Preparing raster files for Condatis

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What input data are required?

Data/files	Name
Reproductive rate	Number of individuals per km² per generation
Dispersal distance	km travelled per individual per generation
Source/target raster	Source cells labelled 1; target cells labelled 2
Habitat raster	Proportion of habitat per grid cell (0-1)
Prioritisation raster	Proportion of habitat per grid cell (0-1)

All raster files for one Condatis analysis must:
- Have the same **spatial resolution** (i.e. the same pixel size, in **meters**)
- Have the same **spatial extent** (according to requirement)
- Be in **geoTIFF format**, i.e. *sourcetarget.tif*

Training plan

Training activities, in ArcMap:

0. Check your data
1. Set the "Environment" for the ArcMap project

*Habitat** layer
2. Reduce the extent of the *Habitat* layer
3. Coarsen the spatial resolution of the *Habitat* pixels
4. Correct the pixel values to a proportion
(*very similar process would apply to prioritisation layer)

Source-target layer from a polygon shapefile
5. Set which polygons are sources (1) and targets (2)
6. Convert polygon to raster file (same functions can be used if your habitat data starts as a shapefile)

0. Check your data

- *Ensure the geographical projection for all files is the same*
- *Check attributes, e.g. raster resolution*

i. Create an ArcMap project (a *Map Exchange Document*), e.g. *launchtraining**.mxd***, in a folder where all associated GIS files will be saved – **File → Save As**
    OR if a project file already exists, open it - **File → Open**
i. Ensure that all GIS files needed for the project are in the folder where the *.mxd* has been created/is, either by:
    - Pasting them into the folder at the start;
    - Ensuring they are automatically saved there after creation through setting the "workspace" for the project - **Geoprocessing → Environments → Workspace**
ii. **Add Data** - *ForestBorneo30m.tif*
    (Data may already load with your *.mxd* file if it was created previously)
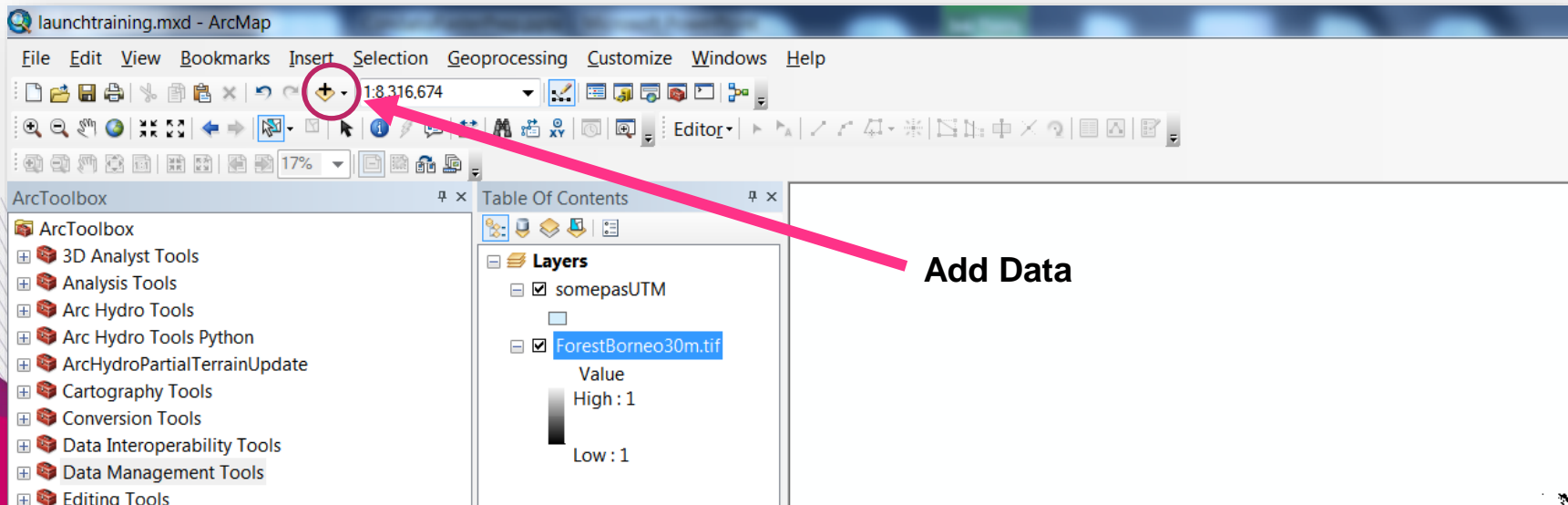
0. Check your data

iii. Open:

