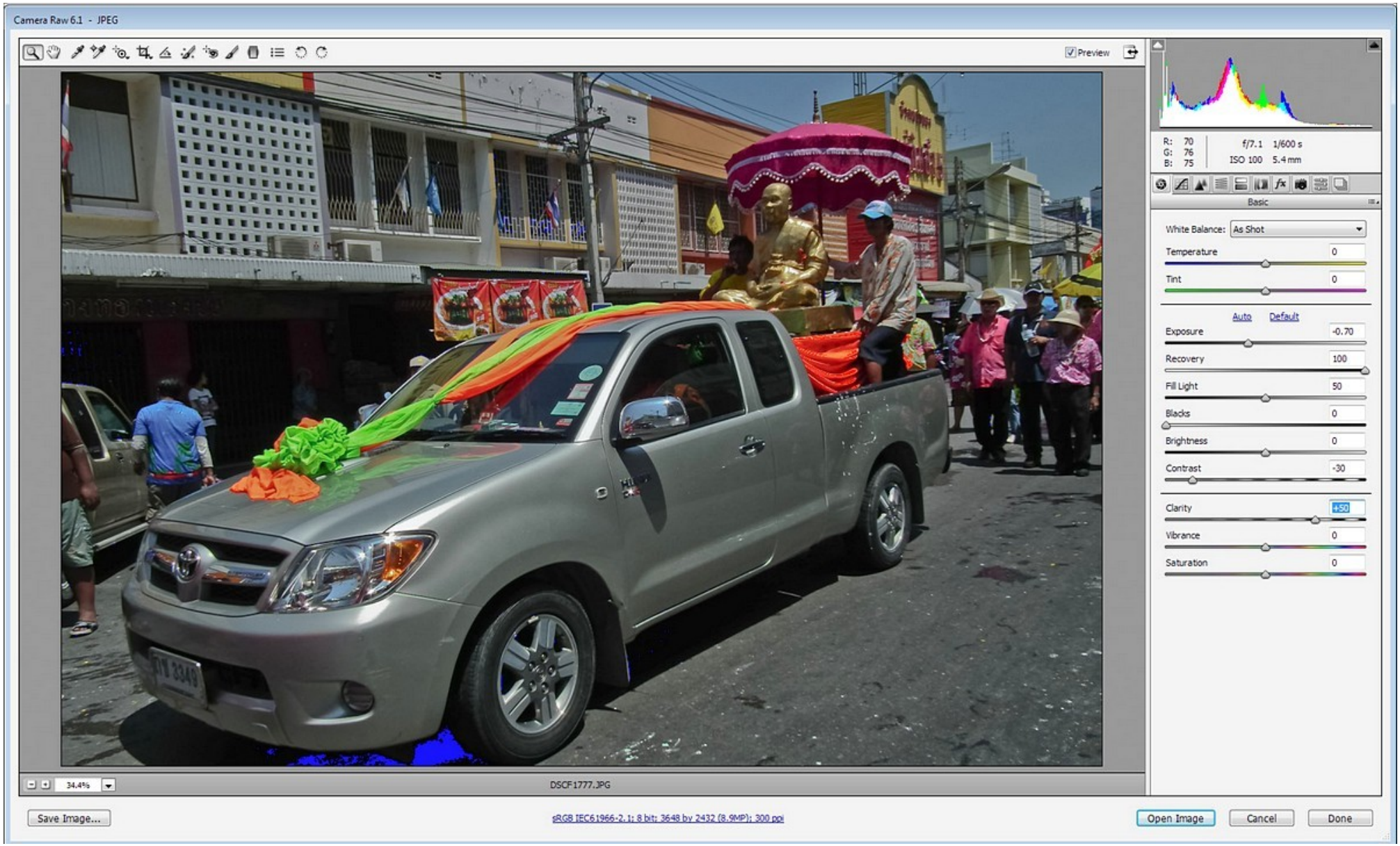

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/5.6 1/640 s
ISO 100 16.1 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
34.4%
DSCF1014.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: 150
G: 176
B: 212
f/5.6 1/640 s
ISO 100 16.1 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure -0.10
Recovery 65
Fill Light 15
Blacks 0
Brightness 0
Contrast +20
Clarity +25
Vibrance 0
Saturation 0
34.4%
DSCF1014.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done

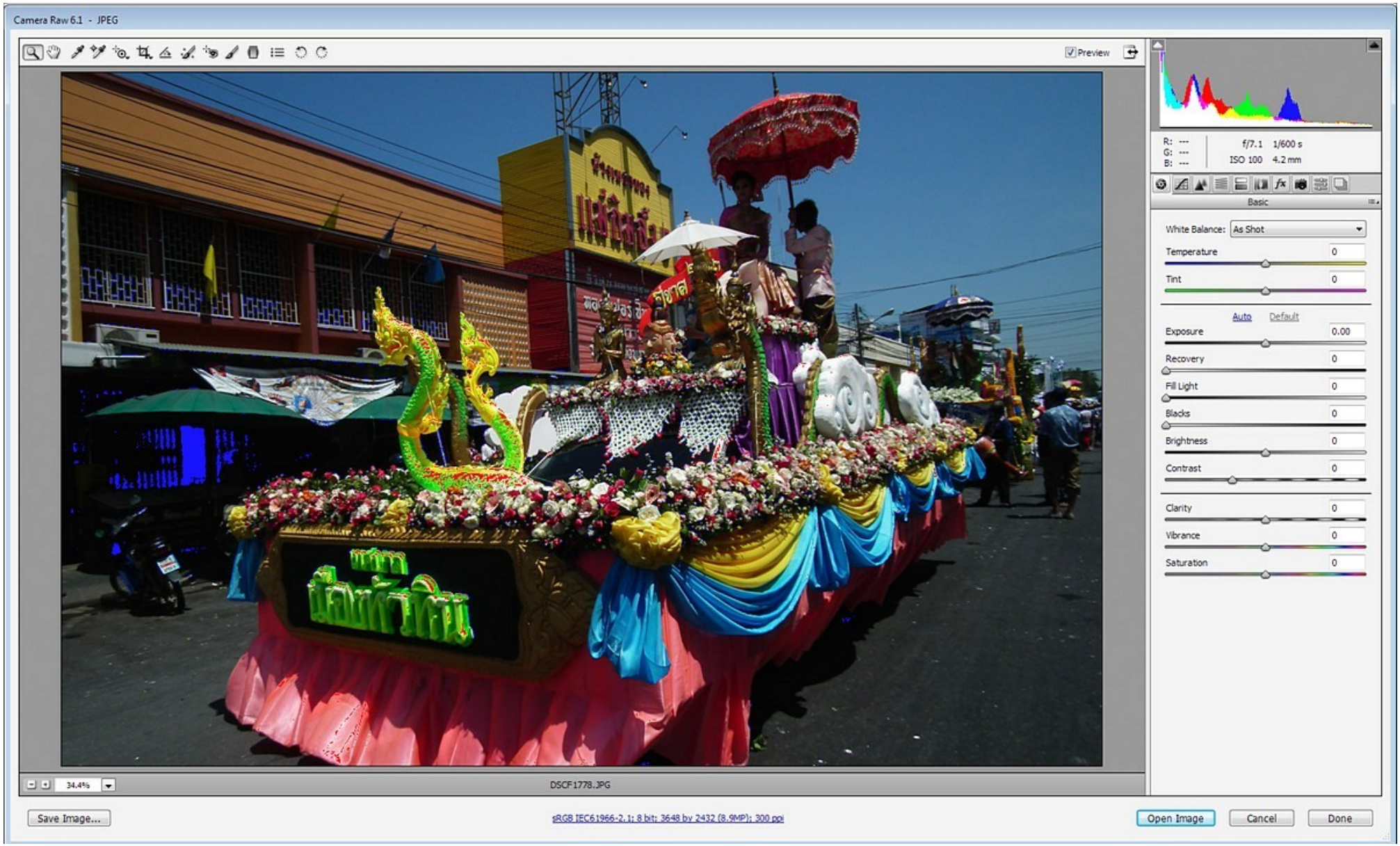
With the next image, I have taken the more traditional approach of compensating EV to control highlights.
The settings used were ISO 100, DR 100% and - 0.67 EV.

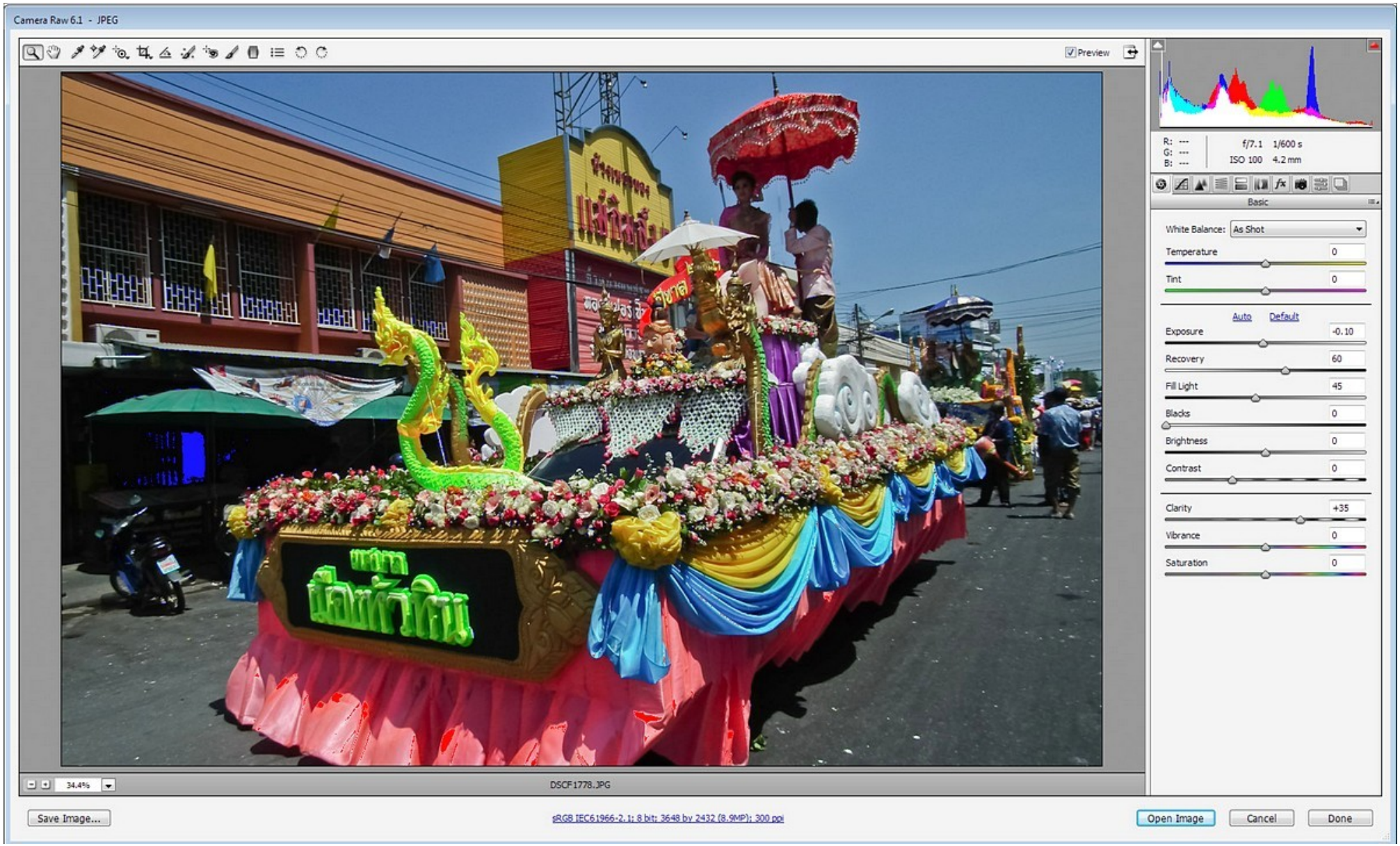
It can be seen, that even though doing this, some highlights are blown and the image is dark, overall.
Whilst not all the highlight areas can be completely recovered, there is still a lot there to pull back.

