

WATER CYCLE MODELING

The idea of the project is to create a huge library (open source library) that provides different 3d models and hologram videos, in which teachers could explain in a more interactive way the lessons' themes. Taking into account the usefulness of the holograms in the learning development, in this document you will find the modelling process of the "Water Cycle".

This modelling was made in Autodesk 3ds Max Design (2014x64), and it is composed by six (6) parts. In this document, you will find each part constructed in the same file. As we can see in Image No. 1 the elements that composed the final 3d model are: a) Mountains b) Water c) Cloud d) Rain e) Steam f) Sunlight.

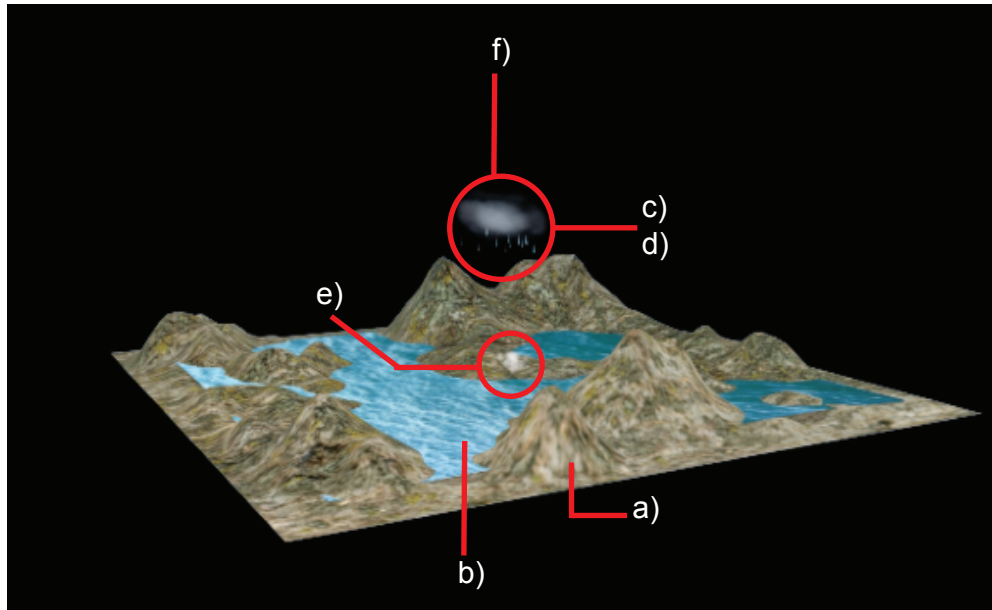


Image No. 1

Green Words: Parameters to look for and change values or edit data that are present in the interface tool bars.

Gray Words: Windows that will open to edit.

Blue Words: Buttons you might be clicking in order to give commands.

a) MOUNTAINS

In first place, you have to download from internet two images (look for a big size as 2000x1080 pixels or similar formats). The first image can be found as "Height Maps;" this texture will help us to recreate the heights of the terrain, it is like a black and white picture took from the space. For the second search you can write "Terrain texture". Save the images.

Locate the perspective viewport and create a plane (Image No. 2a). Change the parameters to **length 200 - width 200 - length segs 40 - width segs 40**. Having the plane divided in 40 segments will help to change the mesh, adding more segments could be unnecessary and will need more space in your computer.

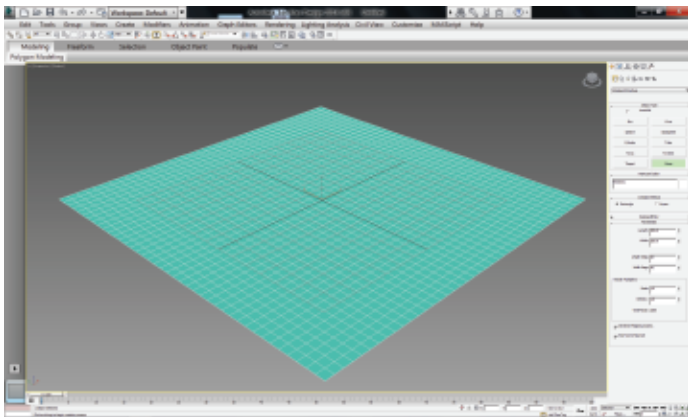


Image No. 2a

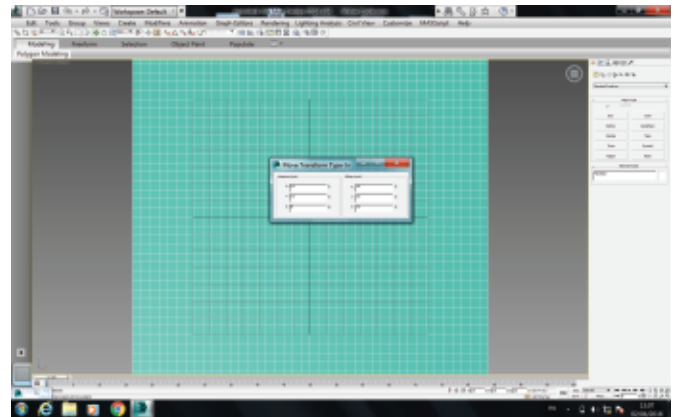



Image No. 2b

Right click on the move icon  and check that coordinates x,y,z are in 0,0 (Image No. 2b) this means the shape will be in the origin of the axis.

Go to the **Modify Window** and add a **Displace** modifier (Image No. 3). As you can see in Image No. 4, look for the **Image Parameters** and look for **Bitmap**. Click on the **None** button and then **Select Displacement Image** window will open. At this moment, you have to open the “Height Map” picture that you have saved. Adjust the length of the displace modifier.