- **ArcToolbox** - containing all of the ArcGIS functions needed to manipulate GIS data
- **Catalog** – containing information on the location of files and folders
- **Table of Contents** – containing information on the different layers within the project
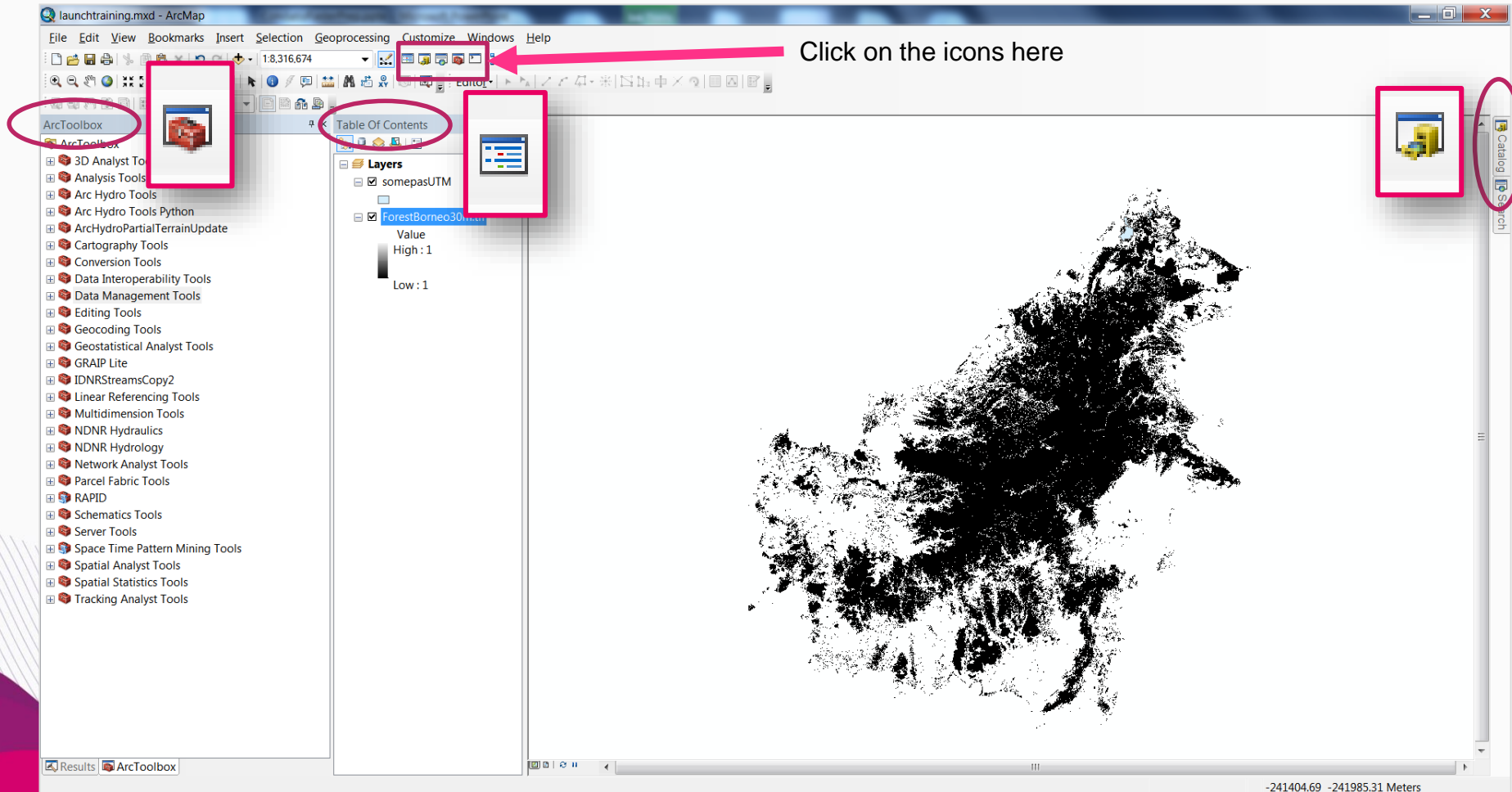
Preliminary checks on the *Habitat* layer