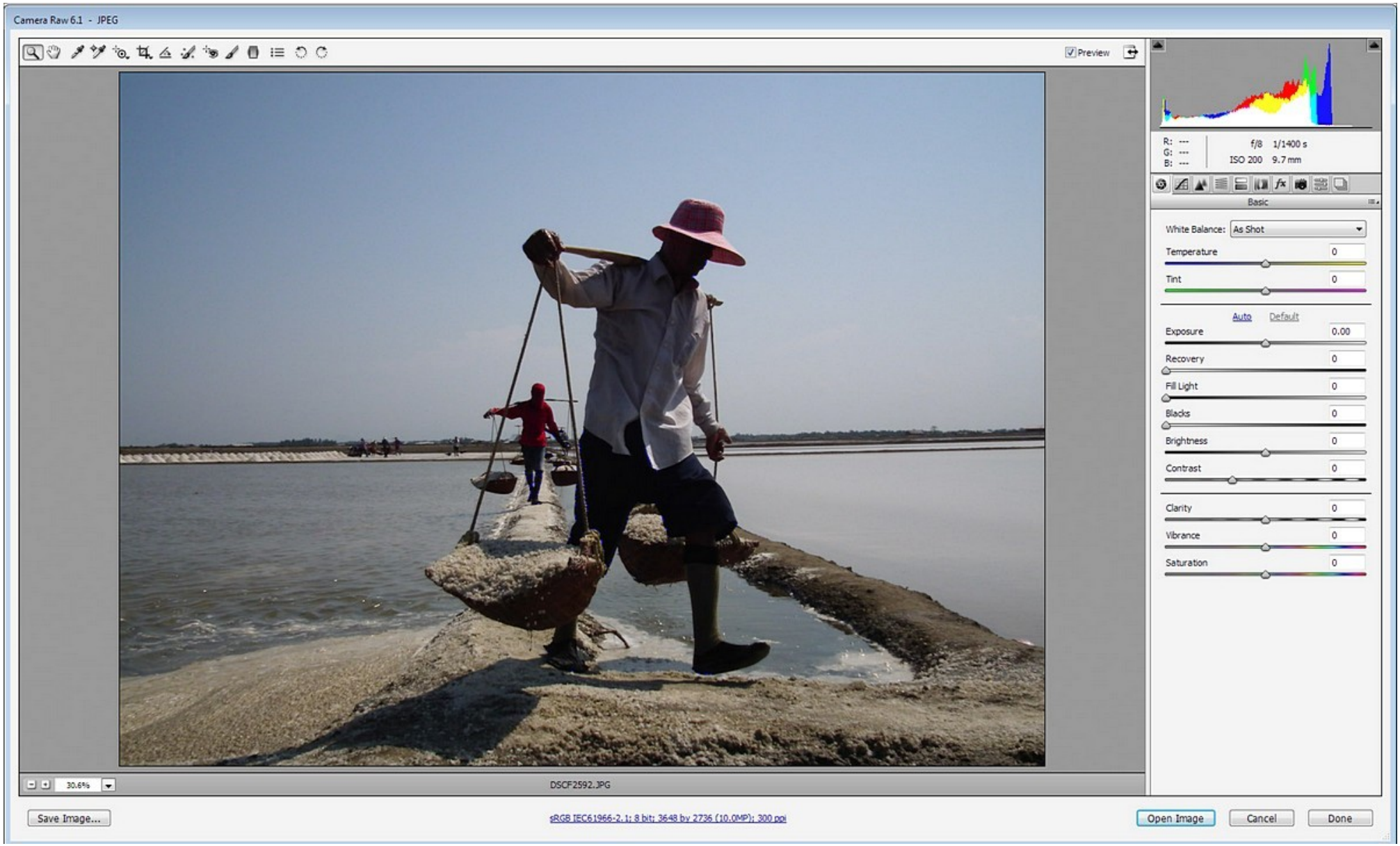

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/7.1 1/600 s
ISO 100 5.4 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
34.4%
DSCF1777.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done

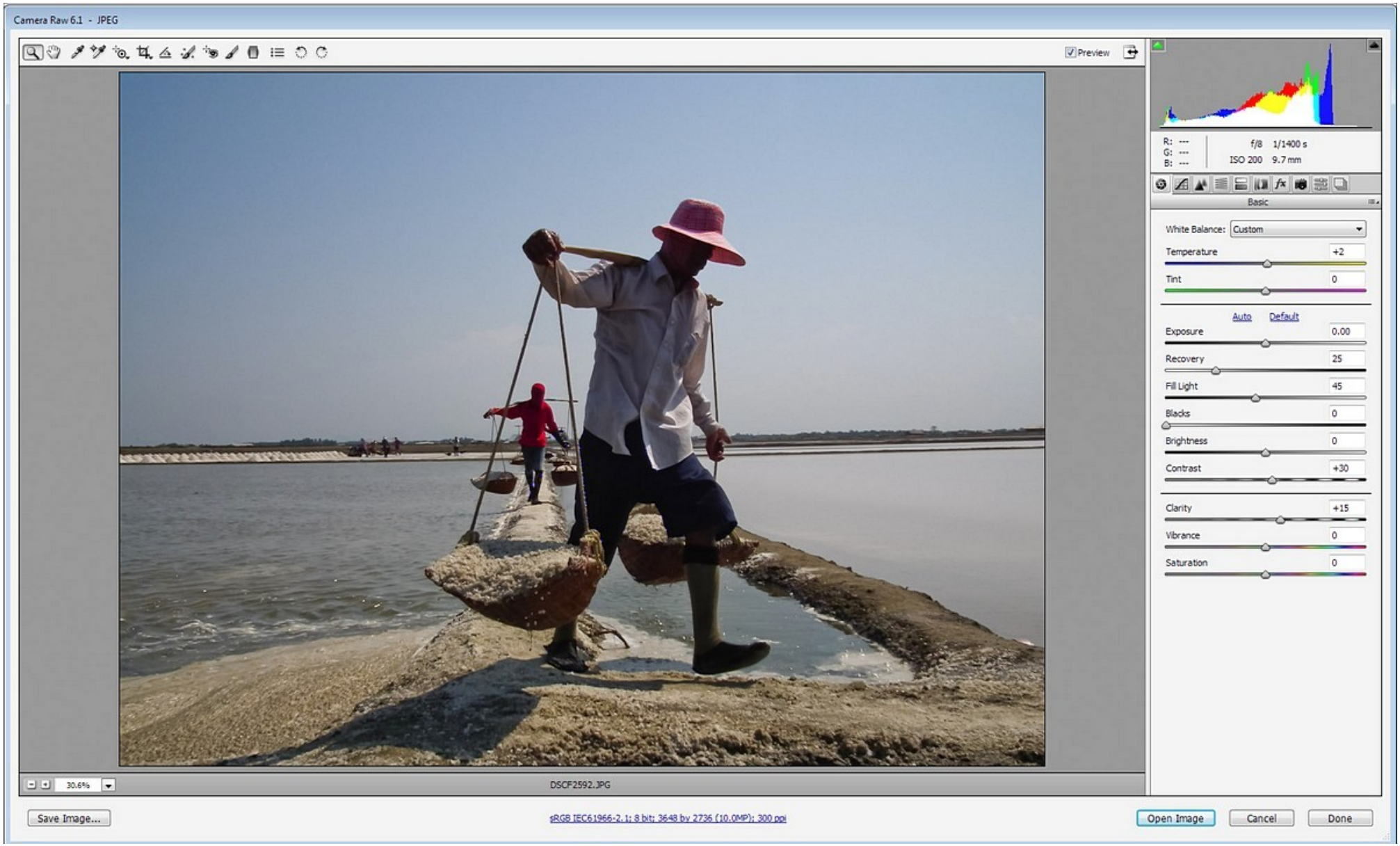

Camera Raw 6.1 - JPEG
Preview
R: 70
G: 76
B: 75
f/7.1 1/600 s
ISO 100 5.4 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure -0.70
Recovery 100
Fill Light 50
Blacks 0
Brightness 0
Contrast -30
Clarity +50
Vibrance 0
Saturation 0
34.4%
DSCF1777.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done

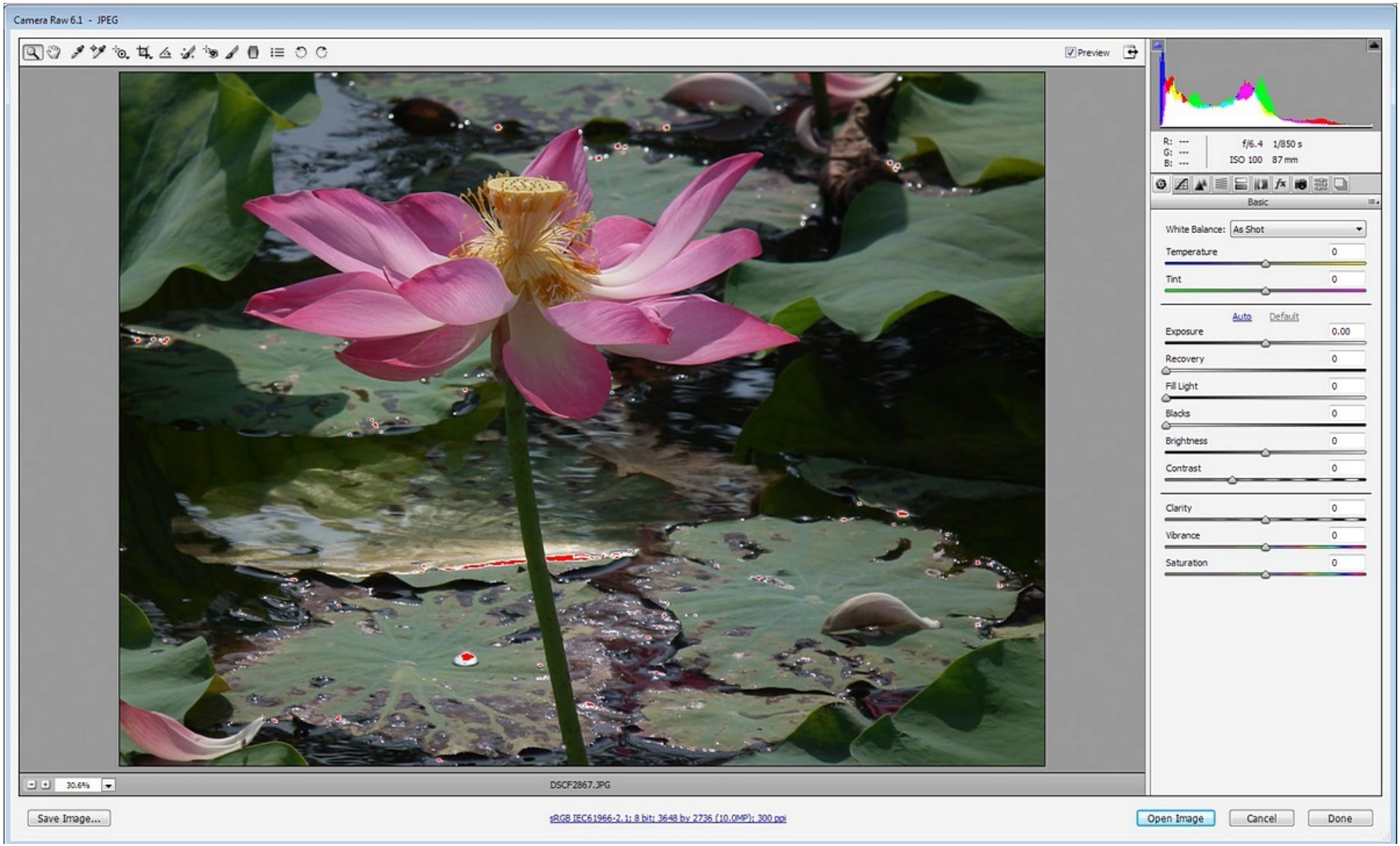
Similarly, the next seven examples show images with the exact same approach used.
ISO 100 (or ISO 200), DR 100% and - 0.67 EV.

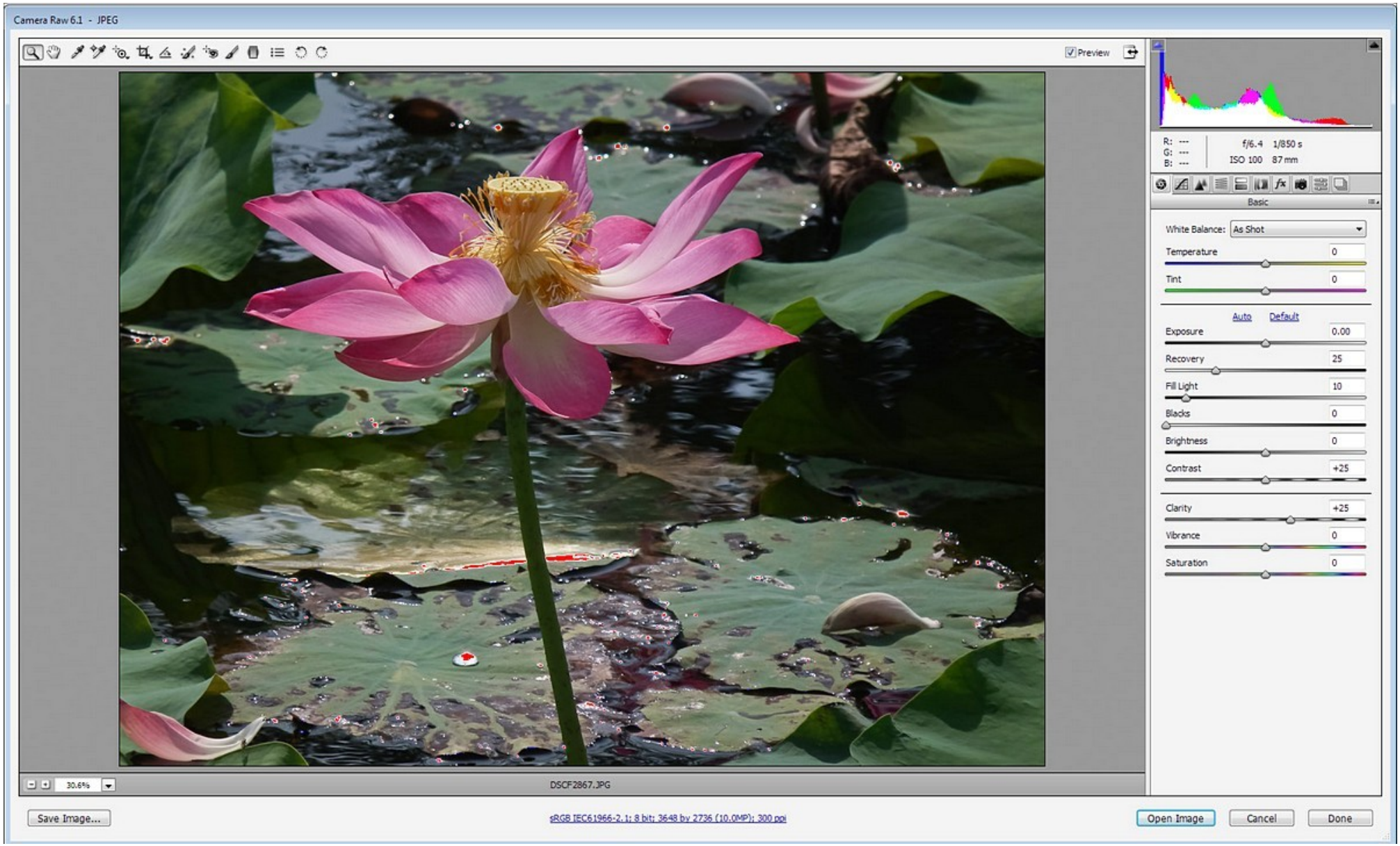

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/7.1 1/600 s
ISO 100 4.2 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
34.4%
DSCF1778.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done

