

Exercises



The following exercises belong to the EarthWatchers application, part of the DeforestACTION project. These exercises can also be found online at the EarthWatchers Wiki, at shout.tiged.org/dfahq/writing. A short introduction of using the application, can be found at the Getting Started wiki-page: shout.tiged.org/dfahq/writing/?id=34585.

2.0 Introduction to detecting deforested areas

[EarthWatchers Wiki](#) > [Detecting deforested areas](#) > **Introduction to detecting deforested areas**

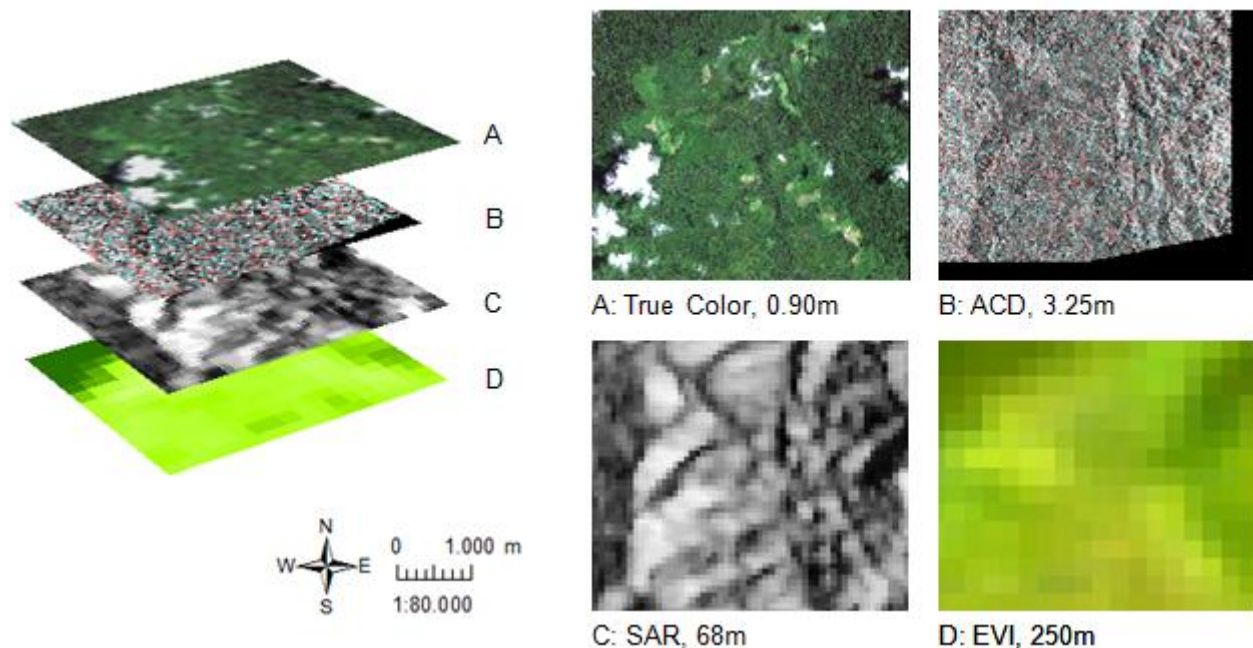


Figure 2: A stack of four image layers in an area of 4.3x3.7km, each with its own type and resolution: A = GeoEye true color, B = TSX ACD change detection, C = Envisat SAR, D = MODIS EVI vegetation index (figure created with Esri's ArcMap and ArcScene).

The area covered here is 4.3 by 3.7 km, and the same images can be seen in EarthWatchers here: <http://bit.ly/MdYRAK>. **(1) Click on the link** and notice the images on top of each other. Slide the transparency sliders of the four images a little to the left to show the underlying layers. The forest edge can be clearly seen on the GeoEye image, because of the easy recognizable true colors and the very high resolution of not even one meter per pixel. However, there are some clouds (including their shadows) disturbing the true color image. Clouds are not visible on the other three layers, since radar is able to see through clouds.

When you check off the GeoEye true color image in EarthWatchers, **(2) can you still see the forest edges on the other three images?** With careful interpretation you possibly can see it on the TSX ACD image and the MODIS EVI image, but it may be harder on the Envisat SAR image. This is probably because of the resolution of the Envisat SAR image; one pixel representing 68m is too hard for us to see a forest edge. Maybe we should just use the Envisat SAR image as an overview image, because when you zoom out, this image covers a wide area and is great for putting other images in perspective.

As you may have noticed, the MODIS EVI has an even coarser resolution of 250 meter. However, this is a vegetation index image, so it focusses on whether there is vegetation or not, and uses its representation colors accordingly. This makes it easier for us to see the distinction between forest and non-forest, although the edge is not as sharp as it is on the high resolution true color image.

If you would like to read more about resolution: [EarthWatchers Wiki](#) > [General information](#) > [Image resolution and size](#).