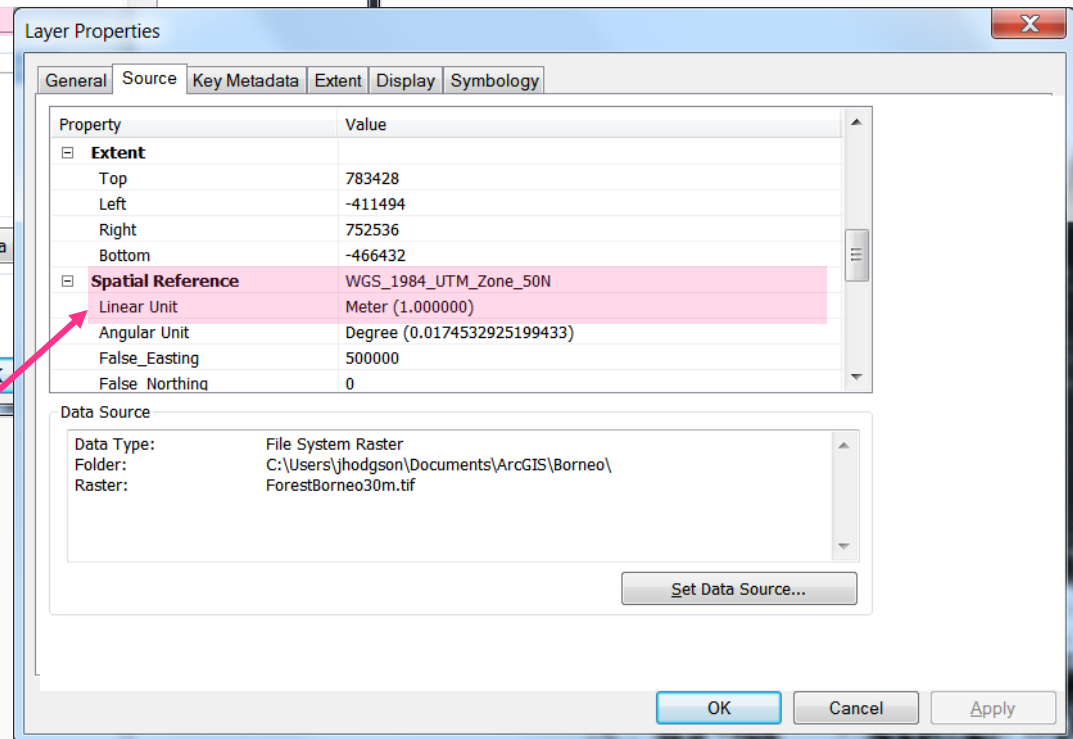i. First check on the settings of the *Habitat* layer – double-click on the layer in **Table of Contents** to generate **Layer Properties** table
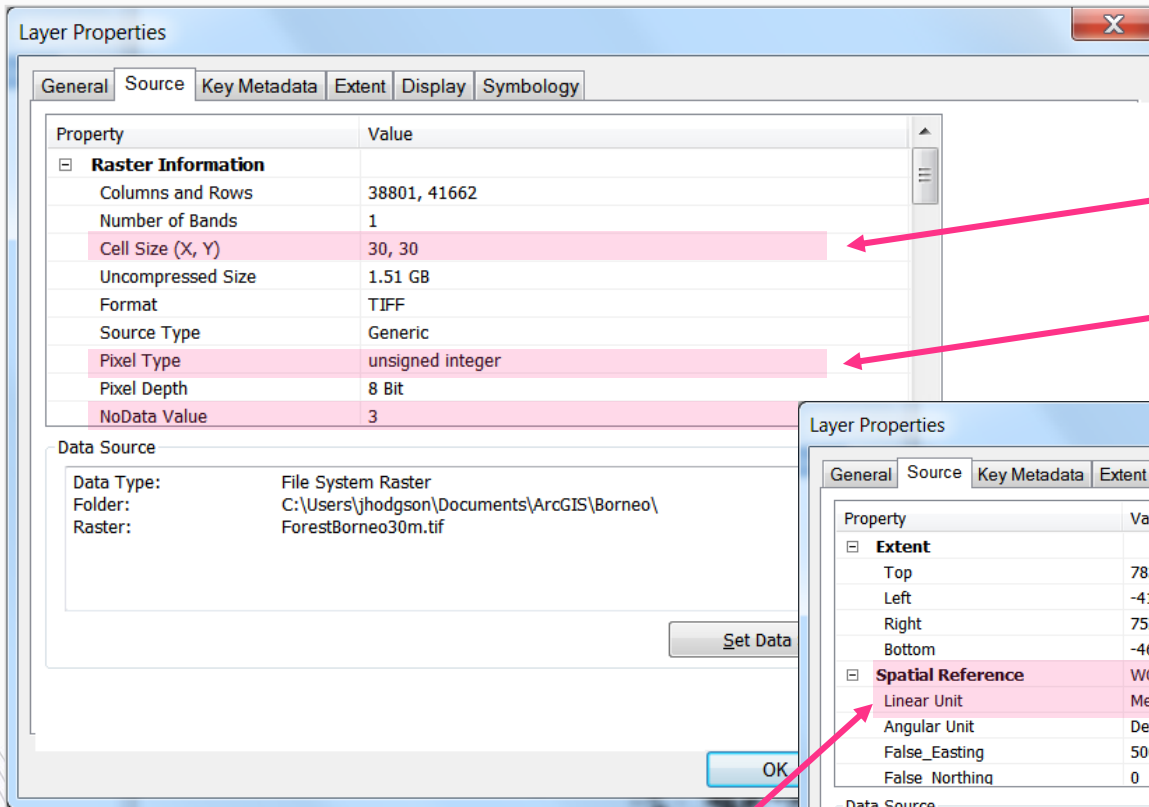
Check on these properties