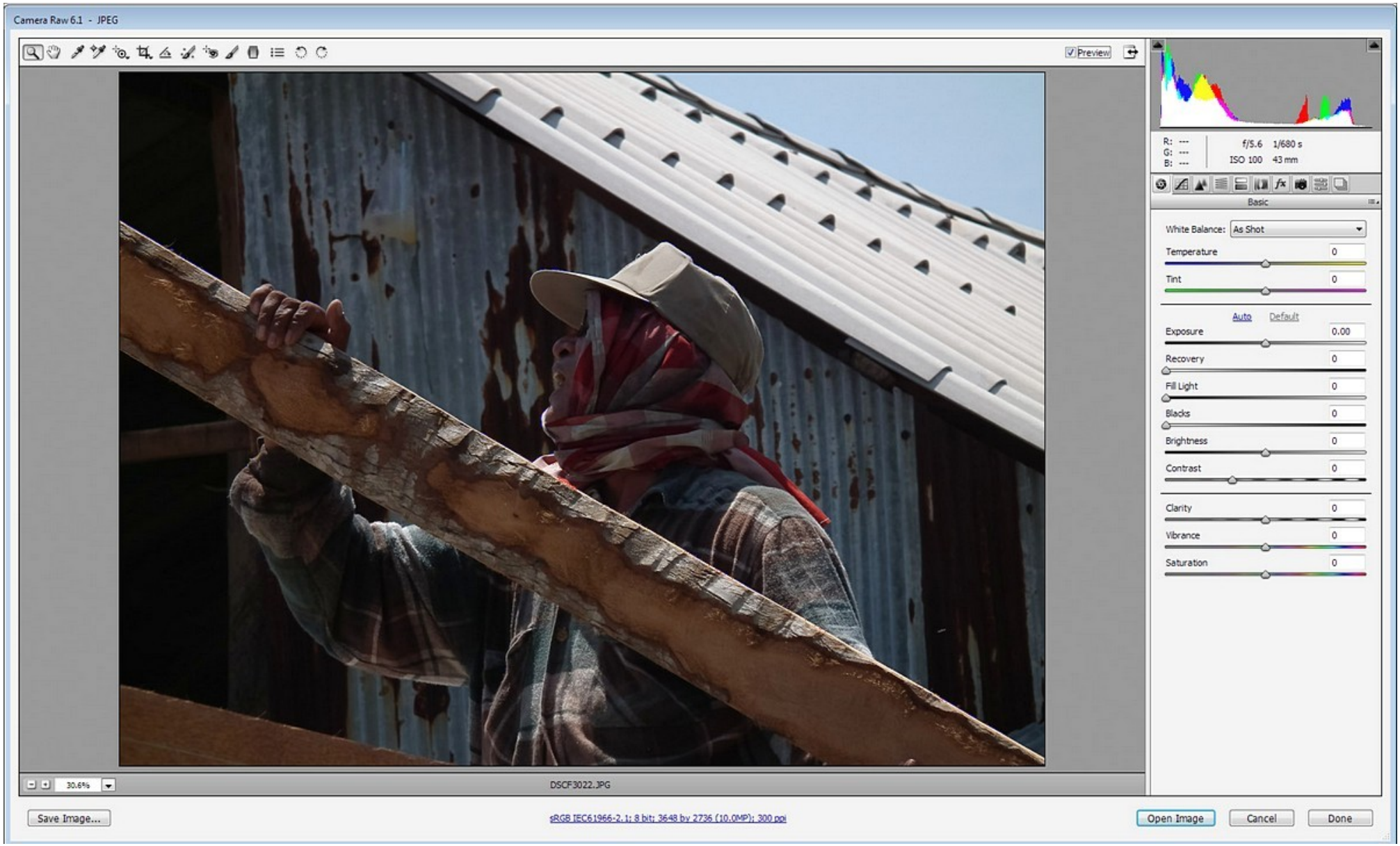

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/7.1 1/600 s
ISO 100 4.2 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure -0.10
Recovery 60
Fill Light 45
Blacks 0
Brightness 0
Contrast 0
Clarity +35
Vibrance 0
Saturation 0
34.4%
DSCF1778.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done

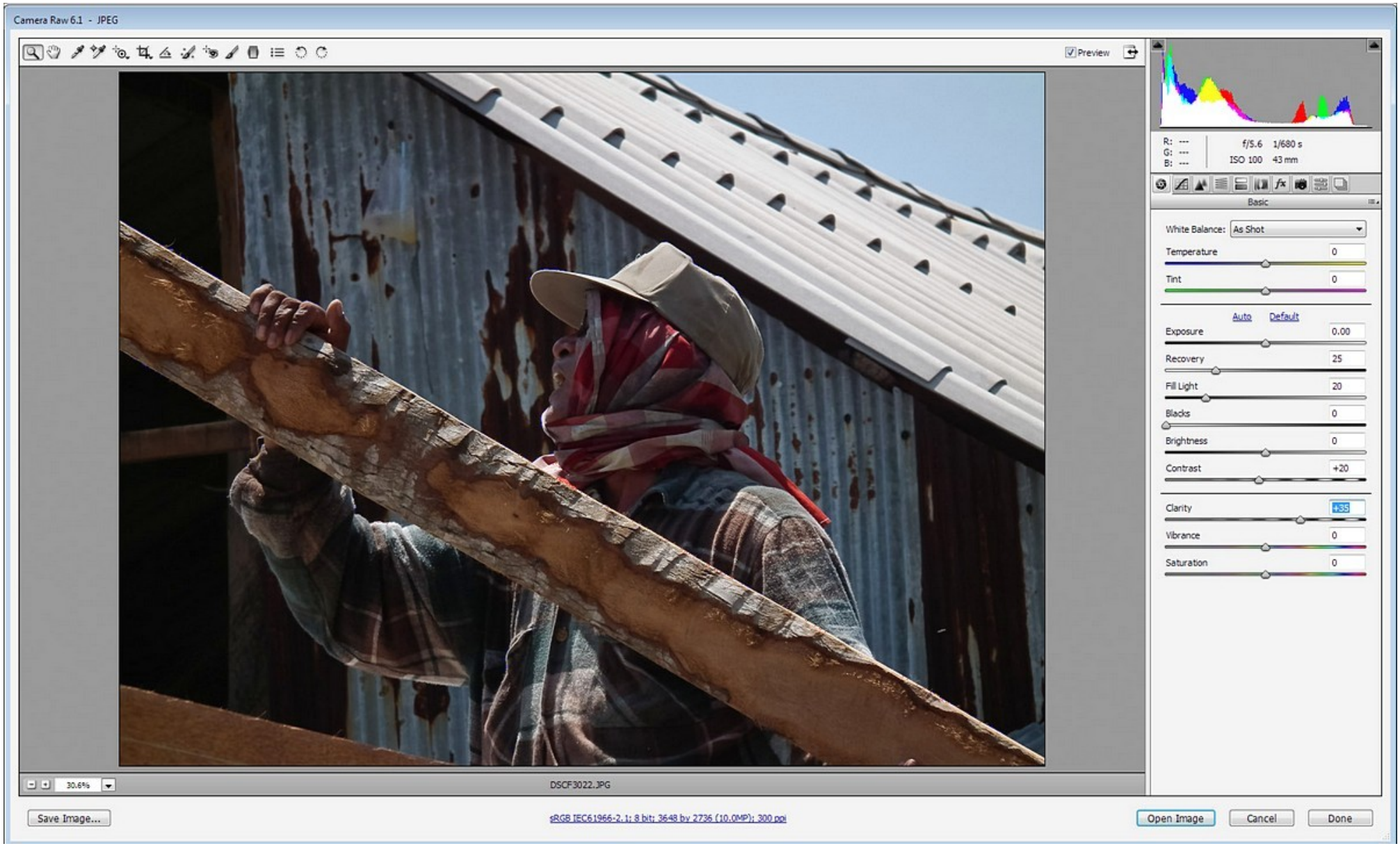

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/8 1/1400 s
ISO 200 9.7 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF2592.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

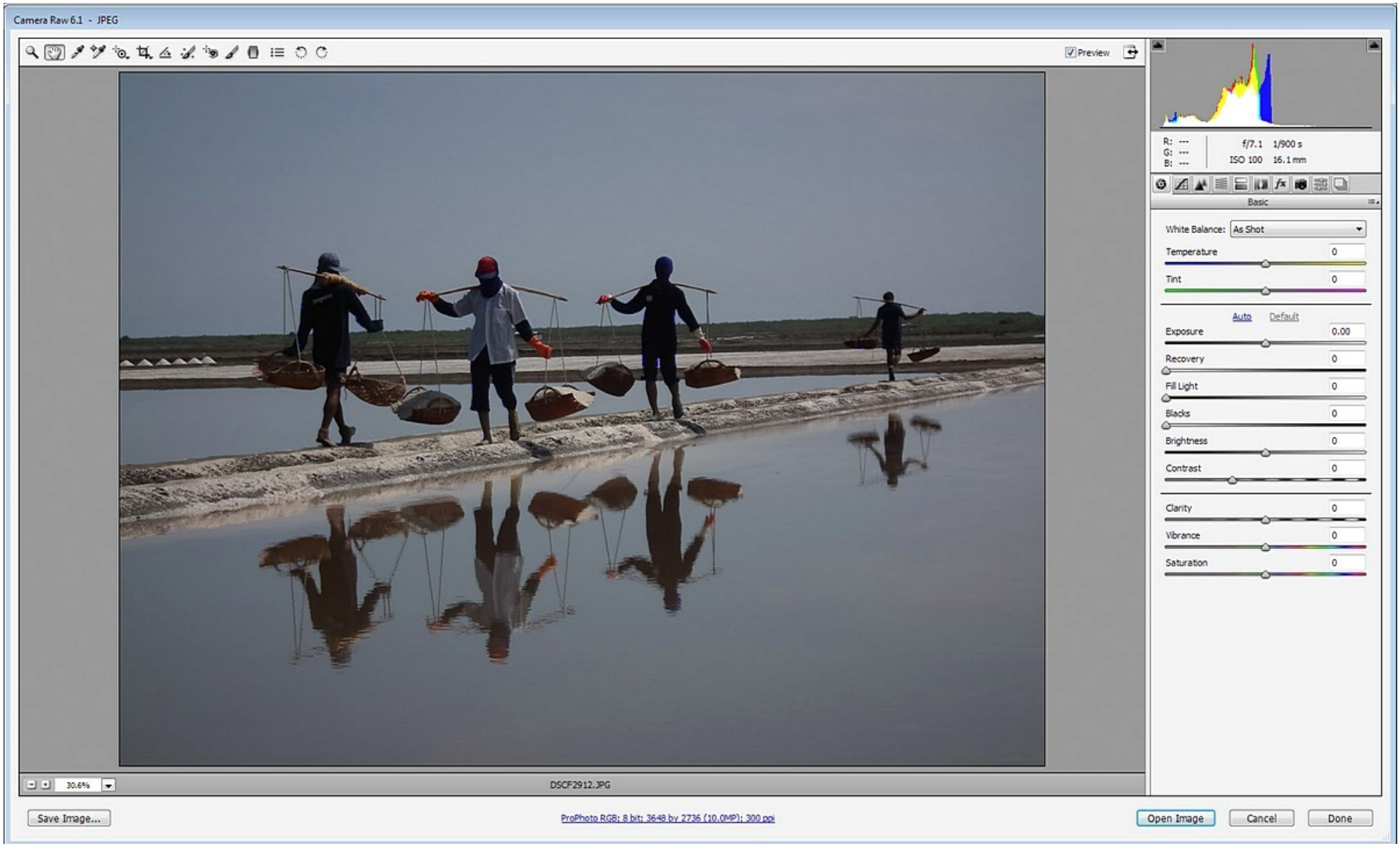

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/8 1/1400 s
ISO 200 9.7 mm
Basic
White Balance: Custom
Temperature +2
Tint 0
Auto Default
Exposure 0.00
Recovery 25
Fill Light 45
Blacks 0
Brightness 0
Contrast +30
Clarity +15
Vibrance 0
Saturation 0
30.6%
DSCF2592.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