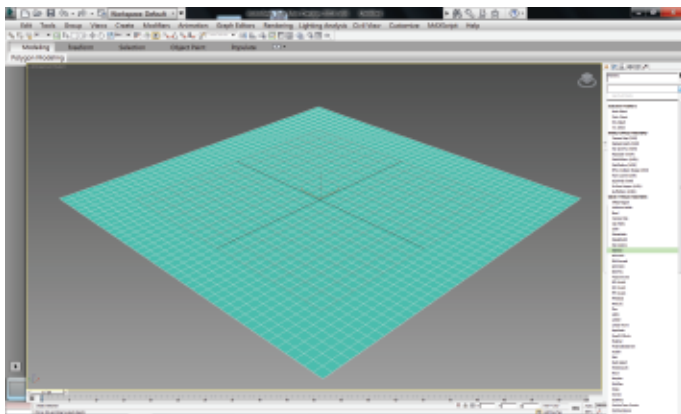


Image No. 3

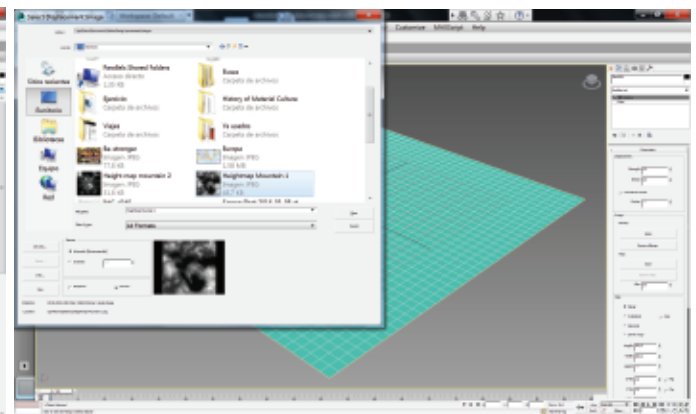


Image No. 4

As shown in Image No. 5, the mesh is going to change and if the measures of your plane does not match with those of the height map, modify the plane's length and width.

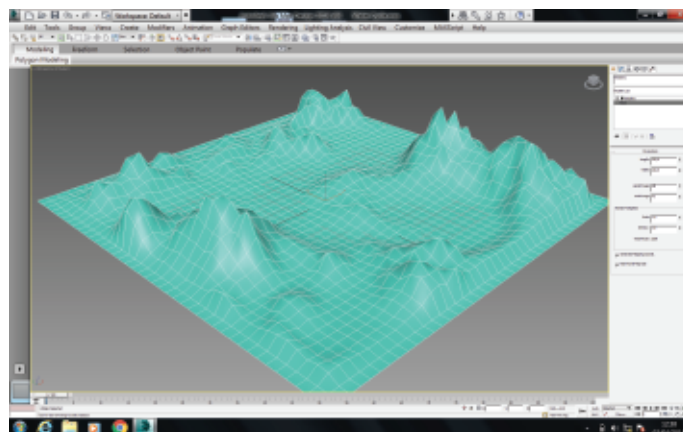


Image No. 5

Considering that some of the edges are harsh it is possible to apply a **Turbosmooth** modifier (Image No. 6a) with one **iteration** (Image No. 6b).

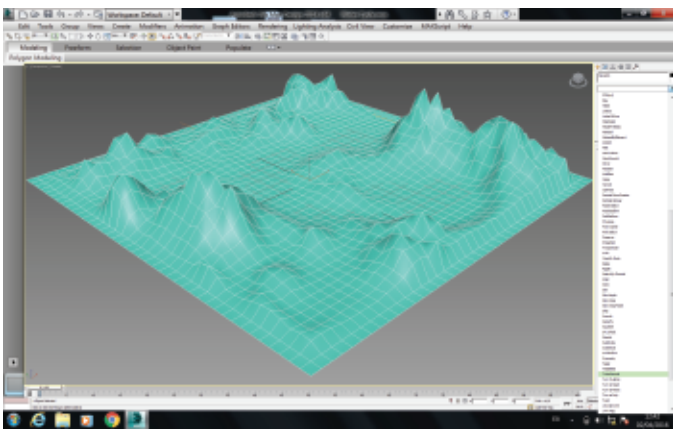


Image No. 6a

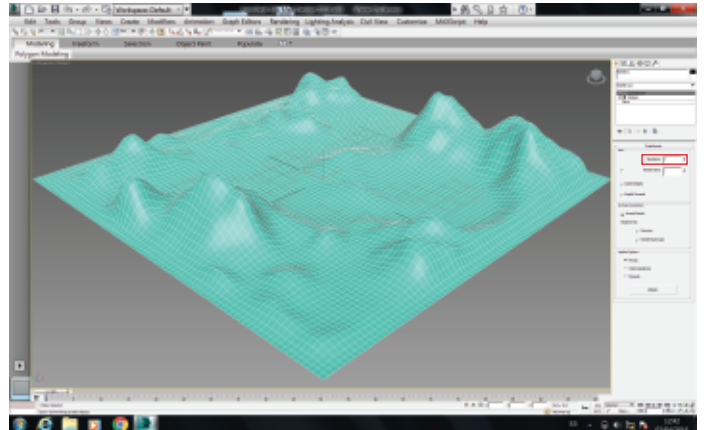


Image No. 6b

For applying the material, you can click on the **Material Editor** (or press the letter M in your keyboard as a shortcut) as it is in Image No. 7a; select a Standard material on the left column and select the Show Shades Material in Viewport (Image No. 7b). Apply a Bitmap -as the Standard material, this is located in the left column; displace it close to the Standard material and click it twice, the **Select Bitmap Image File** window will open (Image No. 7c) and the Terrain texture image should be selected, at this moment, the bitmap can be connected to the standard material by the option **Diffuse Color** (Image No. 7d). Apply the Standard material directly to the shape. Finally, adjust the **Real World Scale** of the plane, remove the check sign in order to see the entire texture.