Cell Size – big effect on Condatis processing time

Pixel Type – we eventually need *floating points* so values between 0-1 possible

Linear Unit – Condatis will assume your spatial units are metres

Preliminary checks on the *Habitat* layer

ii. Check on the projection (**Spatial Reference**) of the raster file in **Layer Properties**, i.e. WGS_1984_UTM_Zone_50N – all files must have this same projection. (If you ever need to change the projection of a layer, use the **Projections and Transformations** section of the toolbox (within Data Management Tools folder) to create a new version with the right projection. Don't rely on ArcGIS's 'on-the-fly' projection.)
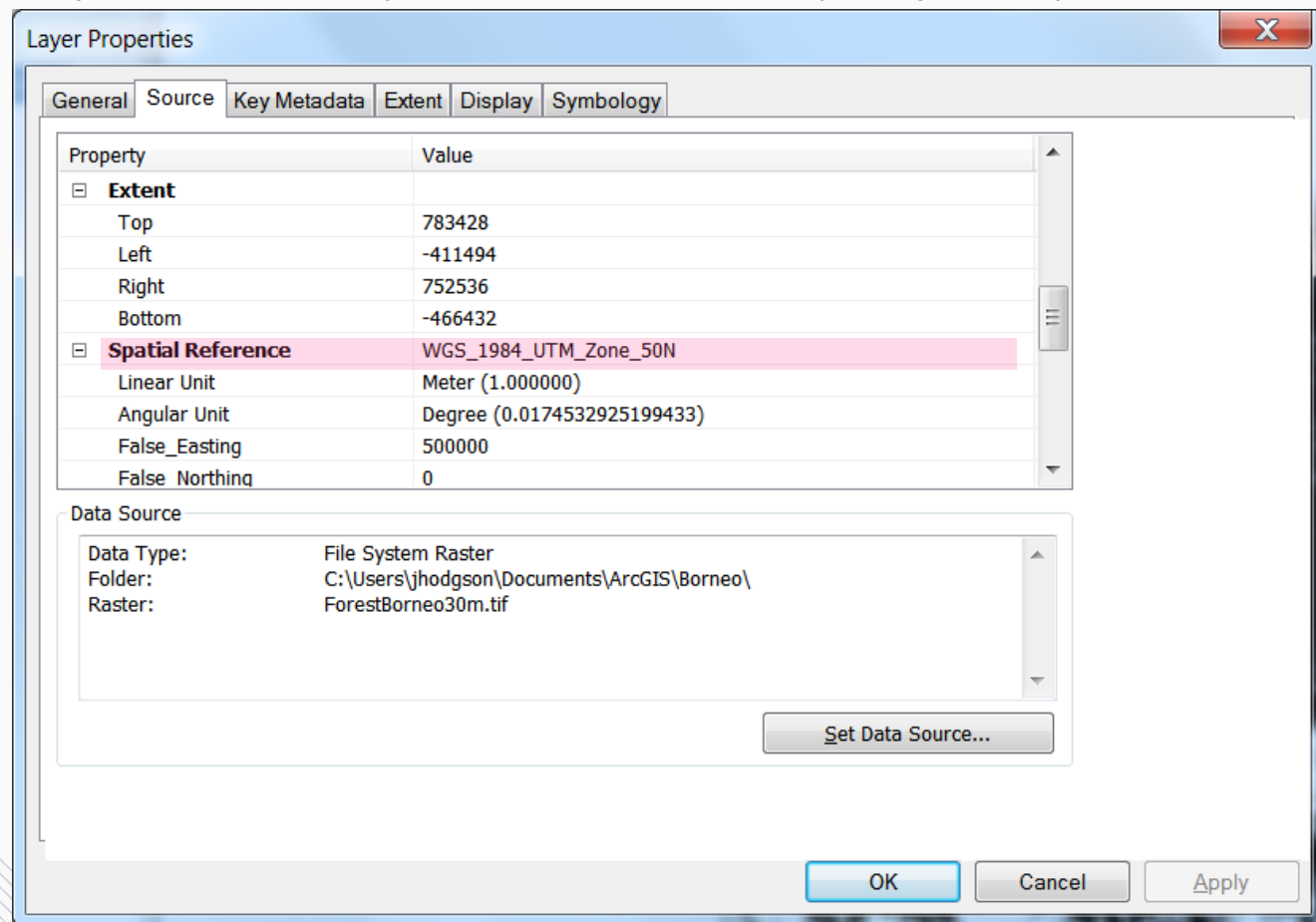
1. Set the "Environment" for the project

Set the bounding coordinates: **Geoprocessing → Environments → Processing Extent** ….set extents (m) (according to extent requirement) (i.e. Top – 738000; Right – 613000; Bottom – 590000; Left – 435000; though exact numbers will change according to pixel size)