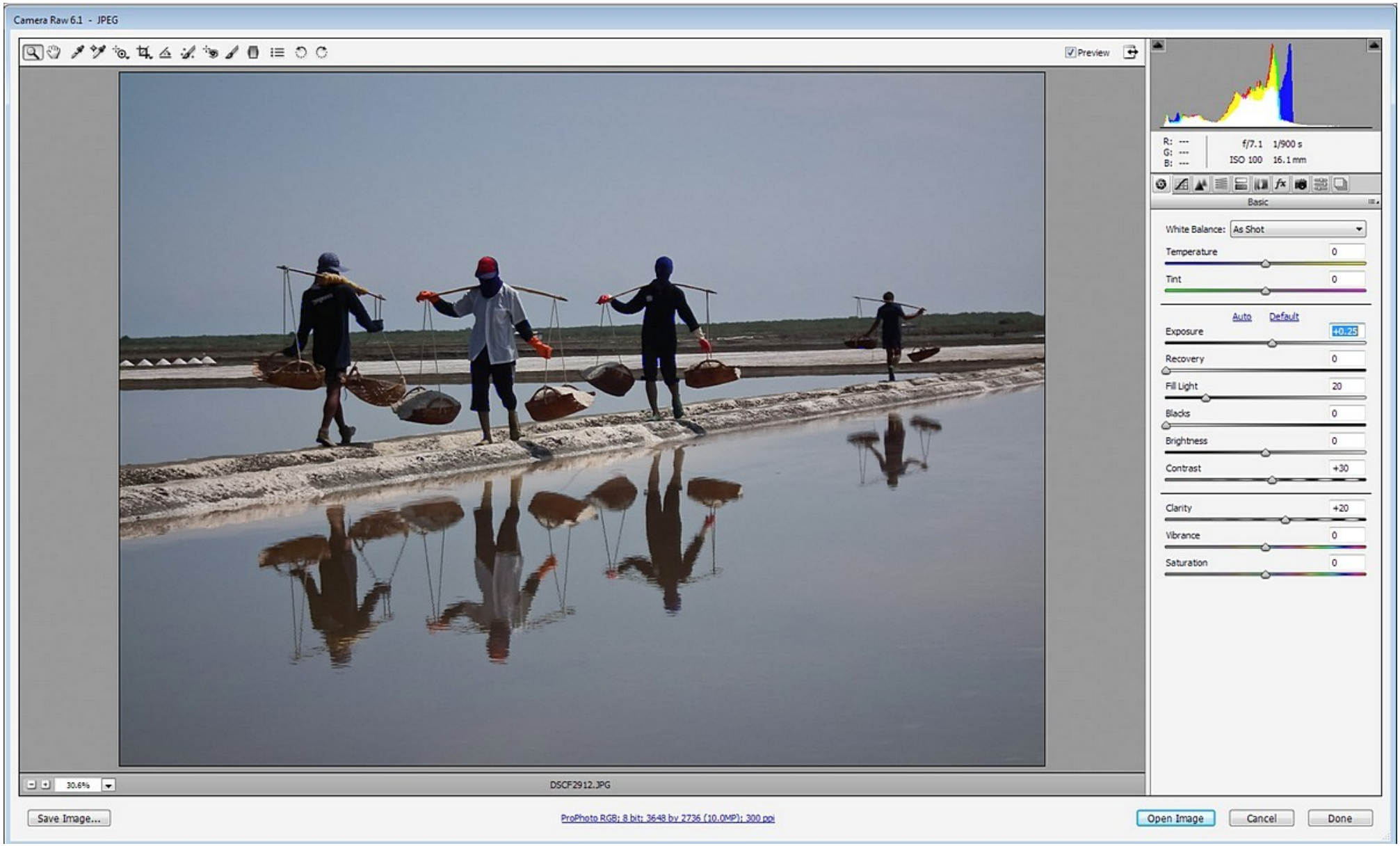

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/6.4 1/850 s
ISO 100 87 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF2867.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

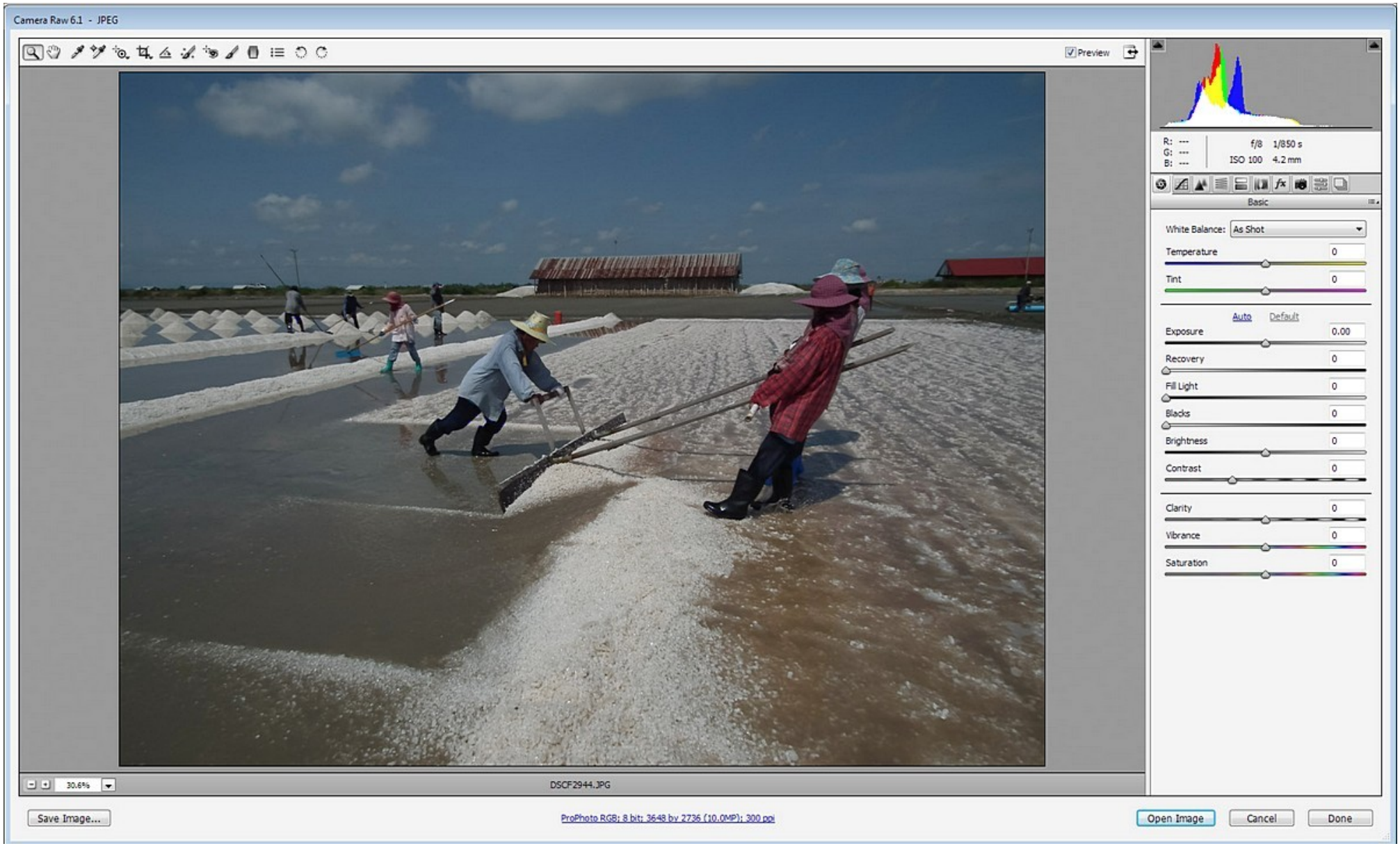

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/6.4 1/850 s
ISO 100 87 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 25
Fill Light 10
Blacks 0
Brightness 0
Contrast +25
Clarity +25
Vibrance 0
Saturation 0
30.6%
DSCF2867.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

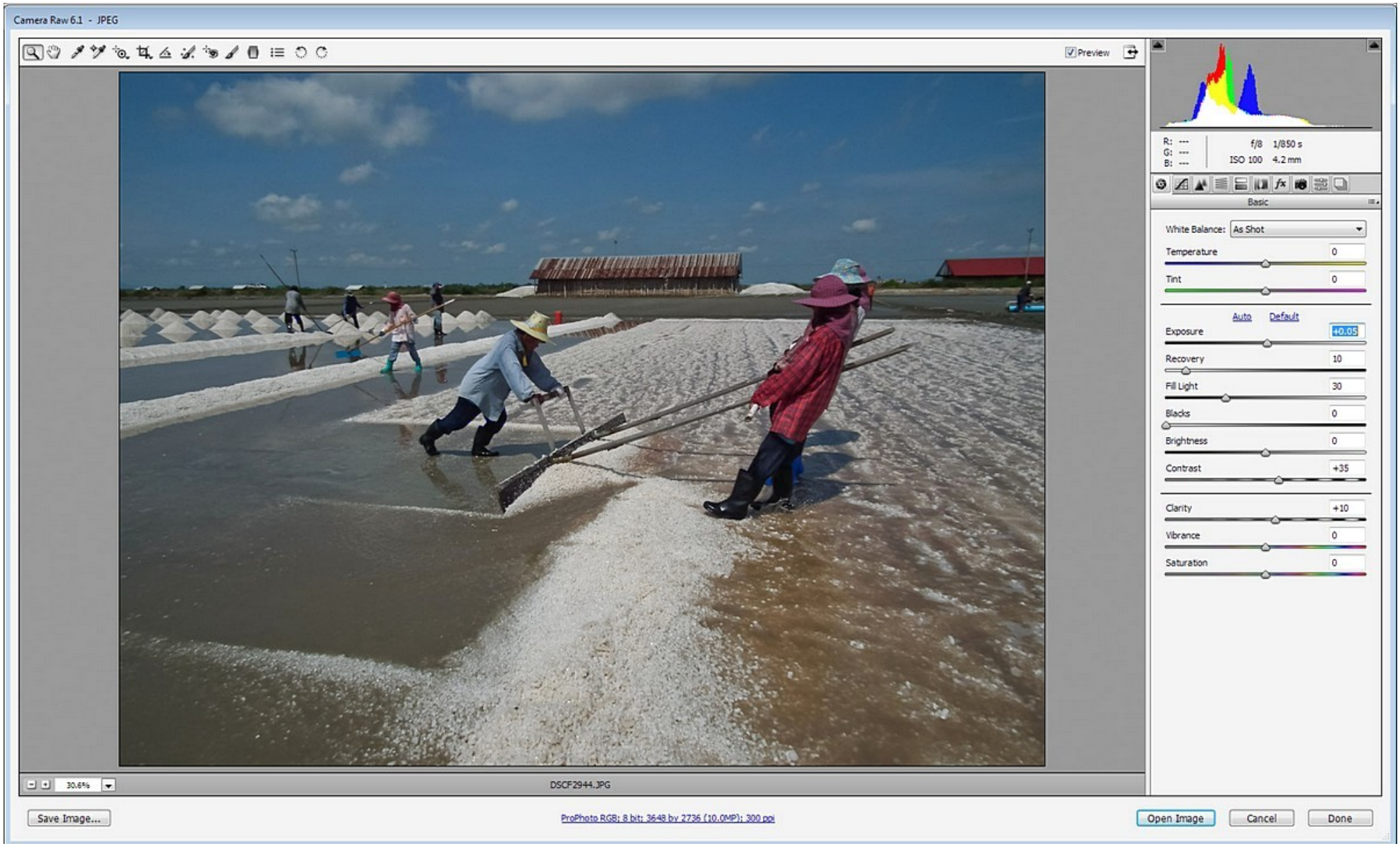

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/5.6 1/680 s
ISO 100 43 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF3022.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

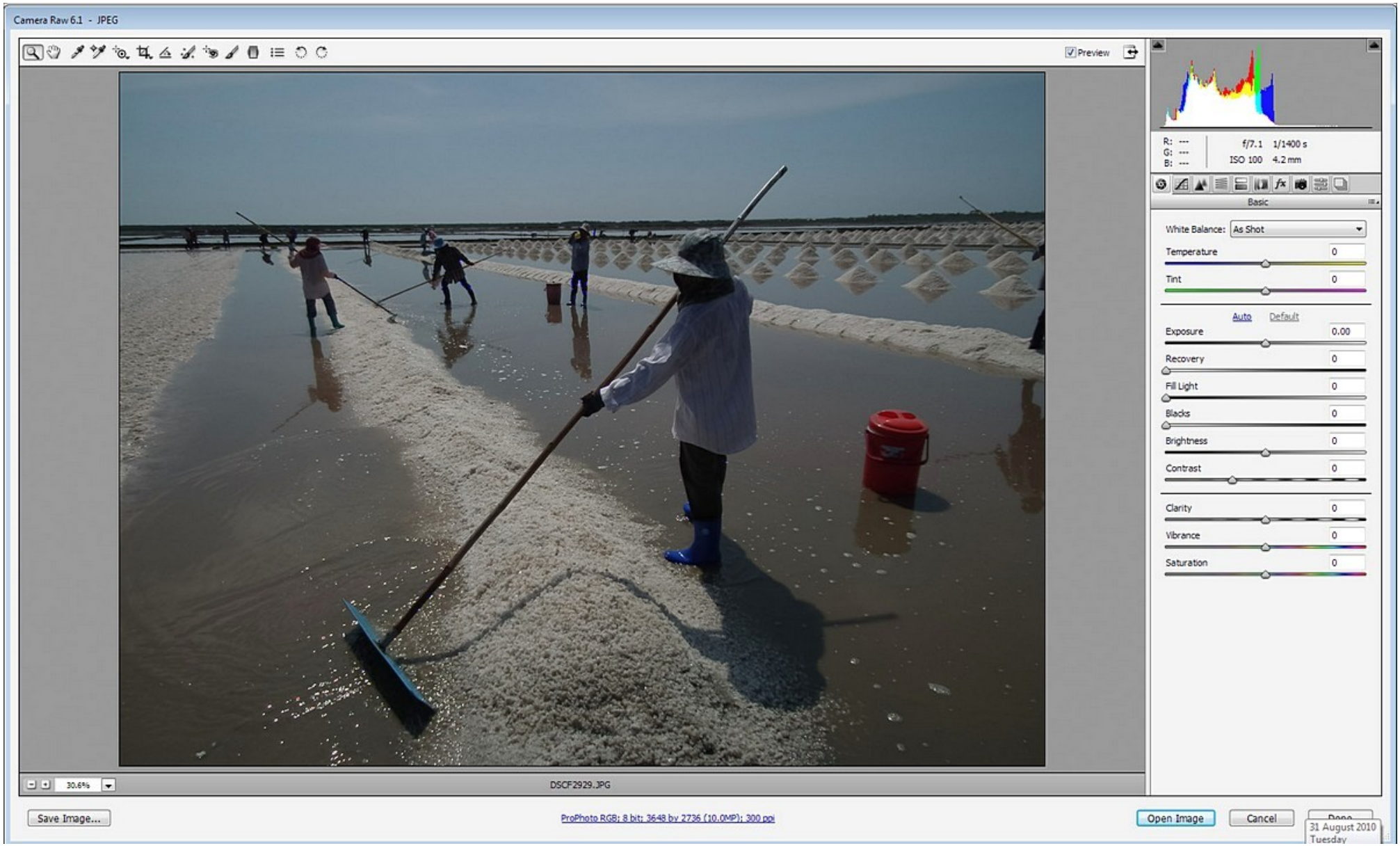

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/5.6 1/680 s
ISO 100 43 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 25
Fill Light 20
Blacks 0
Brightness 0
Contrast +20
Clarity +35
Vibrance 0
Saturation 0
30.6%
DSCF3022.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