□

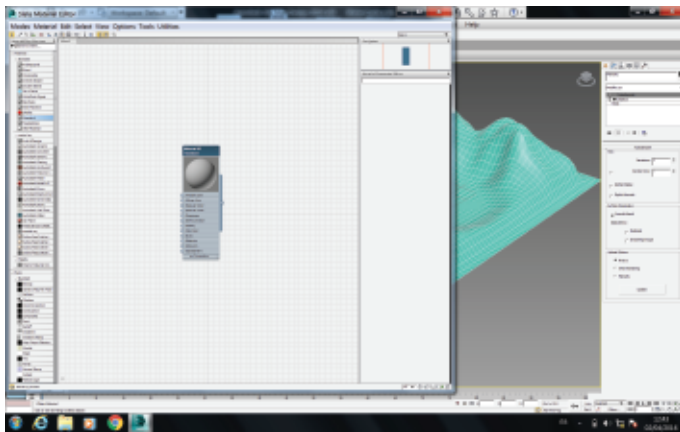


Image No. 7a

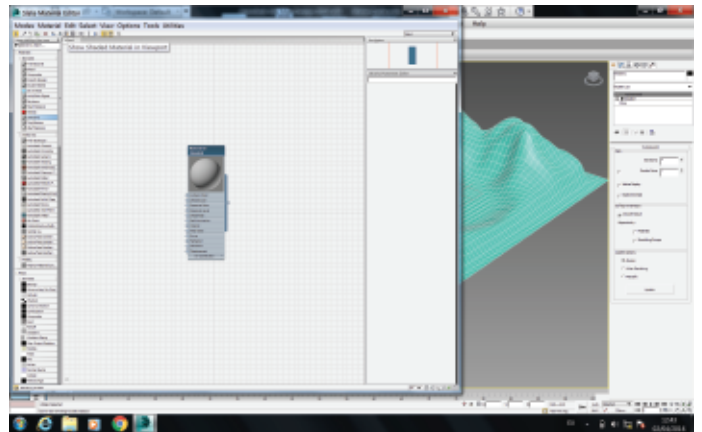


Image No. 7b

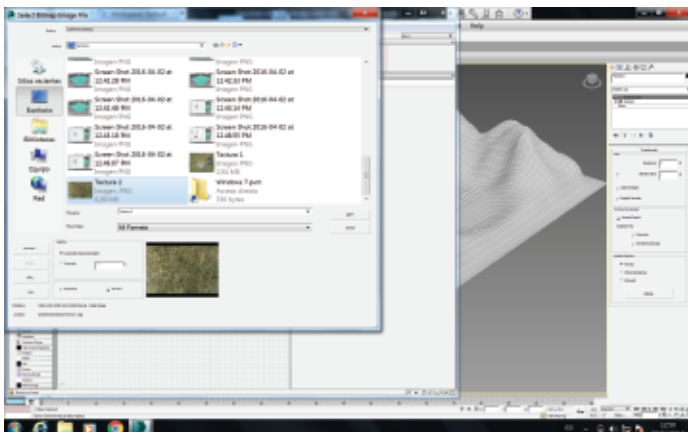


Image No. 7c

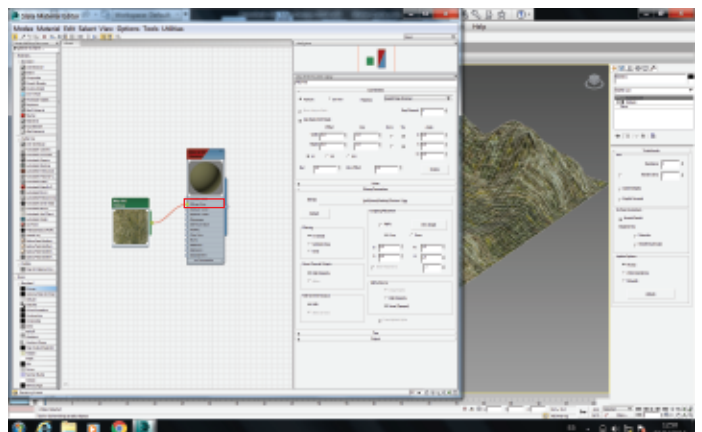


Image No. 7d

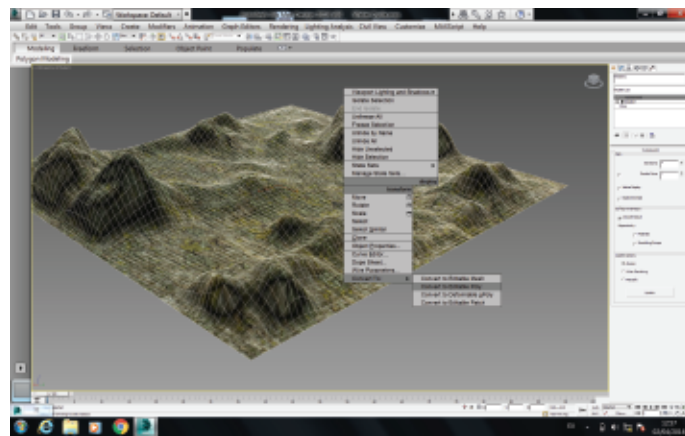



Image No. 8

At this moment, the texture will be all over the plane. As in image No. 8 convert the plane to Editable Poly (in order to unify the modifiers and the shape).

Do not forget to save your file!

b) WATER

Look for a “Water texture” big size picture and save it.

Place the Top viewport (Image 9a) and create a new plane. The measures could change depending if you want them equal to the terrain’s area or smaller (Image No. 9b). Position the four viewports and click on the left or right view (Image No. 10a); select the  icon in order to separate the water from the bottom (Image No. 10b) and give the scene an accurate valley’s perception.