2. Reduce the extent of the *Habitat* layer

i.   Since we have set the processing extent to our desired box, *any operation* that produces a new raster will conform to this box

ii. For convenience, we'll choose an operation that will change the **Pixel Type** from *unsigned integer* to *floating points* – **Spatial Analyst Tools → Map Algebra → Raster Calculator** …. Multiply the *Habitat .tif* file by **1.0** to create a new *.tif* with pixel values that can take decimal values (required for assigning each *Habitat* cell a habitat quantity/quality value)
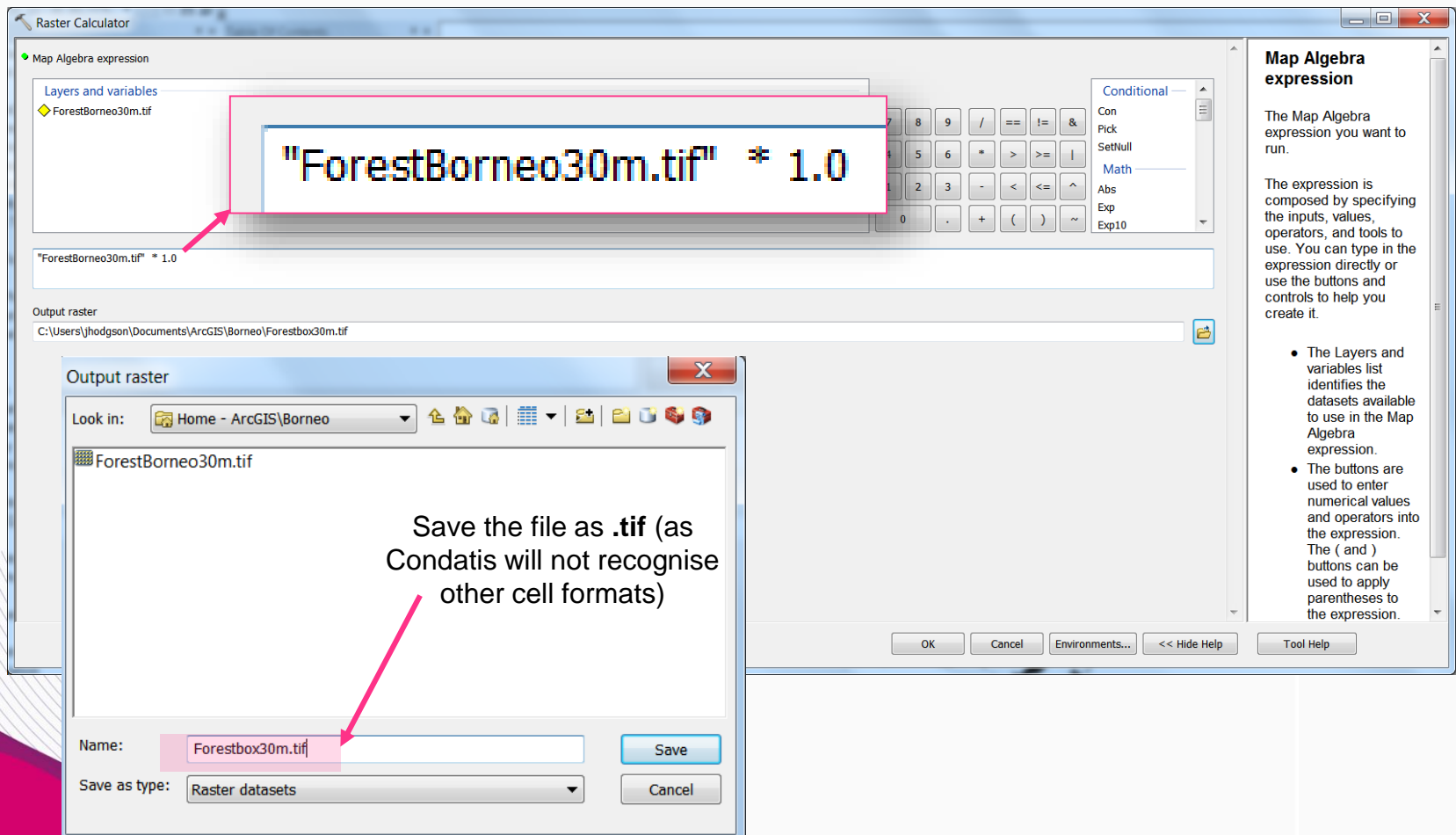
2. Reduce the extent of the *Habitat* layer

iii.   Check– **Layer Properties** → **Source** …. To check the extent of your new habitat layer – note it is not exactly identical to the box you specified, because it had to be a whole number of 30m cells