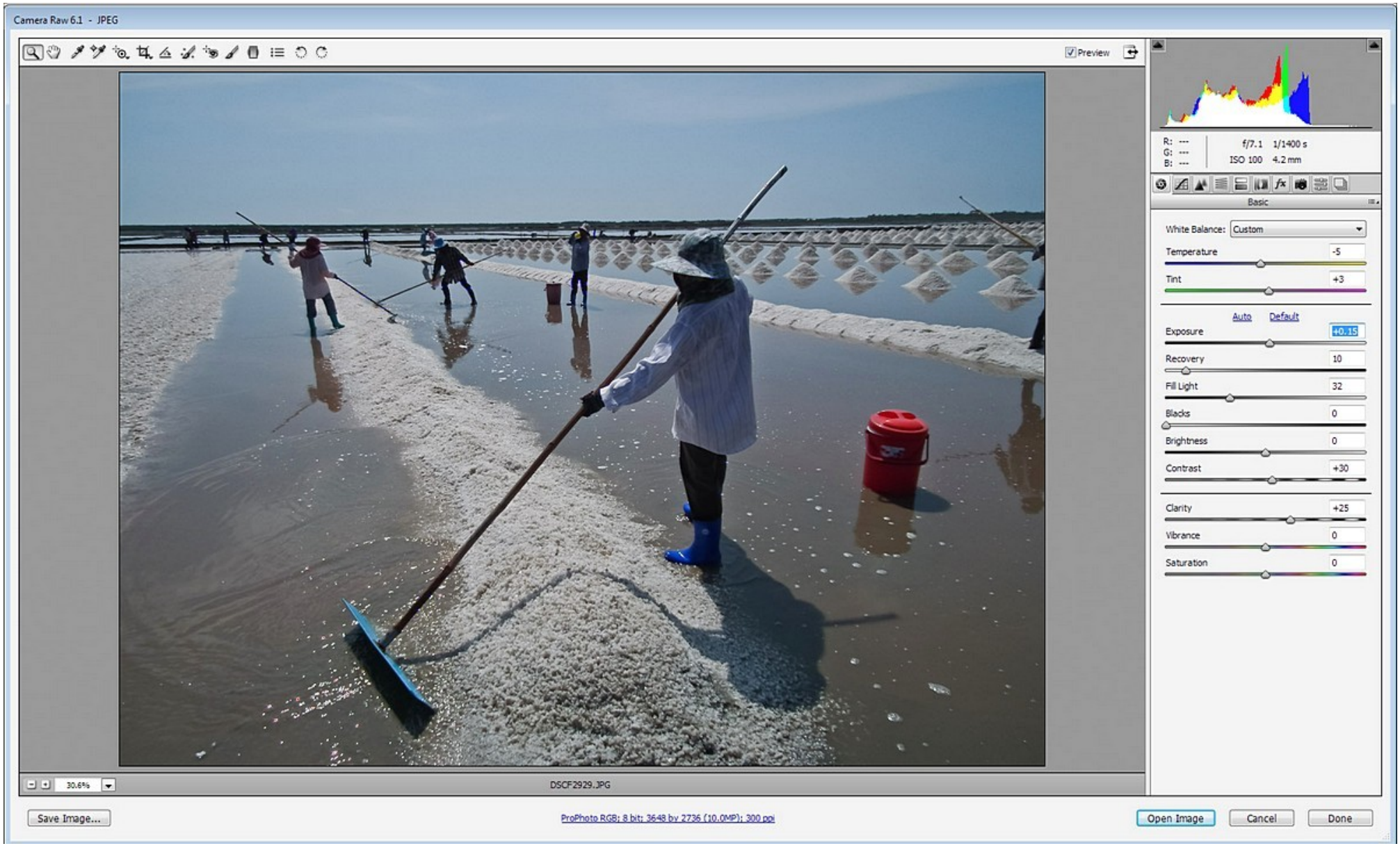

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/7.1 1/900 s
ISO 100 16.1 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF2912.JPG
Save Image...
ProPhoto RGB; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/7.1 1/900 s
ISO 100 16.1 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure +0.25
Recovery 0
Fill Light 20
Blacks 0
Brightness 0
Contrast +30
Clarity +20
Vibrance 0
Saturation 0
30.6%
DSCF2912.JPG
Save Image...
ProPhoto RGB; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/8 1/850 s
ISO 100 4.2 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF2944.JPG
Save Image...
ProPhoto RGB; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/8 1/850 s
ISO 100 4.2 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure +0.05
Recovery 10
Fill Light 30
Blacks 0
Brightness 0
Contrast +35
Clarity +10
Vibrance 0
Saturation 0
30.6%
DSCF2944.JPG
Save Image...
ProPhoto RGB; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/7.1 1/1400 s
ISO 100 4.2 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF2929.JPG
Save Image...
ProPhoto RGB; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
31 August 2010
Tuesday

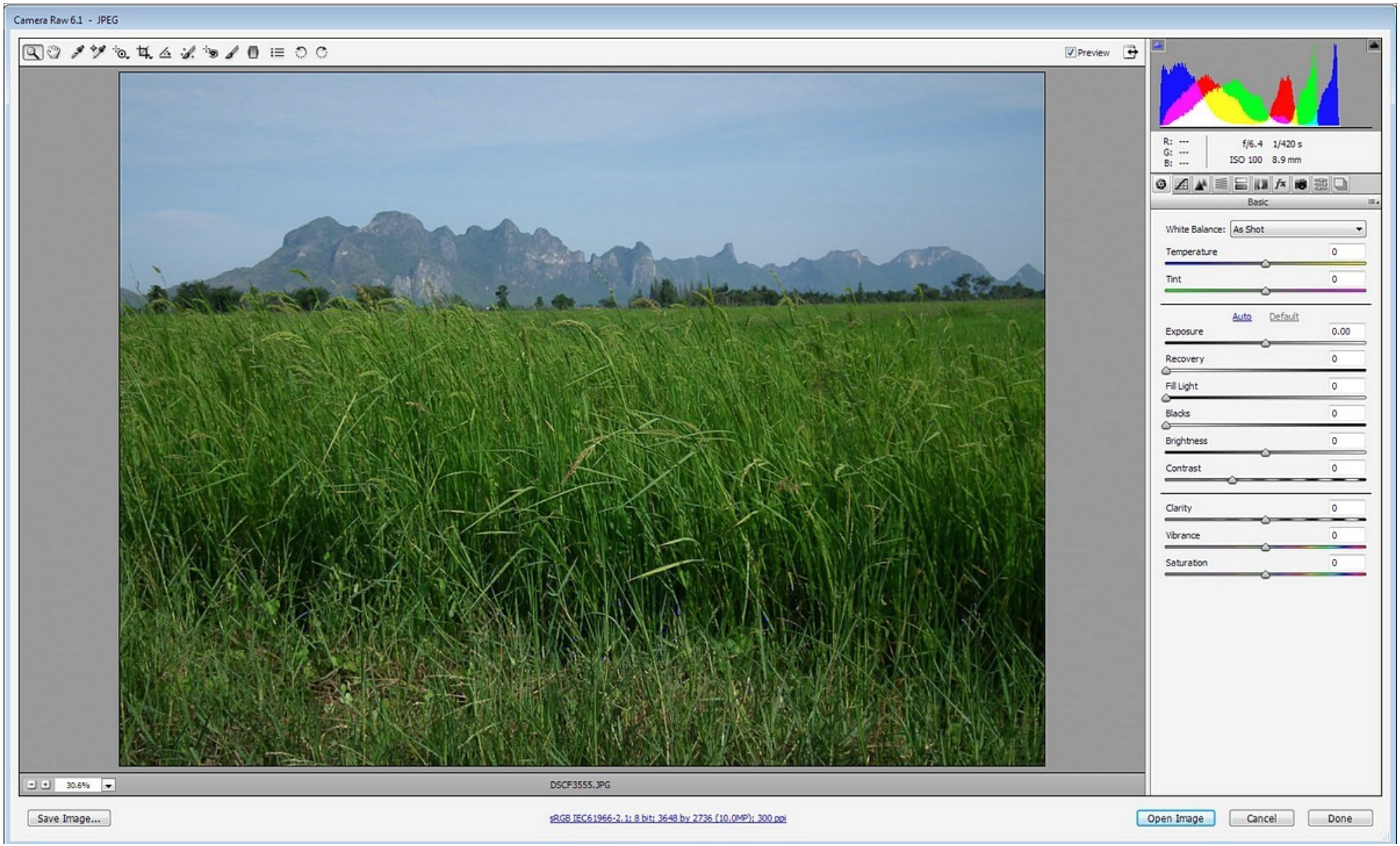

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/7.1 1/1400 s
ISO 100 4.2 mm
Basic
White Balance: Custom
Temperature -5
Tint +3
Auto Default
Exposure +0.15
Recovery 10
Fill Light 32
Blacks 0
Brightness 0
Contrast +30
Clarity +25
Vibrance 0
Saturation 0
30.6%
DSCF2929.JPG
Save Image...
ProPhoto RGB; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

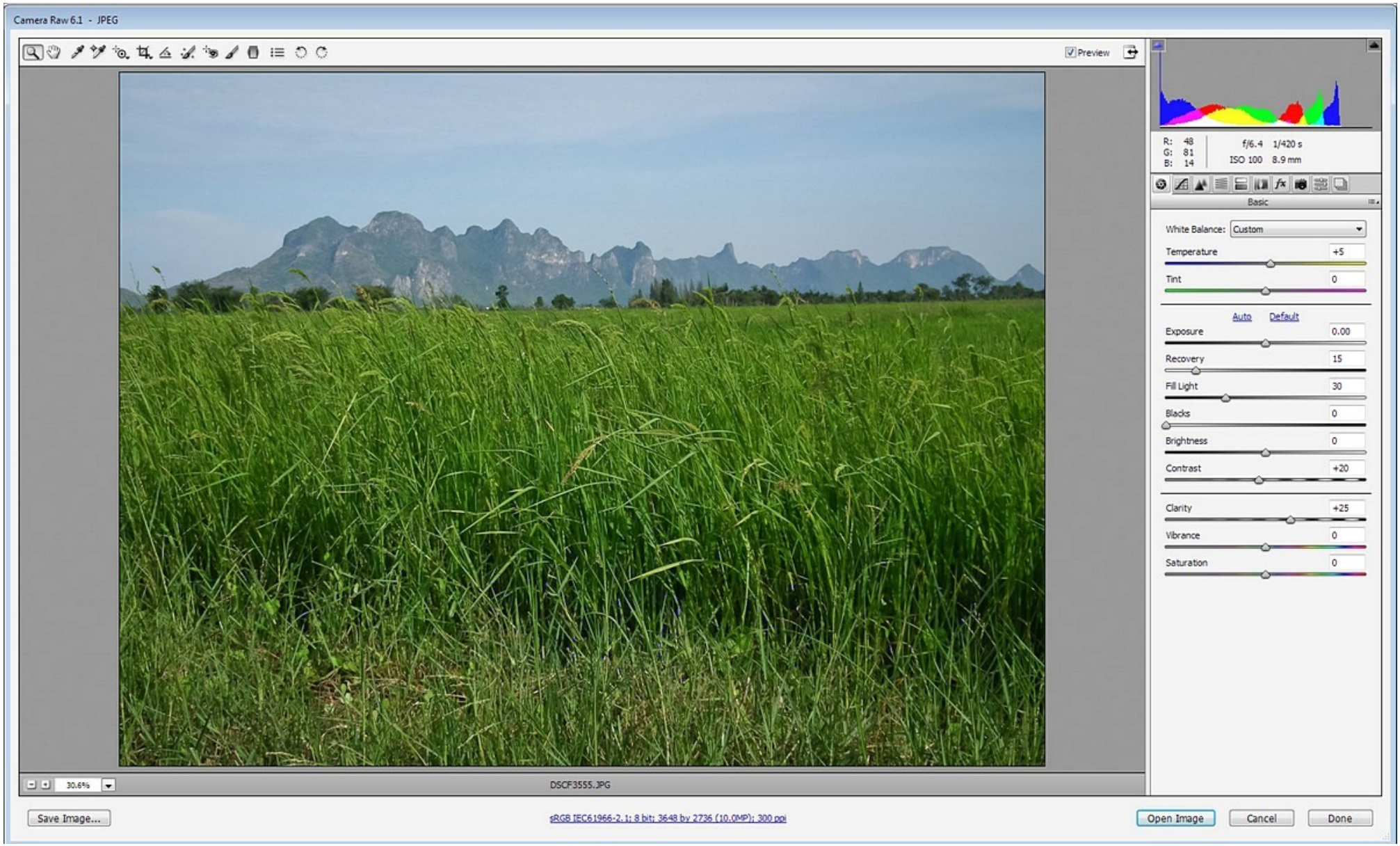
What about if we use the same approach, but limit our EV to - 0.33 ?