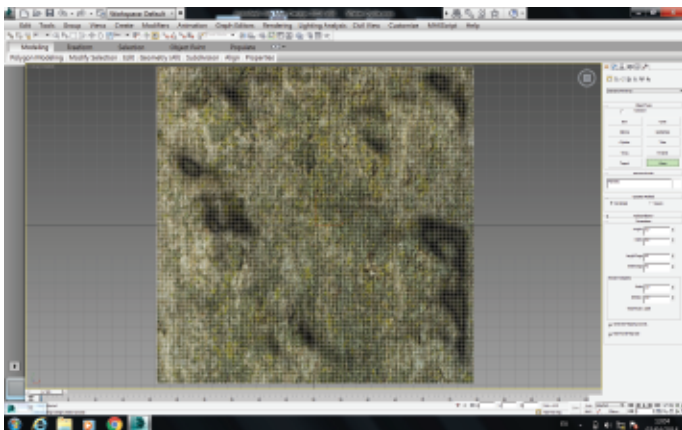


Image No. 9a

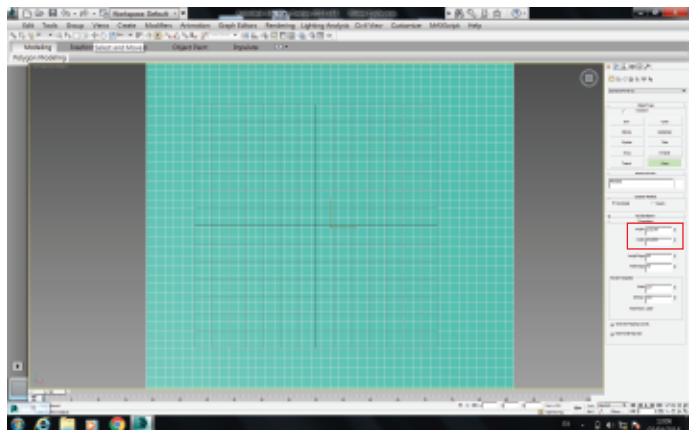


Image No. 9b

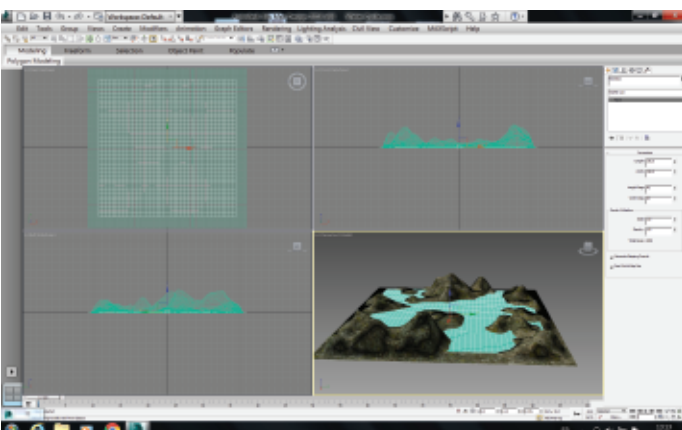


Image No. 10a

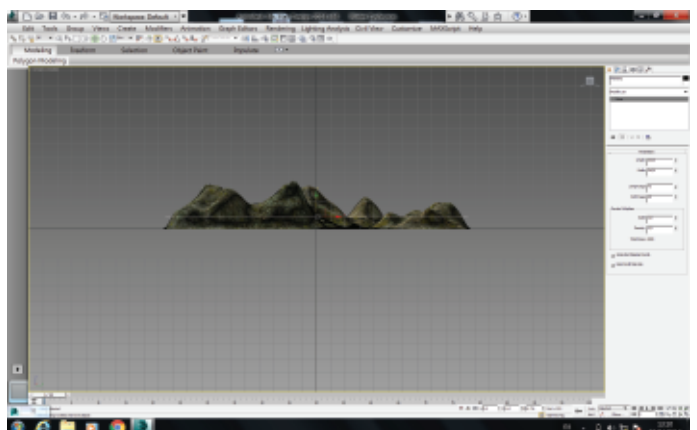


Image No. 10b

Apply the **Noise modifier** (Image No. 11a) and change the Z axis value in order to emphasize the water edge with the continental shore space in the scene (Image No. 11b).

For the material, open **Material Editor** and select a **Standard material**. Then create a **Bitmap** and charge the **Water texture image** you have saved before; connect it by the **Diffuse Color – Self-Illumination – Bump – Refraction** to the standard material. In the **Translucent Basic Parameters**, check the **Specular Highlights** because the **Glossiness** should be in a range from 30 to 50 and in the **Translucency** the **Opacity** should be 40, as in image No. 12.

Do not forget to save your file!

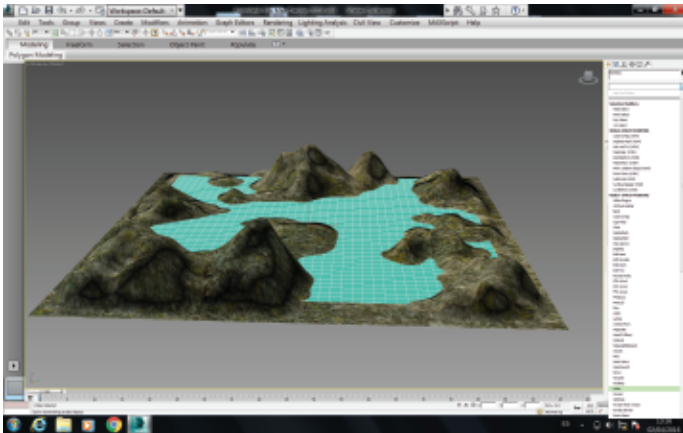


Image No. 11a

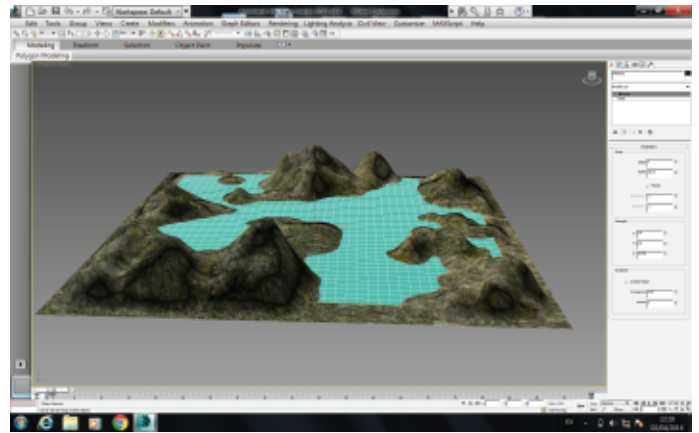


Image No. 11b

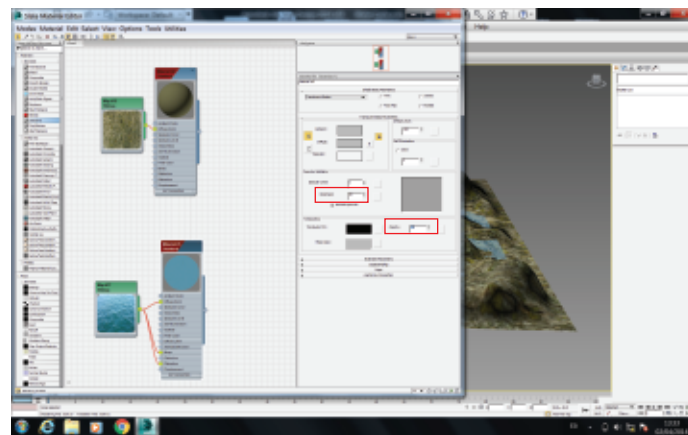


Image No. 12

c) CLOUD

As shown in image No. 13a, create a **Sphere Gizmo**, use the four viewports in order to locate accurately the cloud (Image No. 13b). You can scale and modify by clicking on the **ba** icon, be aware that you make the changes in the front, lateral or front view (DO NOT scale in the perspective view).

Press **Add** on the **Atmospheres & Effects** and when the **Add Atmosphere** window opens, select the **Fire Effect** option (Image No. 14). Now, you have to edit the preferences of **Fire Effect**, so, click **setup** and wait until the **Environment and Effects** window opens (Image No. 15a).