2.5 Using SAR images

[EarthWatchers Wiki](#) > [Detecting deforested areas](#) > **Using SAR images**

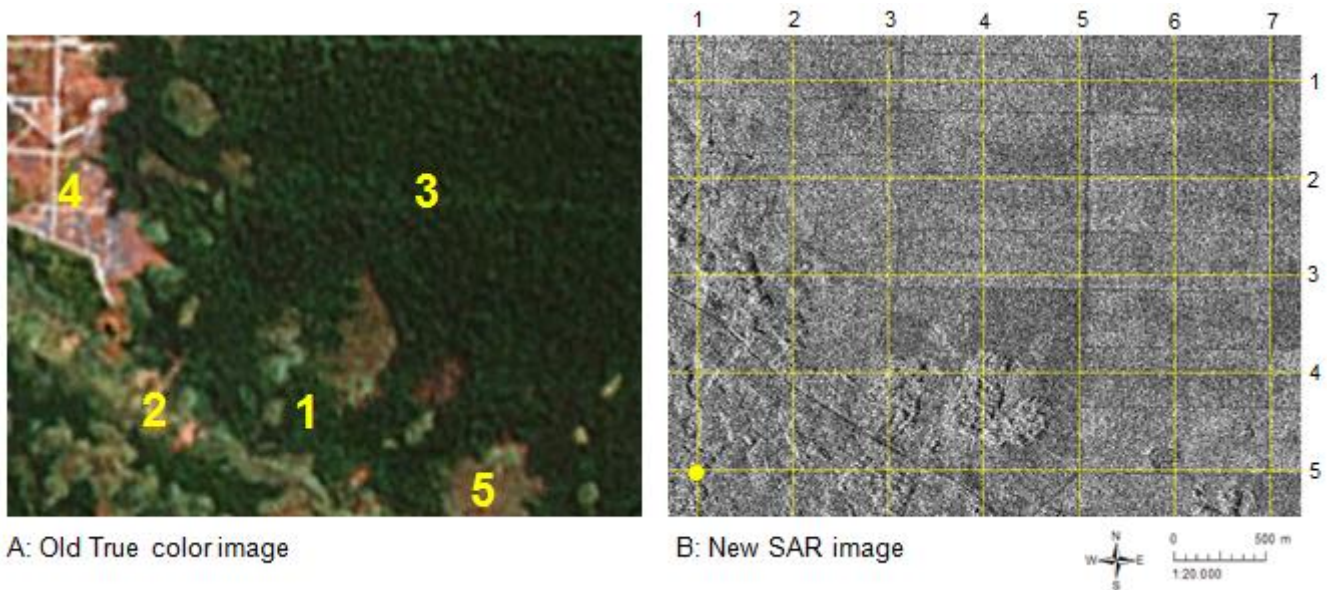


Figure 6: Comparison between two images: **(A)** GE TerraMetrics true color image from beginning of 2012, and **(B)** TSX SAR image from 27th of April 2012 (figure created with Esri's ArcMap).

The two images from figure 6 are from exactly the same area. There are several differences: the date the images were taken, the type of the images, the resolution of the images, and most importantly: the amount of forested regions. Imagine these two images A and B on top of each other. Both have similar features that may be labeled. **(Q1) Finish the following tables** that includes the land cover legend of image A and B, and choose from the following four labels: road, forested region, deforested region, palm oil plantation. Also fill in the corresponding yellow numbers that you see in image A; more than one number per label could be written down. What kind of color would you assign to the land covers if you would trace the image only with its features?

Image A	Land cover label	Number	Color
	.....	....	Pink
	Road	2	....

Image B	Land cover label

Some labels are easy to fill in, others may be more difficult, especially the deforested region in the SAR image, since between the capturing dates of the two images, change of land cover has occurred. Can you point out in image A where there was a forested region that is now deforested? **(Q2) Which yellow number would locate this deforested region?** And what would be the corresponding deforested region in image B? To answer this question, **(Q3) write down the coordinates** in format (.....). For example, the yellow dot is located at (1,5).

Q2: _____ Q3: _____

Take a look at your completed land cover table again, in the color column. In the following image C, the features that are visible in image A and B are traced, and a legend is added. **(Q4) After every legend label write down the corresponding numbers** that you see in the image. Additionally you can color the legend with the colors that you came up with in your completed land cover table.