iv.   PS do not use **Layer Properties** → **Extent,** this only changes the range that you can see in the display, not the underlying data
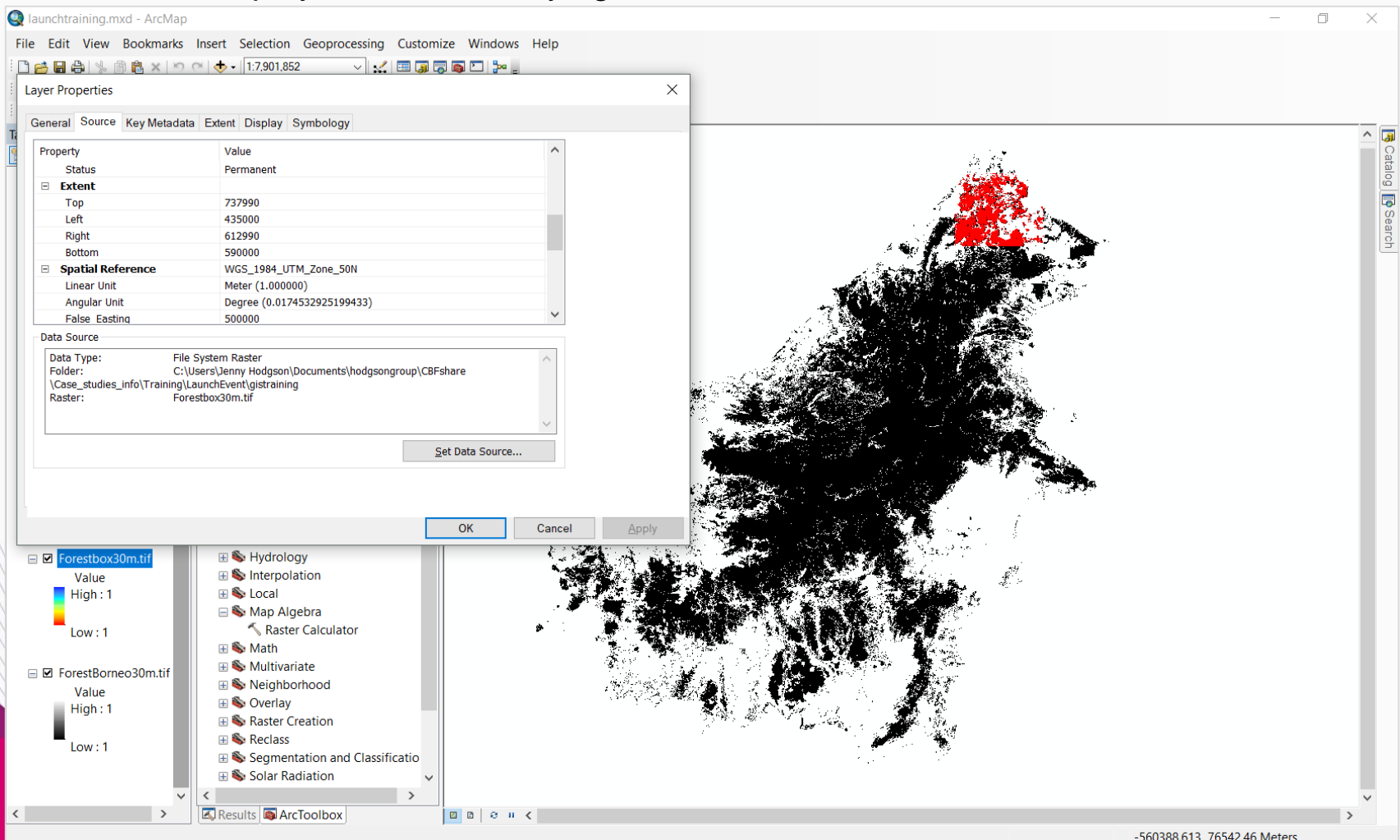
3. Coarsen the spatial resolution of the *Habitat* pixels

i. The size of the pixels of the raster layer may need to be changed, e.g. in order to increase the speed of the Condatis analysis (fewer cells = faster processing) – **Spatial Analyst Tool → Generalisation → Aggregate** ….

Aggregate

Input raster
Forestbox30m.tif

Output raster
C:\Users\jhodgson\Documents\ArcGIS\Borneo\Forestbox990m.tif

Create a new output **.tif**

Cell factor
33

Aggregation technique (optional)
SUM

☑ Expand extent if needed (optional)

☑ Ignore NoData in calculations (optional)

Tick **Expand extent** if you are happy with the extent being enlarged to accommodate full pixels, rather than reduced for the same reason (as illustrated in the information panel)

Tick **Ignore NoData** so these pixels are not included in the aggregation

The **Cell Factor** is the multiplication factor that generates the required pixel resolution, e.g. 30m x **33** = 990m cell width; this is often a compromise between spatial resolution and processing time

Expand extent if needed (optional)

Defines how to handle the boundaries of the input raster when its rows or columns are not a multiple of the cell factor.

- Checked—Expands the bottom or right boundaries of the input raster so the total number of cells in a row or column is a multiple of the cell factor. Expanded cells are given a value of NoData.

  With this option, the output raster can cover a larger spatial extent than the input raster.

  This is the default.

- Unchecked—Reduces the number of rows or columns in the output raster by 1. This will truncate the remaining cells on the bottom or right boundaries of the input raster, making the number of rows or columns in the input raster a multiple of the cell factor.

  With this option, the output raster can cover a smaller spatial extent than the input raster.

If the number of rows and columns in the input raster is a multiple of the Cell factor, these keywords are not used.