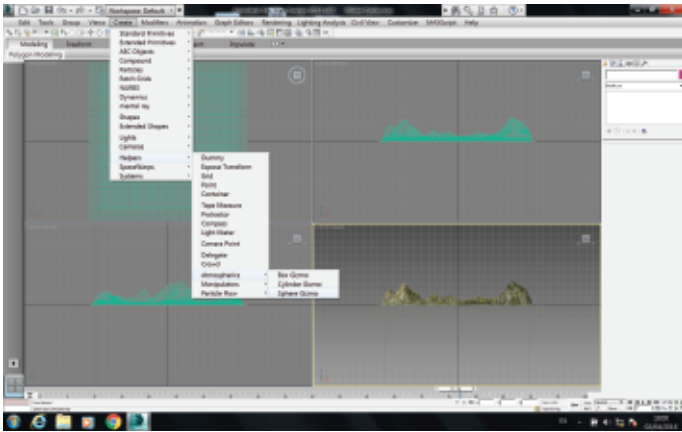


Image No. 13a

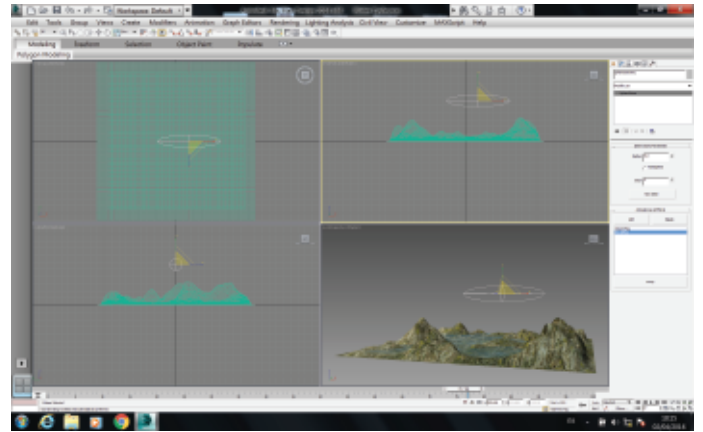


Image No. 13b

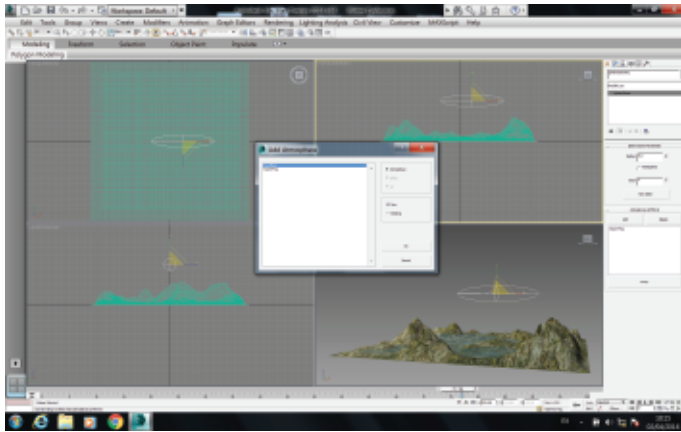


Image No. 14

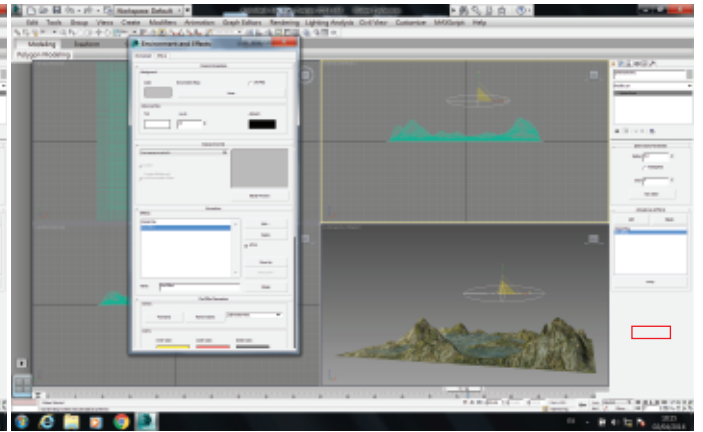


Image No. 15a

Change the preferences as shown in images No. 15b/15c and verify that the effect is working with a frame low quality render (Image No. 16).

Do not forget to save your file!