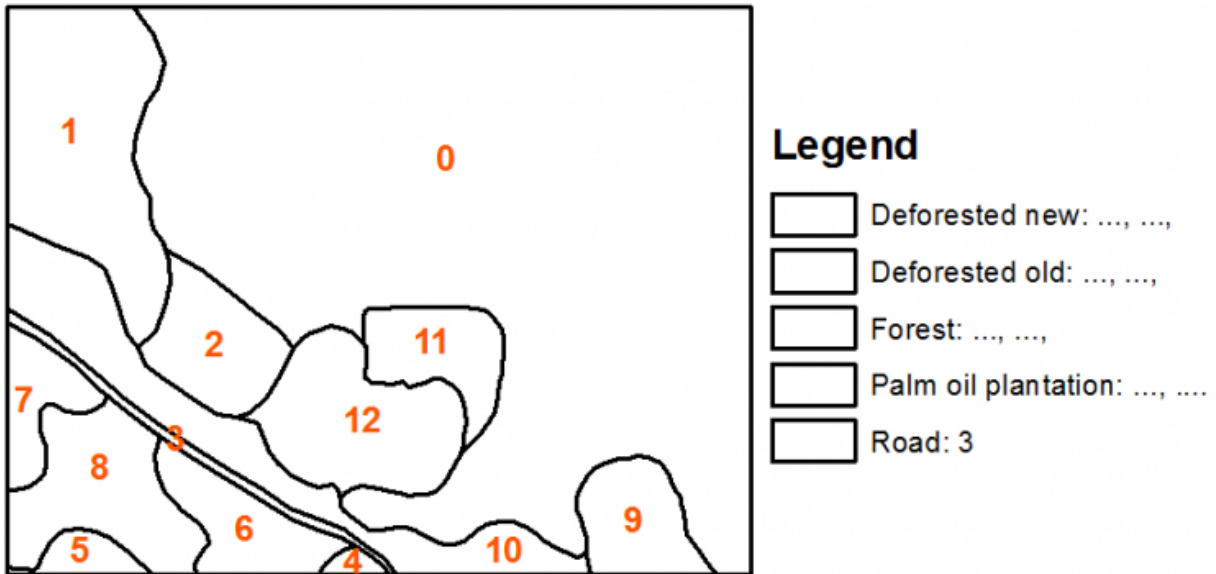


Figure 6: (C) The features that are visible in image A and C are represented as polygons (figure created with Esri's ArcMap).

For more information about the resolution of images, see [EarthWatchers Wiki > General information > Image resolution and size](#).

3. Image resolution and size

[EarthWatchers Wiki](#) > [General information](#) > **Image resolution and size**

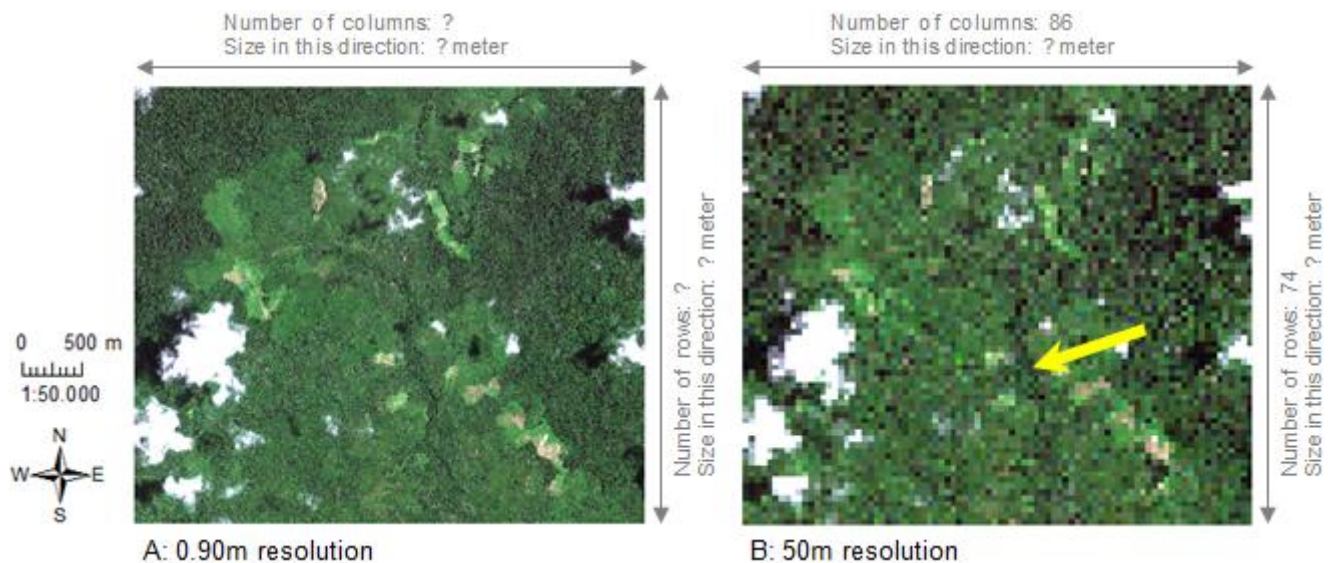


Figure 2: The resolution of (A) is almost fifty times higher than the resolution of (B). They are both GeoEye true color images (figure created with Esri's ArcMap).

In figure 2A several features can be recognized, that may be harder to see in figure 3B. Interpreting the feature that is located with the yellow arrow as a river is more difficult in the less detailed image, than it is in an image with smaller pixels and thus higher resolution.

Although image A and B of figure 2 have different resolutions, they do have the same area size. The difference between the two pictures is the number of columns and rows of pixels. **(Q1) With the information you see in figure 2, try to fill in the following table:**

	<i>pixel-size</i>	<i>columns</i>	<i>size in column direction</i>	<i>rows</i>	<i>size in row direction</i>
A	0.9 m	....	..... m	....	..... m
B	50 m	86	..... m	74	..... m

Tip: first fill in the size in column and row direction of image B. **(Q2) If you would save these two images to your computer, which one would have a bigger file size? Why?**

Q2: _____