OK   Cancel   Environments...   << Hide Help   Tool Help

4. Correct the pixel values to a proportion

i.   Use the **Raster Calculator** to divide the pixel values so that the new 990m pixels are scaled from 0-1 (Condatis uses this value to quantify the proportion or quality of habitat in each cell)

This aggregated layer now has pixel values scaled from 1 to 1089 (33 x 33)

Divide the new Habitat layer twice by the same factor used to aggregate the smaller cells, i.e. **33** x **33**, to get a re-scaled pixel value between 0 and 1

Remember to save the output file as a new *.tif*

4. Correct the pixel values to a proportion

The pixel values of this new layer are now re-scaled so that they are between 0 and 1, as shown by the legend

The value of individual pixels can be assessed by clicking on cells using the **Identify** tool

Preparing the source and target raster

i. Load in *somepasUTM* shapefile – Click **Add Data** & find the *Home* folder

ii. Check on the coordinate system (a.k.a. projection) of this layer to ensure it is the same as the *Habitat* raster layer – double-click on layer → **Layer Properties** – **Source** tab

iii. Open up the attributes **Table** of the shapefile to observe the names of the features & their key characteristics – right-click on layer → **Open Attribute Table** (drag to location)

Preparing the source and target raster

Your final habitat layer can now be used to set the processing extent and the *Snap Raster*, using the **Environment Settings** function, to make sure the source-target raster will be the same

5. Define source and target polygons

iv. Create a new column for the Source/Target markers – **Table Options** → **Add Field**
v. Label the column appropriately, e.g. *st*
vi. Recommended type of input is Float, i.e. floating point numbers

5. Define source and target polygons

vii. Assign the *Target** polygons – select the target(s) → right-click on *st* column header → **Field Calculator** (via bypassing the Edit mode)

viii. Select appropriate **Fields** (i.e. column title – *st*) → type in **2**

v. Repeat for the *Source** polygons but type in **1**
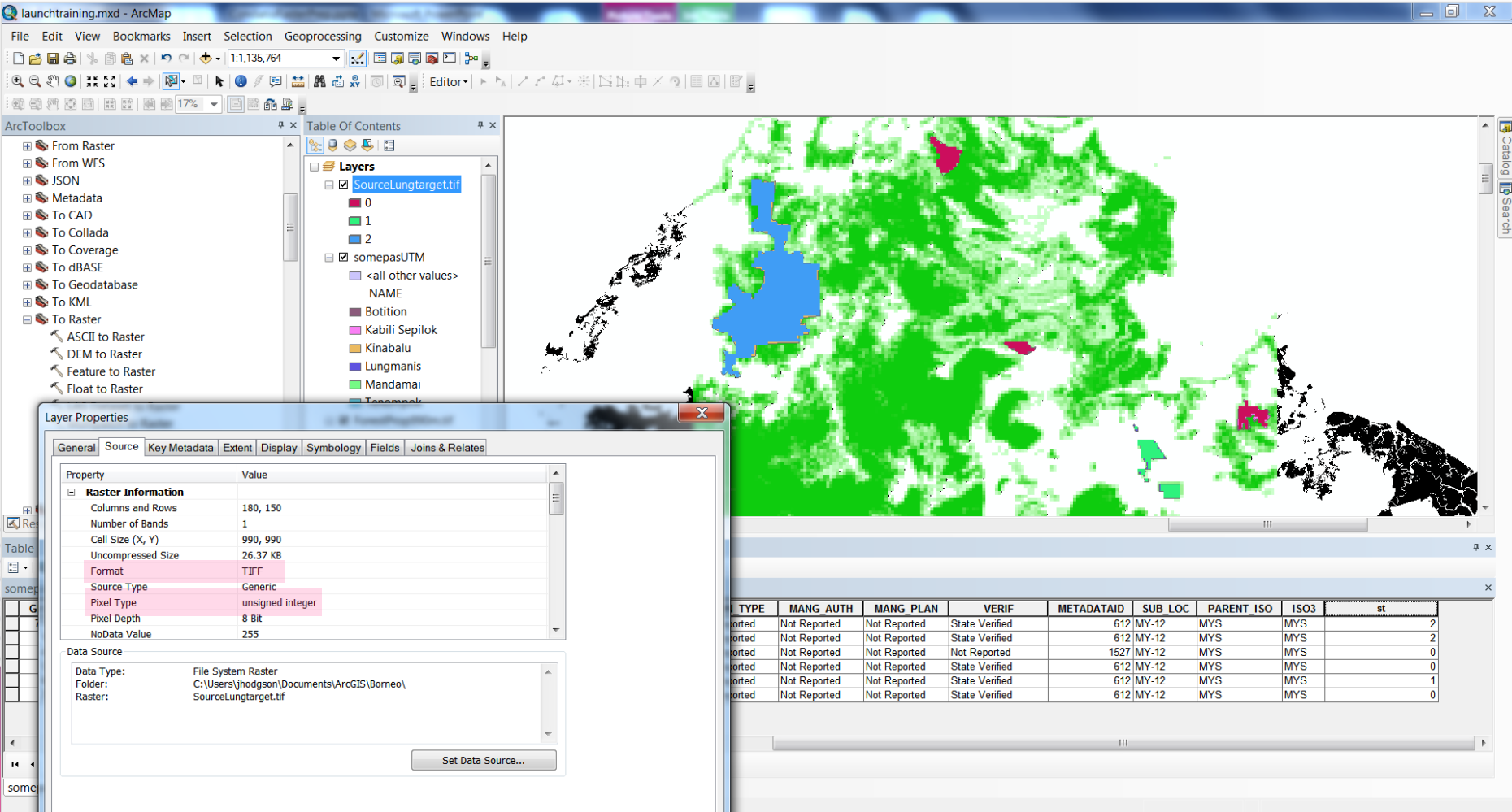
*Assign any polygons as sources/targets at this point