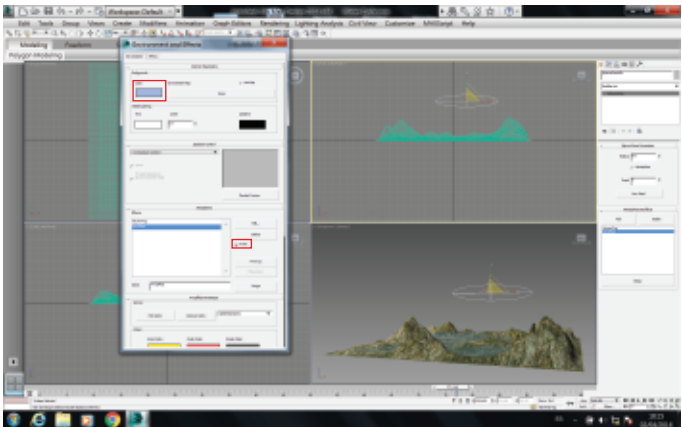


Image No. 15b

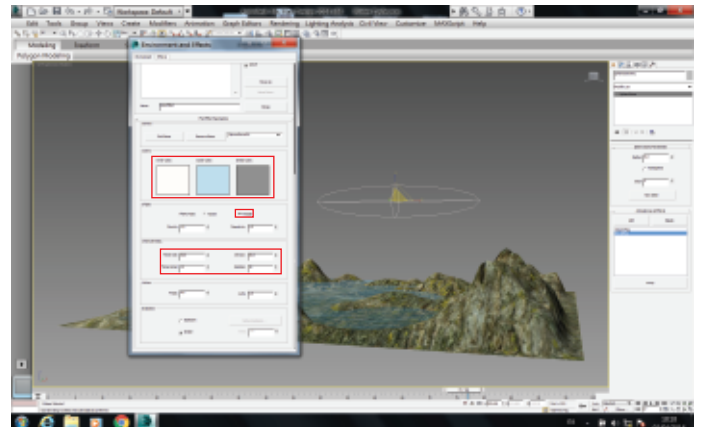


Image No. 15c

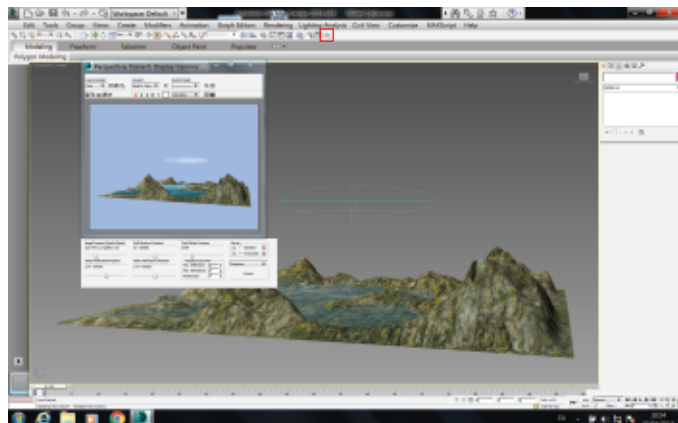


Image No. 16

d) RAIN

In the **Create Panel** change the **Standard Primitives** to **Particle Systems** (Image No. 17a) and select the **spray** option (Image No. 17b). Draw, move and scale the outline of the rain drops inside the cloud like in image No. 18. Change the drop length and spray frequency in the **Modify Panel**.

Do not forget to save your file!

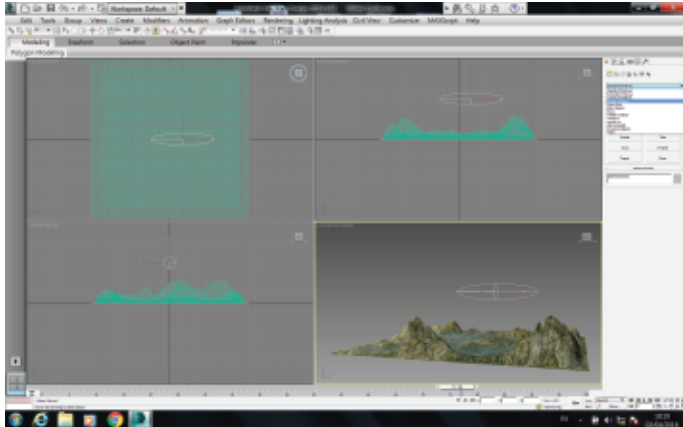


Image No. 17a

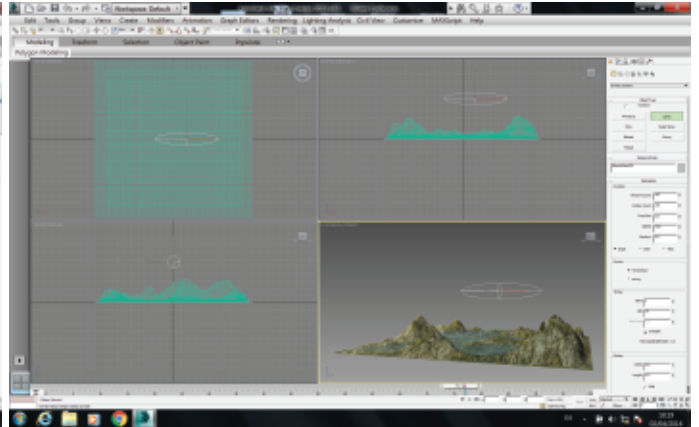


Image No. 17b

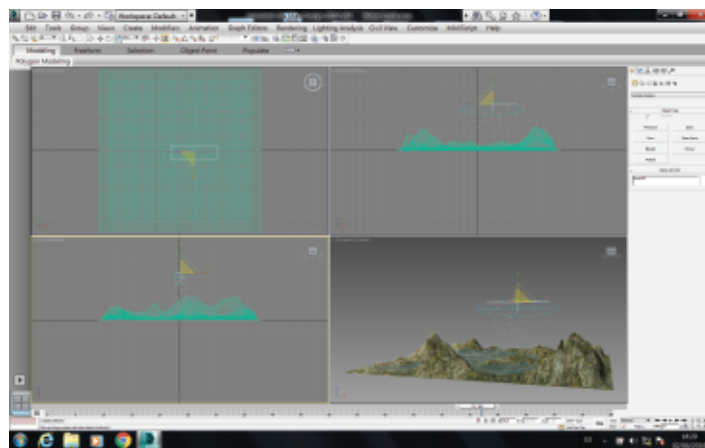


Image No. 18

e) STEAM

Do you remember the process for modeling the cloud? Well, for the steam it is similar. You have to create a **BoxGizmo** (Image No. 19) over the water plane. Manage the measure parameters taking into account that the **BoxGizmo** should be under the cloud.

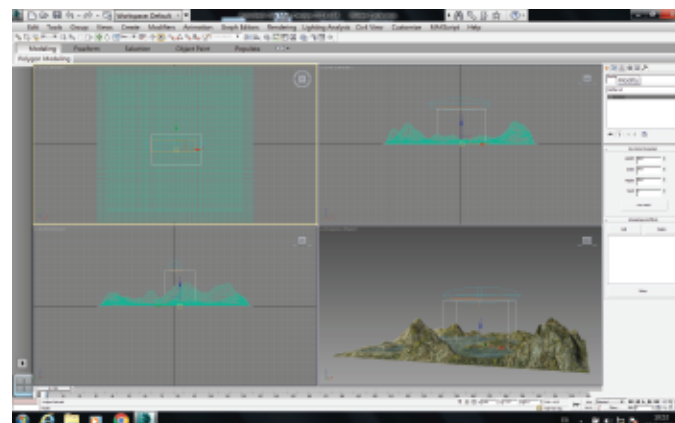


Image No. 19

Press **Add** on the **Atmospheres & Effects** and when the Add Atmosphere window opens, select the **Volume Fog** option (Image No. 20). After this, you can edit the preferences of Volume Fog, so, click **setup** and wait until the Environment and Effects window opens (Image No. 21)

Make a frame render (Image No. 22).

Do not forget to save your file!