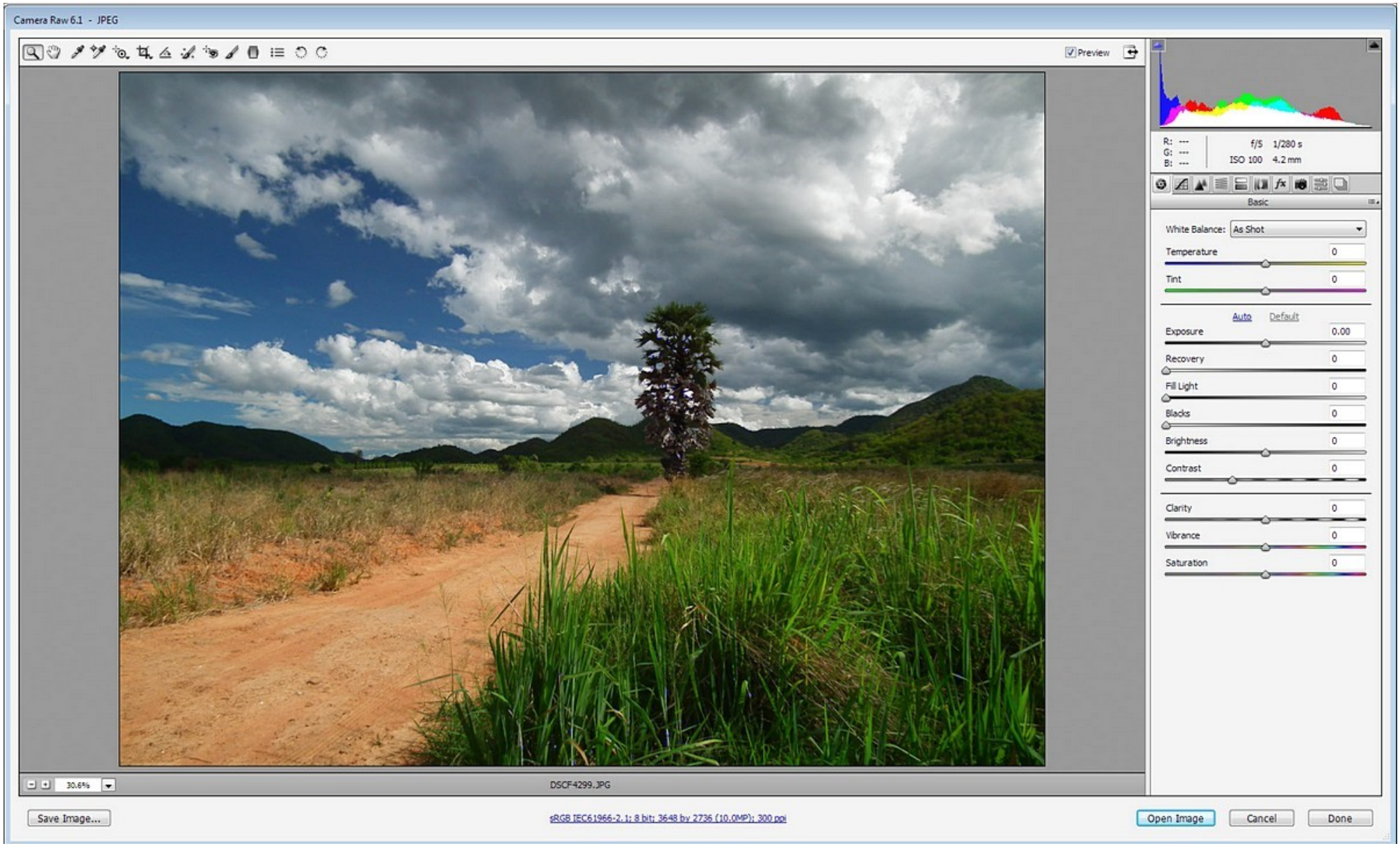
The next three examples show this.

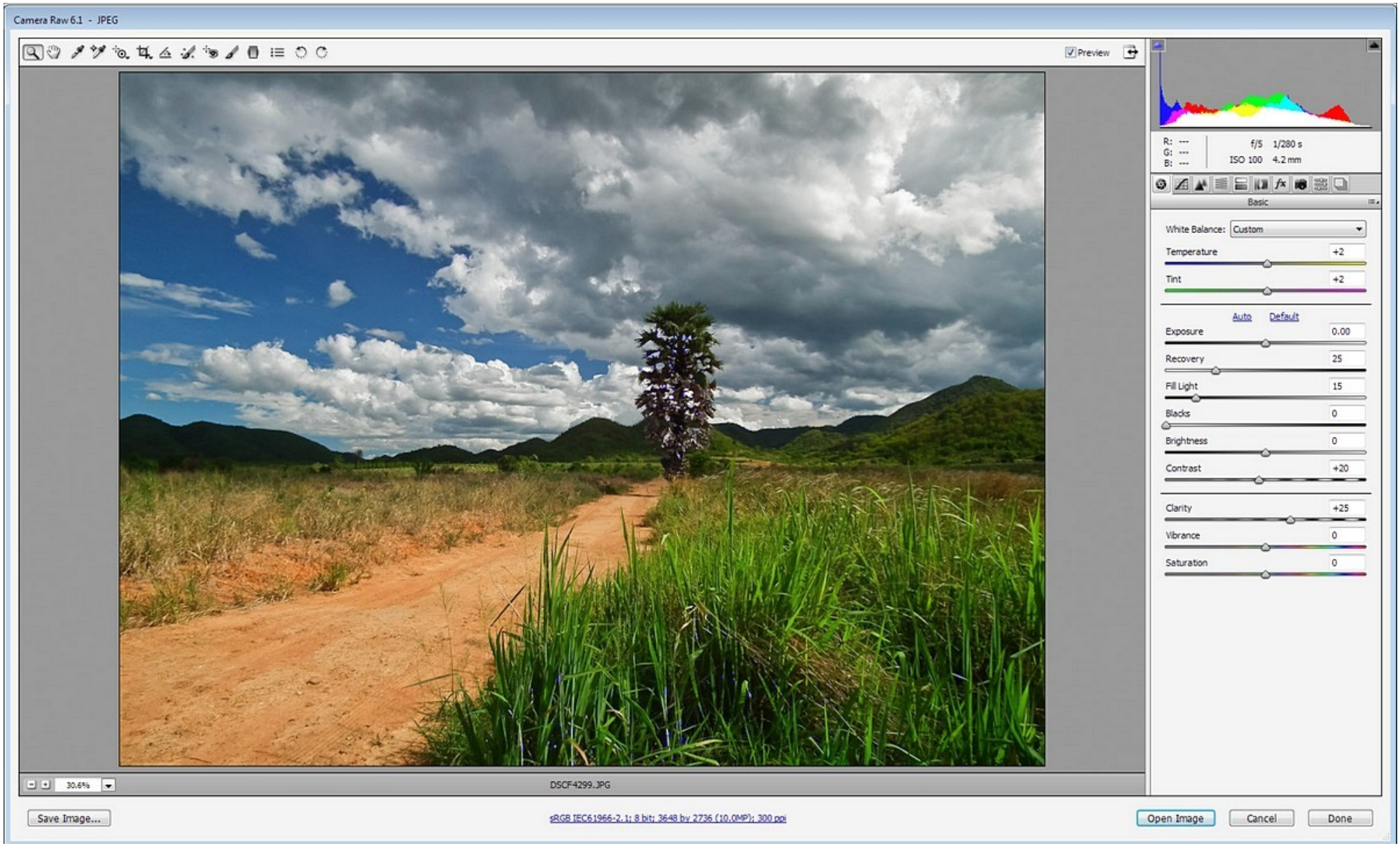
ISO 100, DR 100%, - 0.33 EV.

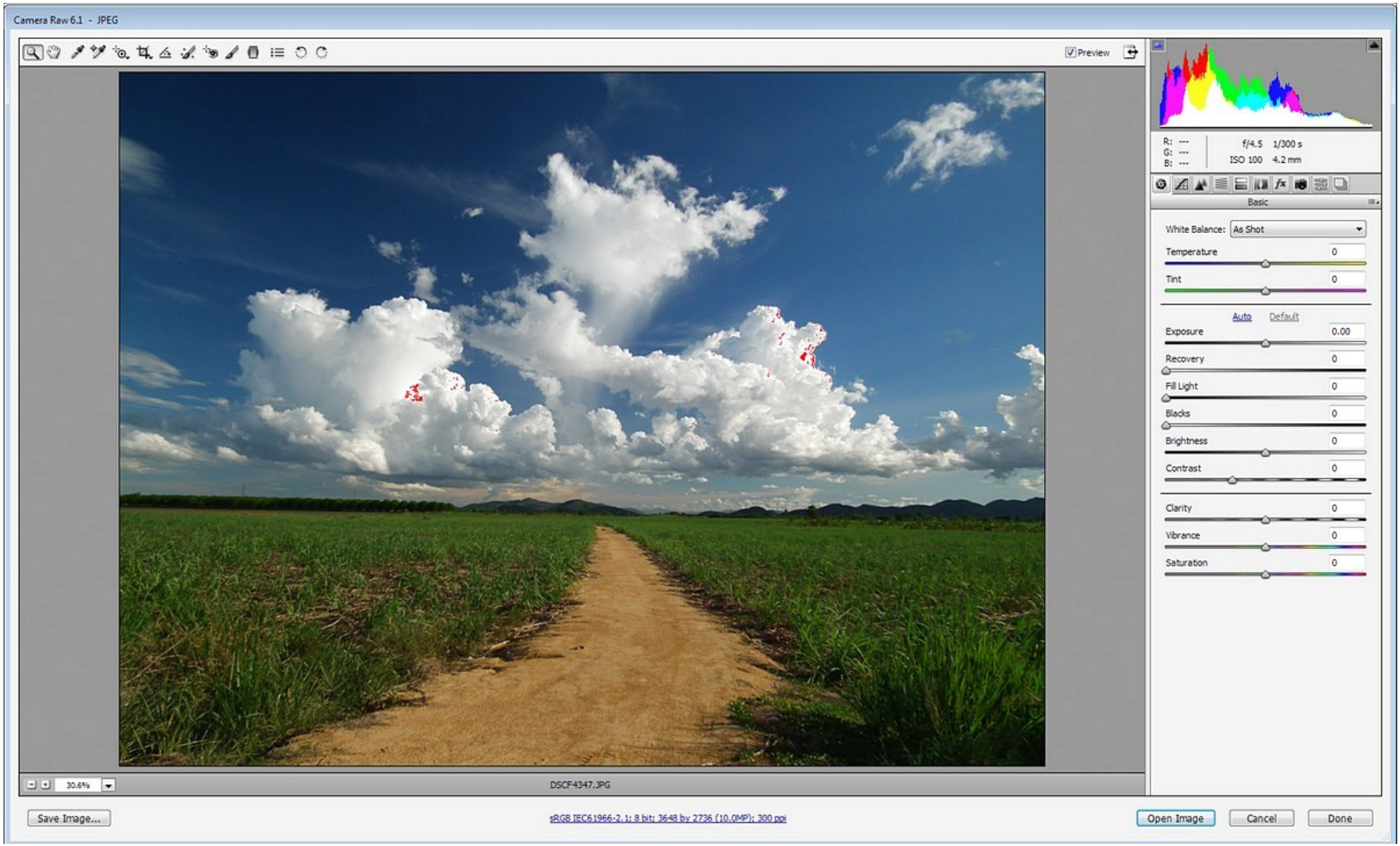
As can be seen from the examples, the HS-10 sensor, even without DR compensation, is still capable of capturing a very broad range of DR.

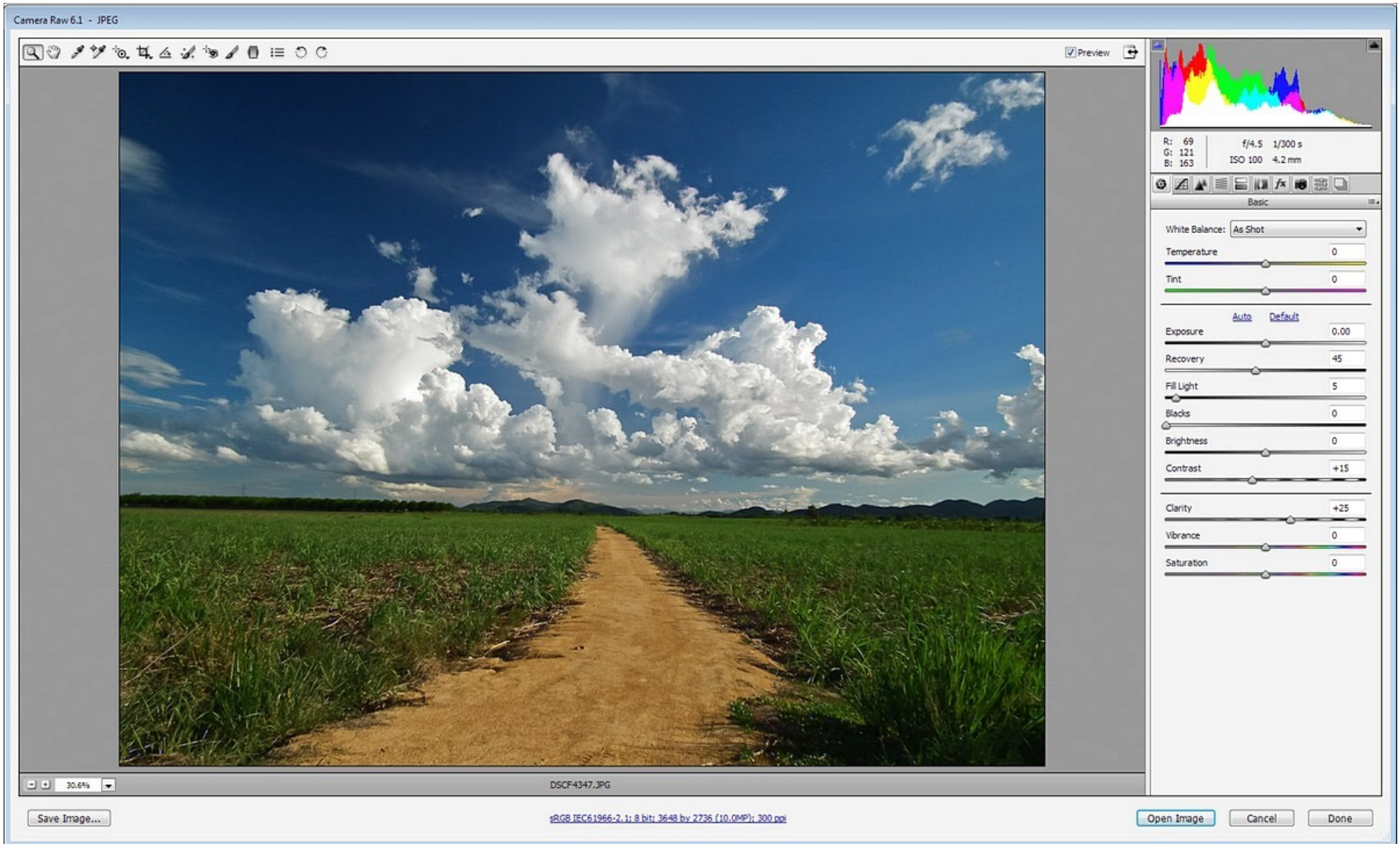

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/6.4 1/420 s
ISO 100 8.9 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF3555.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: 48
G: 81
B: 14
f/6.4 1/420 s
ISO 100 8.9 mm
Basic
White Balance: Custom
Temperature +5
Tint 0
Auto Default
Exposure 0.00
Recovery 15
Fill Light 30
Blacks 0
Brightness 0
Contrast +20
Clarity +25
Vibrance 0
Saturation 0
30.6%
DSCF3555.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/5 1/280 s
ISO 100 4.2 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF4299.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/5 1/280 s
ISO 100 4.2 mm
Basic
White Balance: Custom
Temperature +2
Tint +2
Auto Default
Exposure 0.00
Recovery 25
Fill Light 15
Blacks 0
Brightness 0
Contrast +20
Clarity +25
Vibrance 0
Saturation 0
30.6%
DSCF4299.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