6. Convert polygon to raster file

i. First clear all selected features (so that all are included in the raster) – **Table Options → Clear Selected**

ii. Within the *ArcToolbox* find the rasterise function – **Conversion Tools → To Raster → Polygon to Raster**

iii. Select *st* in the **Value field**

iv. Assign your **Output Raster Dataset** an appropriate name, ending in **.tif**

v. Set the **Cellsize** to **990m** in line with the *Habitat* layer

vi. In **Environments….** check that the raster that is created will have the correct extent ('processing extent') and will 'snap' to the *Habitat* layer (so edges of cells will exactly align, if they are the same size)
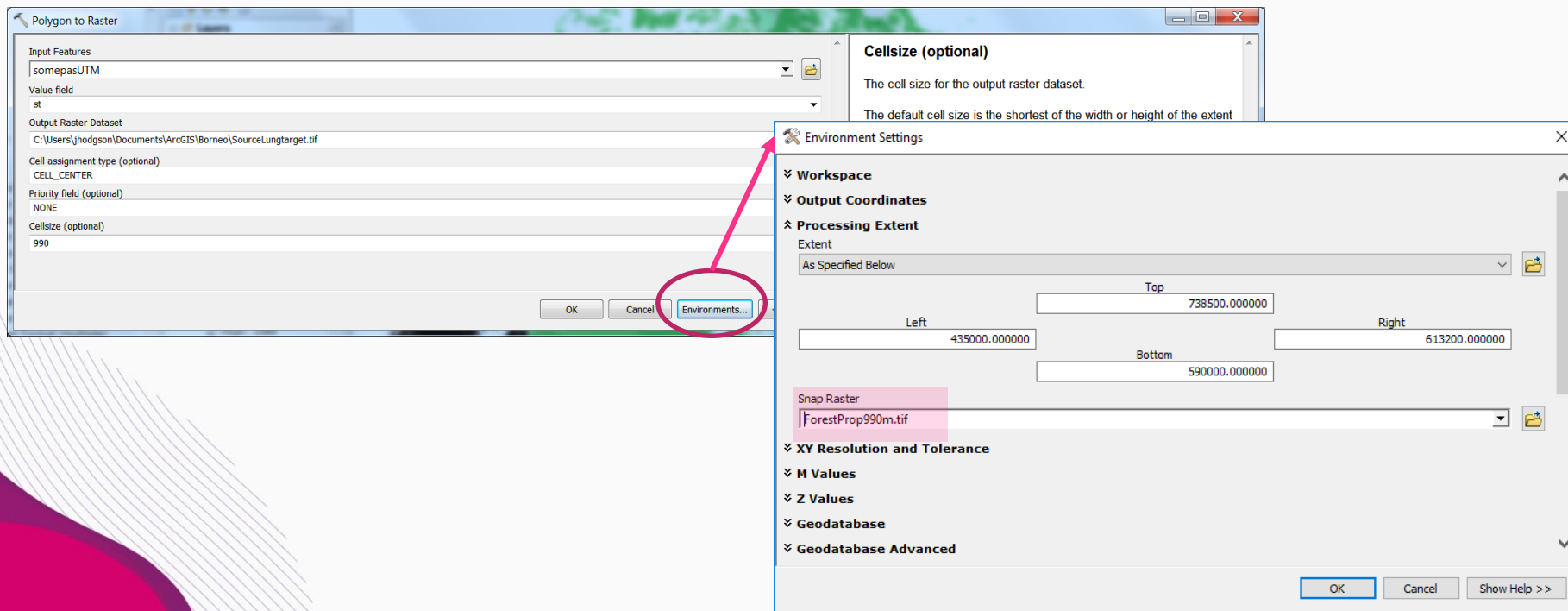
6. Convert polygon to raster file

i. Check that the *SourceTarget* polygon has been rasterised into a *.tif* of the same extent and resolution as the *Habitat .tif*

ii. Be aware of the **Pixel Type** – this may need converting to *floating points* for Condatis to recognise the data (see Step 2ii.)

For further help, please email
contact@condatis.org.uk