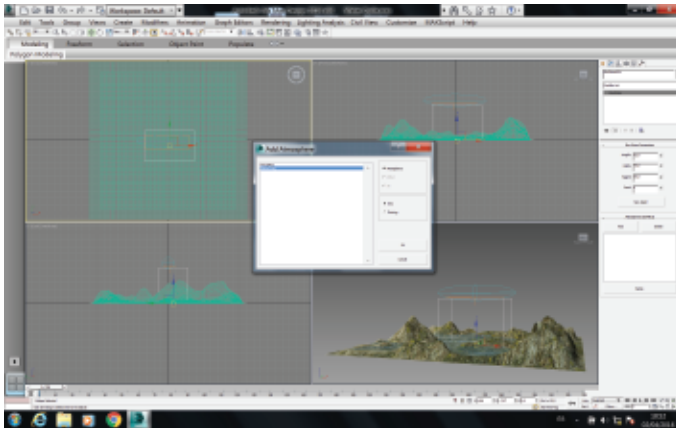


Image No. 20

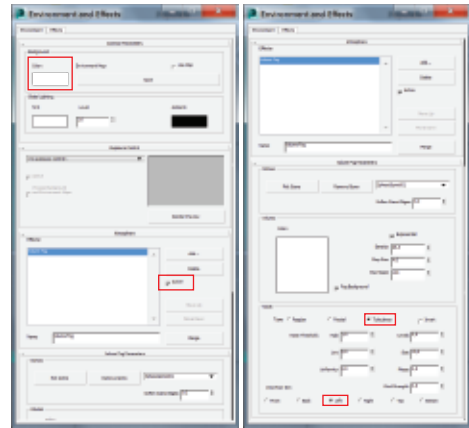


Image No. 21

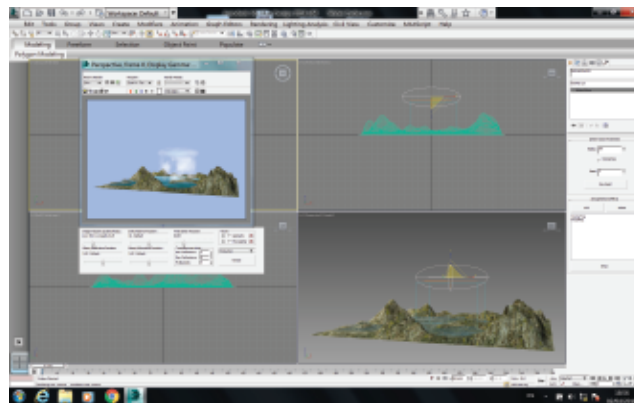


Image No. 22

f) SUNLIGHT

In the **Create Panel** choose **Lights** and select a **Skylight** (Image No. 23a). Position it centered and over the entire scene to recreate the sun's light at noon (Image No. 23b).

Do not forget to save your file!

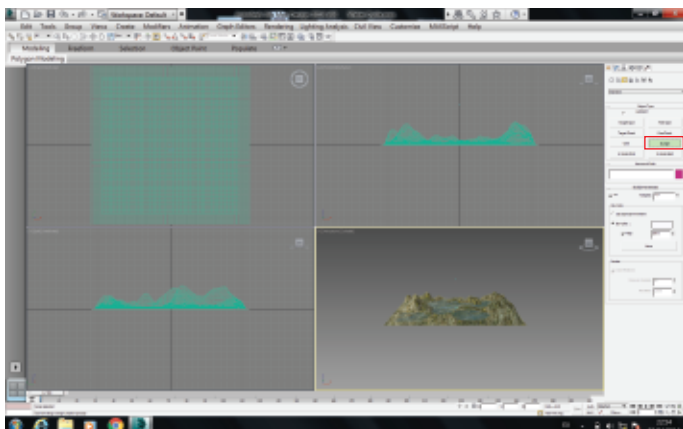


Image No. 23a

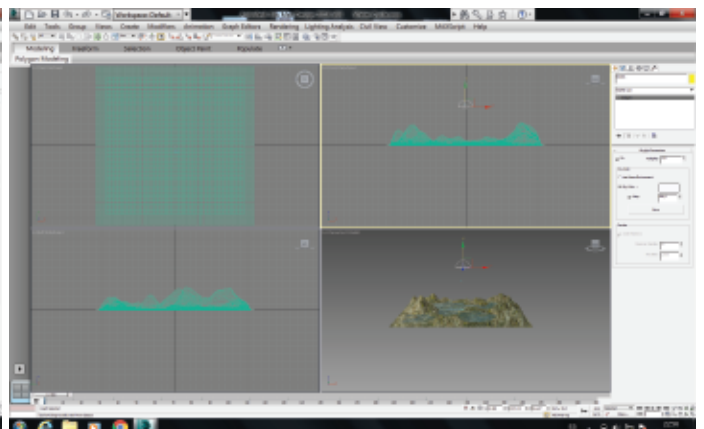


Image No. 23b

ANIMATION



Click on the time icon to open the Time Configuration window and as you can see in image No. 24, it will be possible to change the animation length, the quantity of frames and the speed. This animation has a **Custom Frame Rate**: 30 frames per minute and a **280 frame length**.

Active the **Autokey** button and be aware that the frame bar is in 0/298 –or the selected number of frames. Pay attention to the red bar ahead the frame number, since it indicates the animation is being modified (Image No. 25).

Each object has its own animation timeline. In order to animate the objects, you must displace the frame bar to the frame where the change is required and click the key icon.

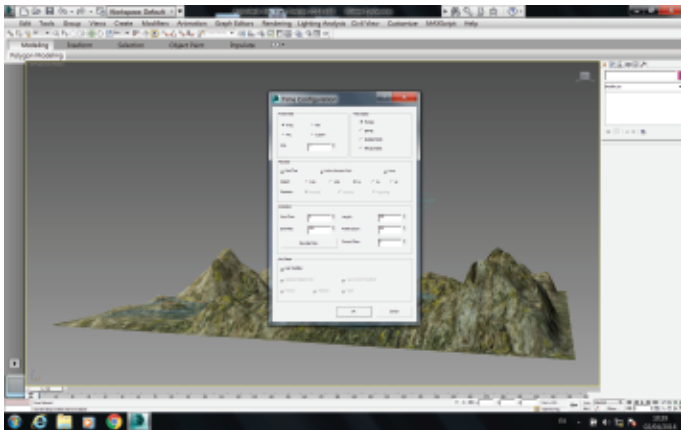


Image No. 24

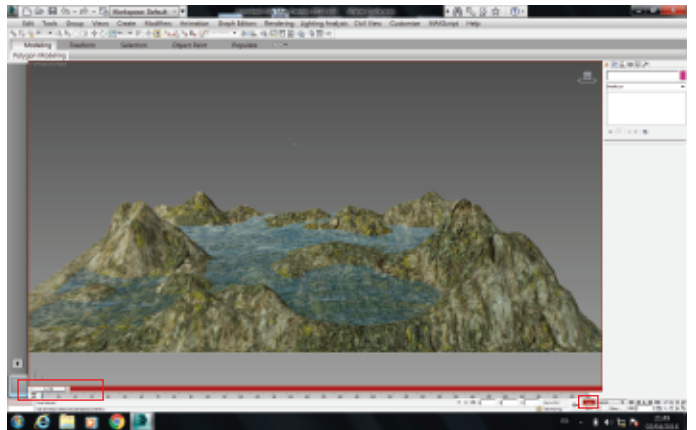



Image No. 25

For example: Animating the steam BoxGizmo (Image 26a/26b/26c/26d). To place the key, the  key icon must be pressed. These keys indicates movement, scale and rotation changes.