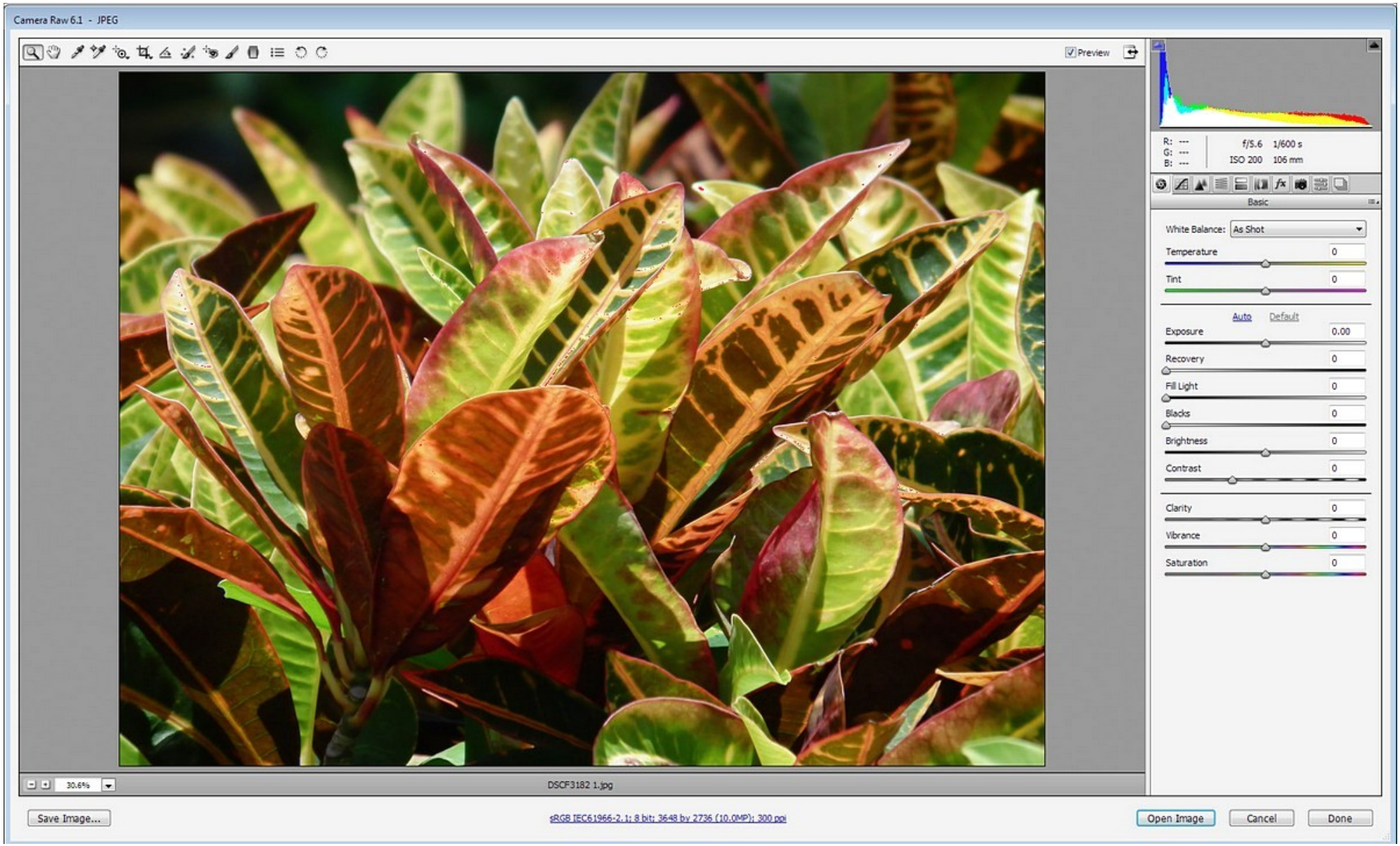

Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/4.5 1/300 s
ISO 100 4.2 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF4347.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

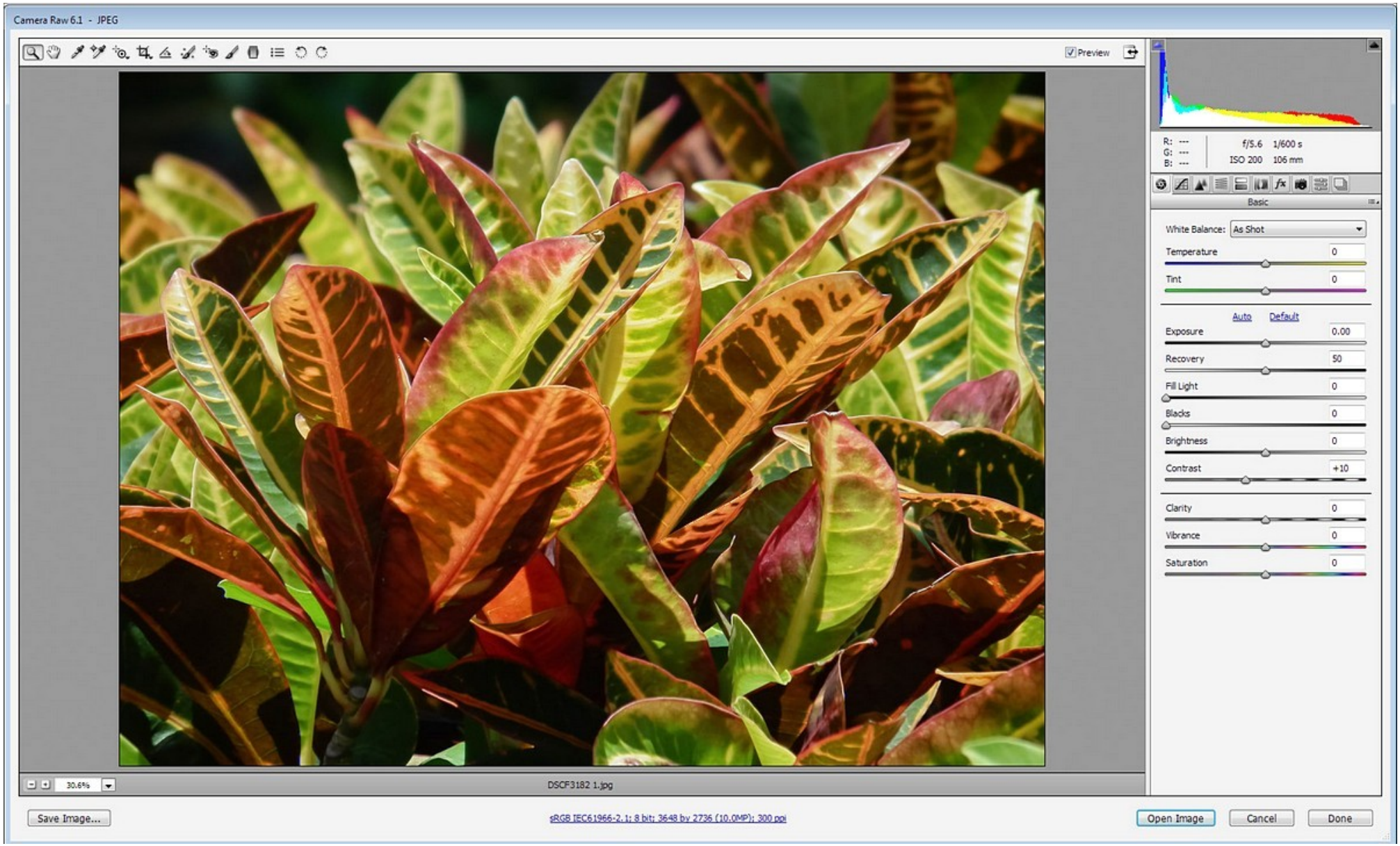

Camera Raw 6.1 - JPEG
Preview
R: 69
G: 121
B: 163
f/4.5 1/300 s
ISO 100 4.2 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 45
Fill Light 5
Blacks 0
Brightness 0
Contrast +15
Clarity +25
Vibrance 0
Saturation 0
30.6%
DSCF4347.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

Next, if we now apply DR 200% and 0 EV.

The next image illustrates this.

ISO 200, DR 200% and 0 EV.


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/5.6 1/600 s
ISO 200 106 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF3182 1.jpg
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/5.6 1/600 s
ISO 200 106 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 50
Fill Light 0
Blacks 0
Brightness 0
Contrast +10
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF3182 1.jpg
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done

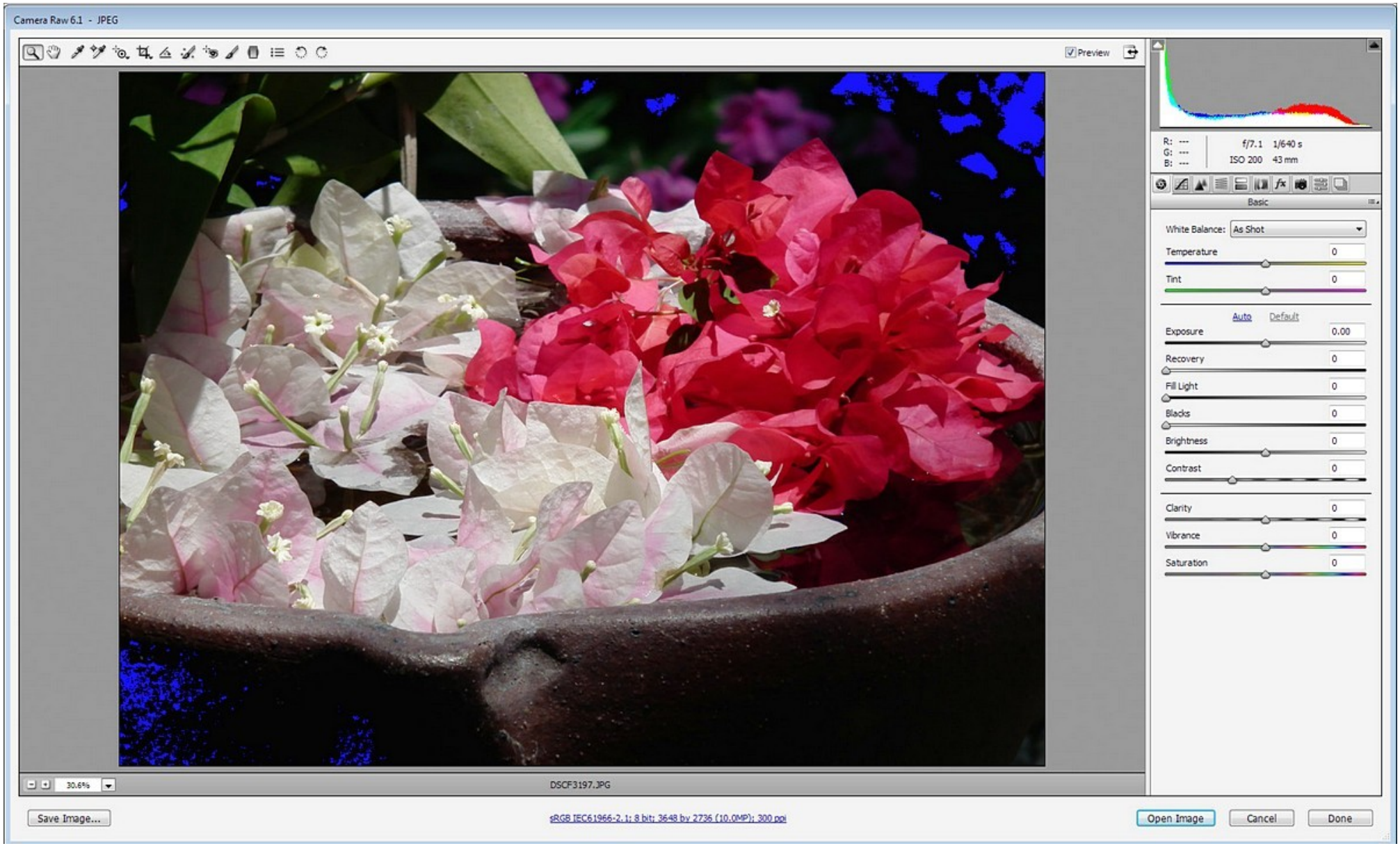
Here are two more shot in the same way, but without the preceding ACR screens. Simply the end resultant edits.