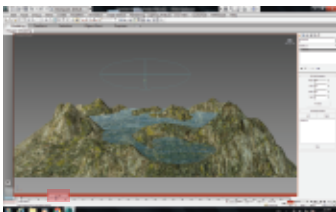


Image No. 26a

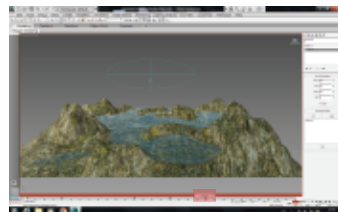


Image No. 26b

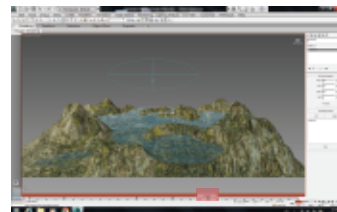


Image No. 26c

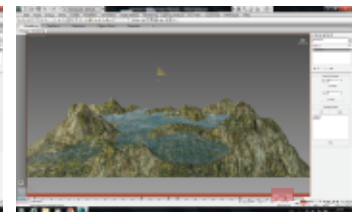



Image No. 26d

Once each object realizes its own movement, it is possible to group all the elements' meshes to animate -entirely- the rotation transformation. Right click on the  rotation icon and start changing the Z axis (Image No. 27) values for each key you want to place.

Check the animation and do not forget to save your file!

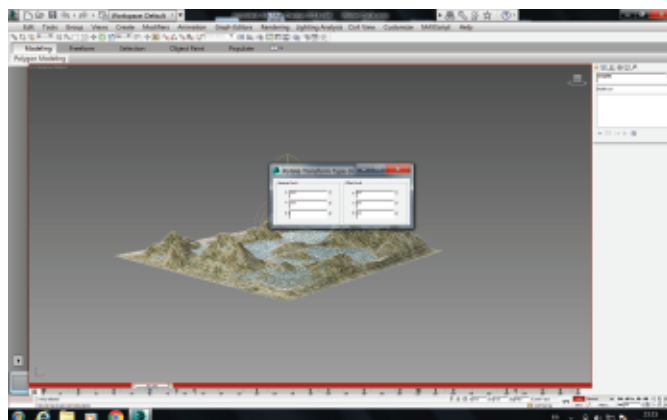


Image No. 27

SAVING FRAMES

Before you start saving the animation as frames or as a movie, you should adjust the **Render Setup** (Image No. 28), including the desired **Time Output – Output Size – Output File**.

In this case the frames were saved like PNG Image File (Image No. 29) so lately, the hologram video could be make in an edition software program.

Click on **Render** (Image No. 30) and wait until the program finish all the frames.

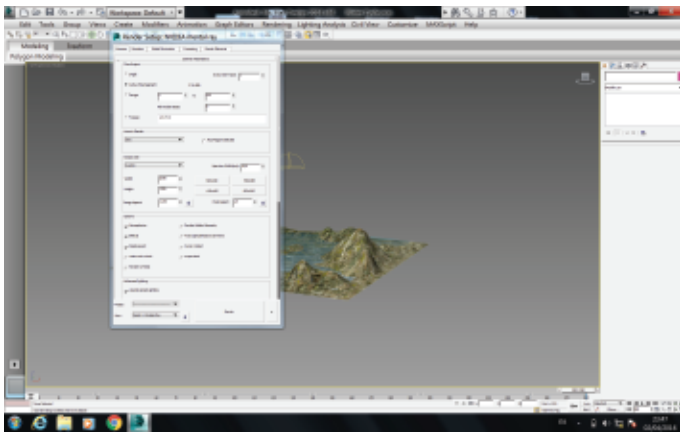


Image No. 28

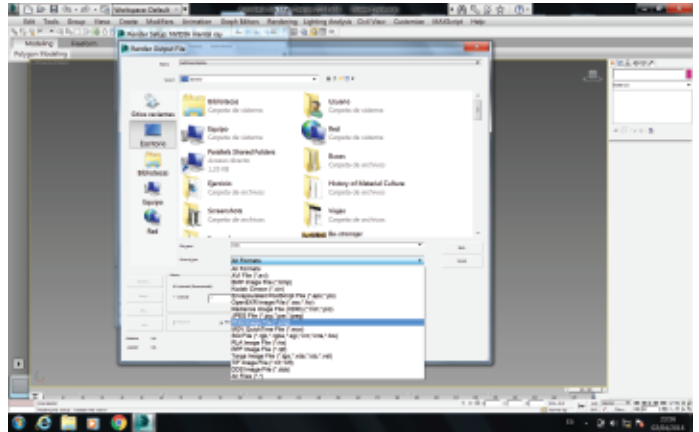


Image No. 29

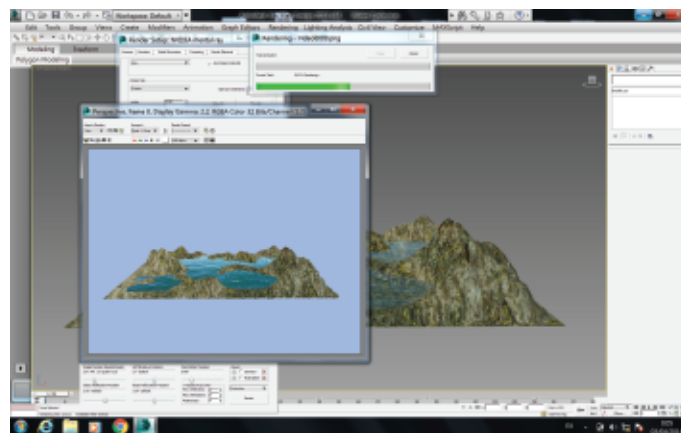


Image No. 30