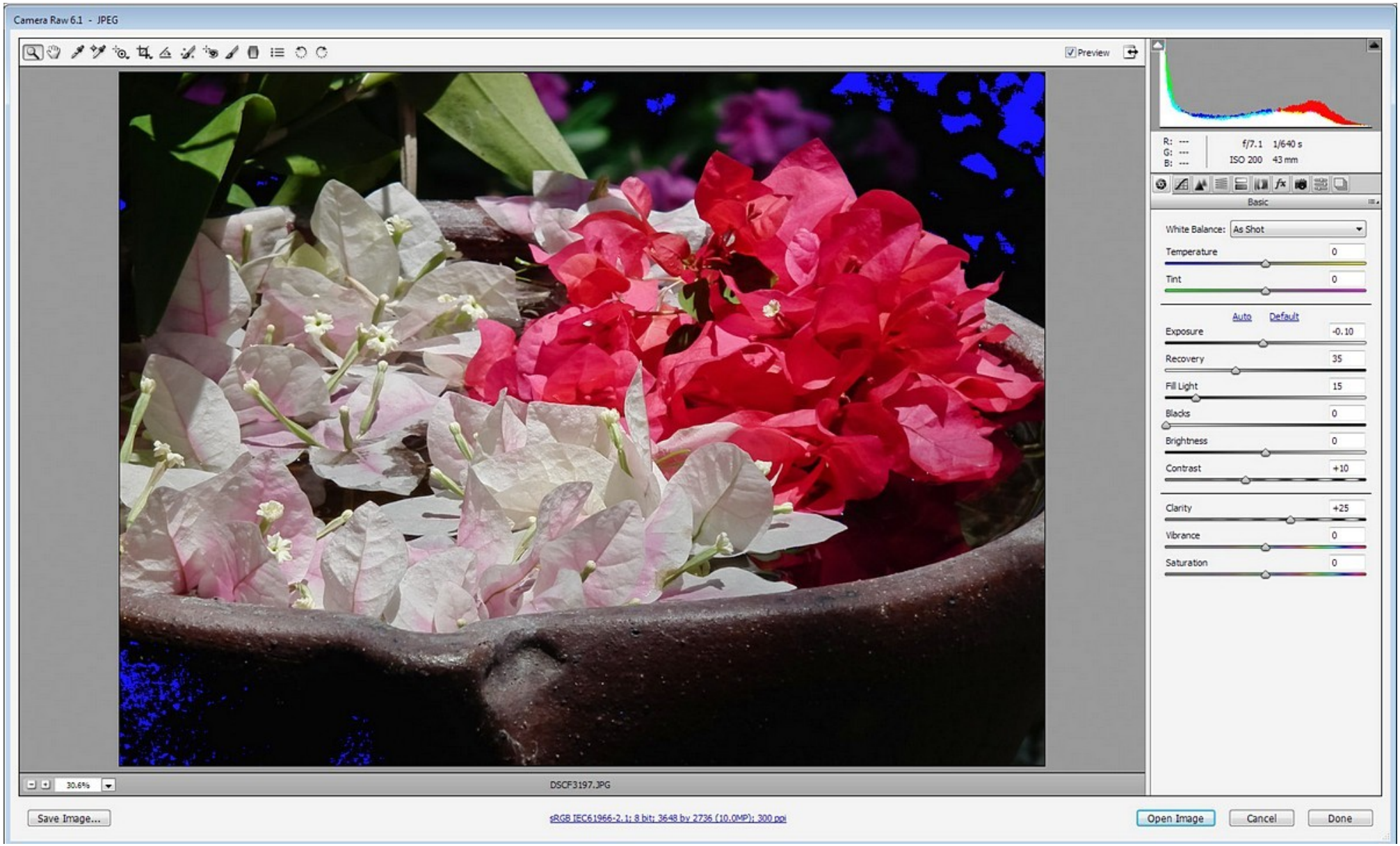
ISO 200, DR 200%, 0 EV.

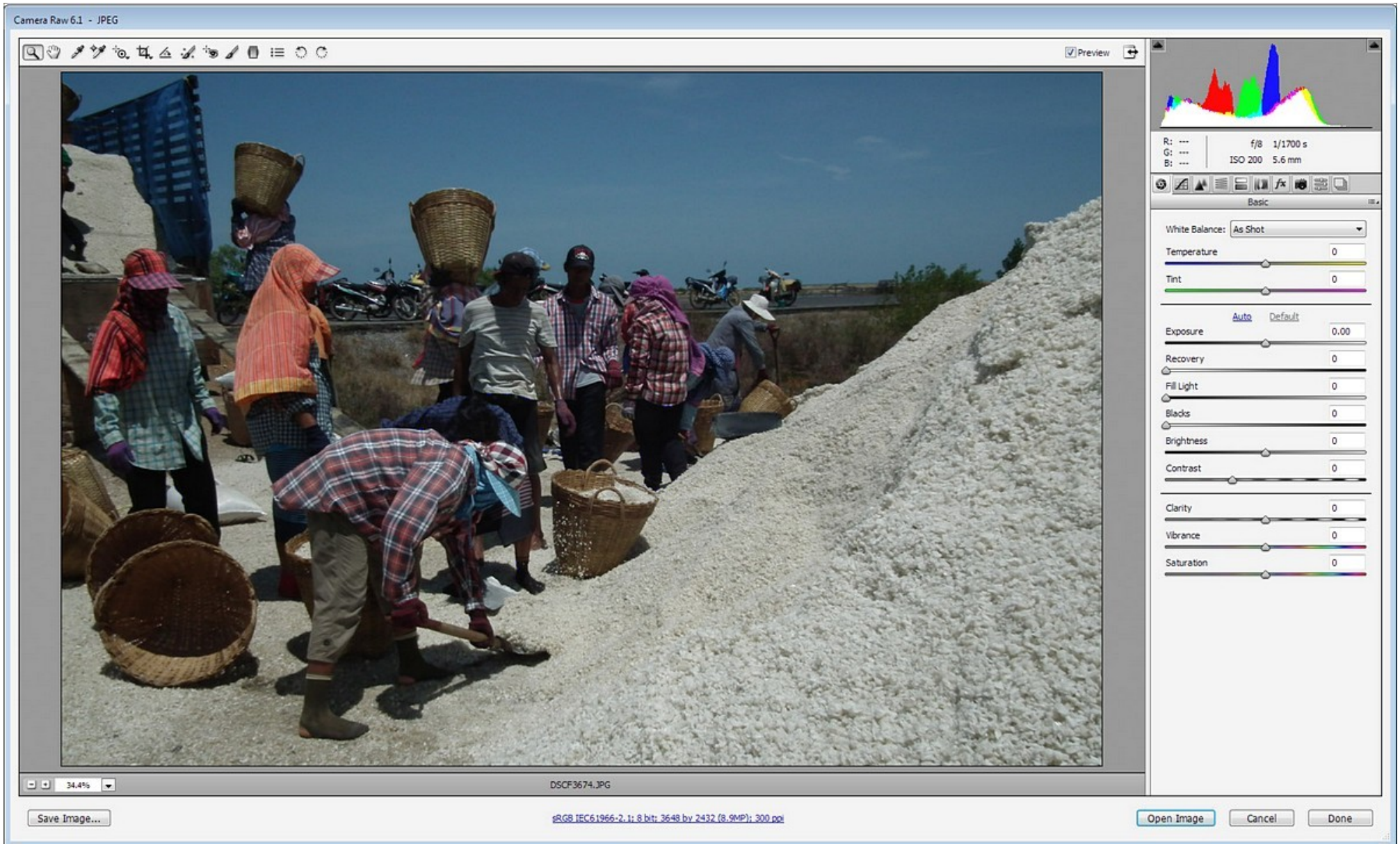

GSX
DOHC
4
VALVE

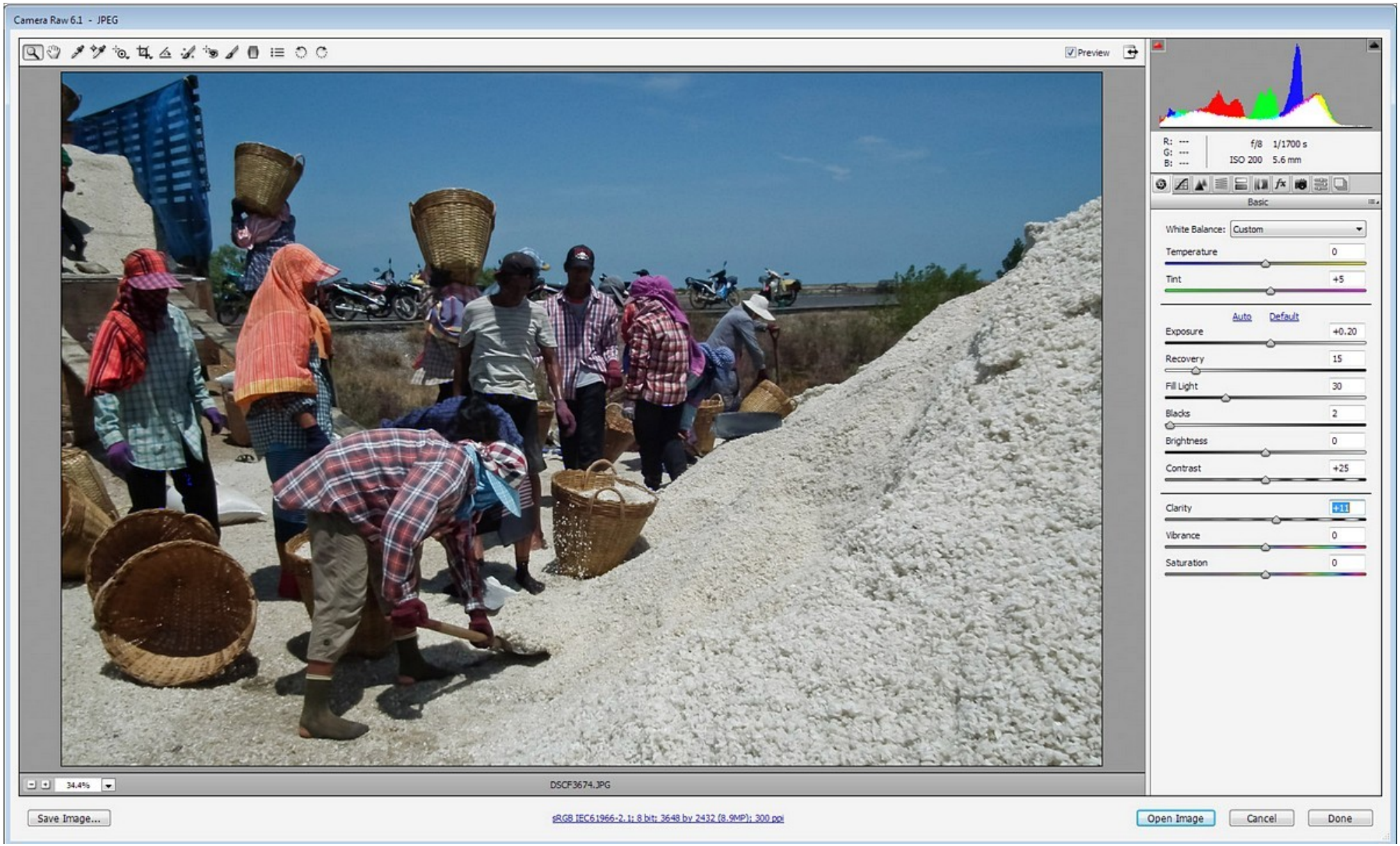
If we then go the next step and also apply - 0.33 EV, we get results as illustrated in the next two images.

ISO 200, DR 200% and - 0.33 EV.


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/7.1 1/640 s
ISO 200 43 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
30.6%
DSCF3197.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/7.1 1/640 s
ISO 200 43 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure -0.10
Recovery 35
Fill Light 15
Blacks 0
Brightness 0
Contrast +10
Clarity +25
Vibrance 0
Saturation 0
30.6%
DSCF3197.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2736 (10.0MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/8 1/1700 s
ISO 200 5.6 mm
Basic
White Balance: As Shot
Temperature 0
Tint 0
Auto Default
Exposure 0.00
Recovery 0
Fill Light 0
Blacks 0
Brightness 0
Contrast 0
Clarity 0
Vibrance 0
Saturation 0
34.4%
DSCF3674.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done


Camera Raw 6.1 - JPEG
Preview
R: ---
G: ---
B: ---
f/8 1/1700 s
ISO 200 5.6 mm
Basic
White Balance: Custom
Temperature 0
Tint +5
Auto Default
Exposure +0.20
Recovery 15
Fill Light 30
Blacks 2
Brightness 0
Contrast +25
Clarity +11
Vibrance 0
Saturation 0
34.4%
DSCF3674.JPG
Save Image...
sRGB IEC61966-2.1; 8 bit; 3648 by 2432 (8.9MP); 300 ppi
Open Image
Cancel
Done

That's all.

Hopefully you have found something helpful here.

Overall, my opinion is that the DR of the HS-10 is quite adequate. It may be slightly behind the S100 fs, but it is still easily managed.

As I mentioned at the start, I normally shoot the HS-10 at DR 200% and - 0.33 EV. In fact, I shoot all my Fuji's in the same way.

I find this will keep highlights under control and give an image which is pleasing, straight from the camera, or one which can have further edit work performed.

Cheers.