**remap**
remote ecosystem monitoring
assessment pipeline

This tutorial is aimed at developing maps for two time periods with in Remap (https://remap-app.org). In this tutorial we are going to develop a classification water and non-water in Dubai for the year 2000 and the year 2016. Before getting started, read the user guide to become familiar with the Remap interface and do tutorial one. For more information, see the user guide, read our paper, and explore the Remap website.

Location search

Search for the Dubai in the remap search bar:
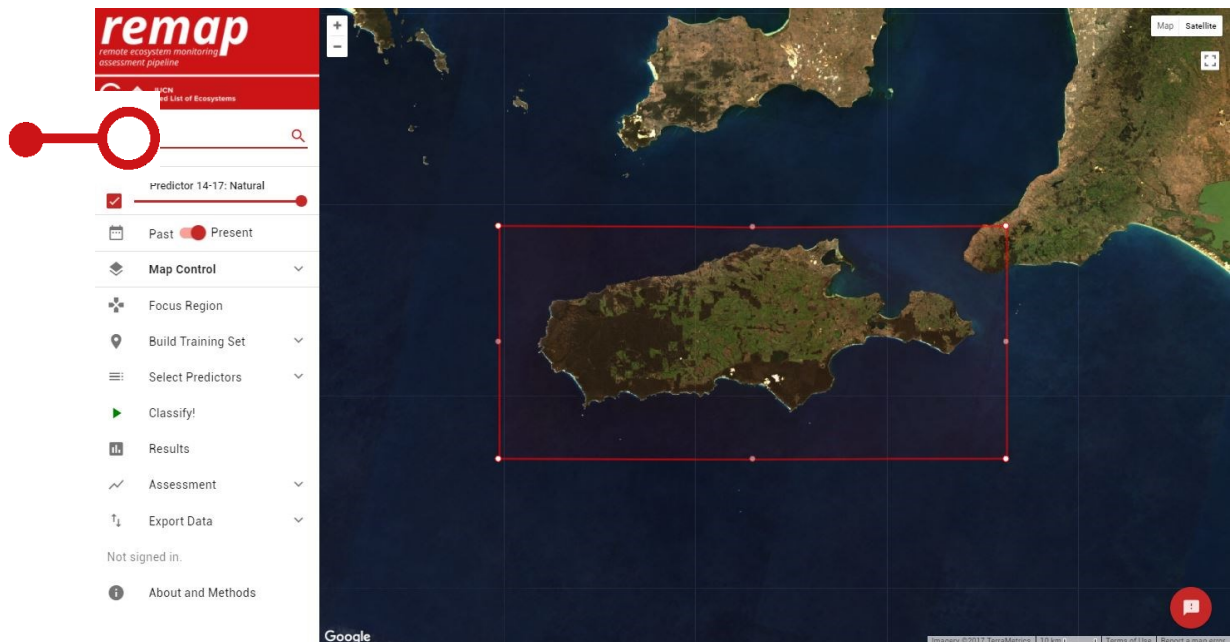
Focus region

Focus region defines the boundary of your analysis and limits the size of the computation required by the Google Earth Engine.

1. We want to map the amount of land reclamation since the year 2000, so ensure focus region includes the coastline.
2. Click Focus Region to define the boundary of the analysis.

Select time period

To map reclamation, we will develop a classification of water and non-water for the two time periods available in remap (2000, 2016).

1. We will produce the 2016 map first. Select Present in the time toggle.

https://remap-app.org

Build training set

Now we develop a training set to distinguish areas of land from areas of water.

1. Use Build Training Set to add a new class (Add New Class)
2. Click the gear icon next to Class 1 and change the Class Name to Marine. You can also change its colour.
3. Repeat the above for another class, this time Terrestrial.
4. Now, select the Marine class, click Add Markers, and place a large number of training points in areas corresponding to water.
5. Repeat this for the Terrestrial class. In the figure below we have provided 50 points per class.

Notes:

Although remap has no lower limit to the number of training points in a training set, we recommending having a large number of points (>50). Too few training points will not enable the classifier to distinguish classes.

Classify

We now have a comprehensive and accurate training set, so we are ready to get the Google Earth Engine to classify our focal region.

1. Click Classify to run the classification.
2. As this is a computationally intensive operation that is farmed out to several processors by the Google Earth Engine, this step can often take some time.
3. When it is complete the wheel will disappear and the classified map is returned.
4. If no map is returned within a few minutes click Classify to try to run the classification again.
5. We now have a classified map showing marine and terrestrial areas in Dubai.
6. Use the map control to hide the training set, and the transparency slider to compare the classified map to the underlying data.
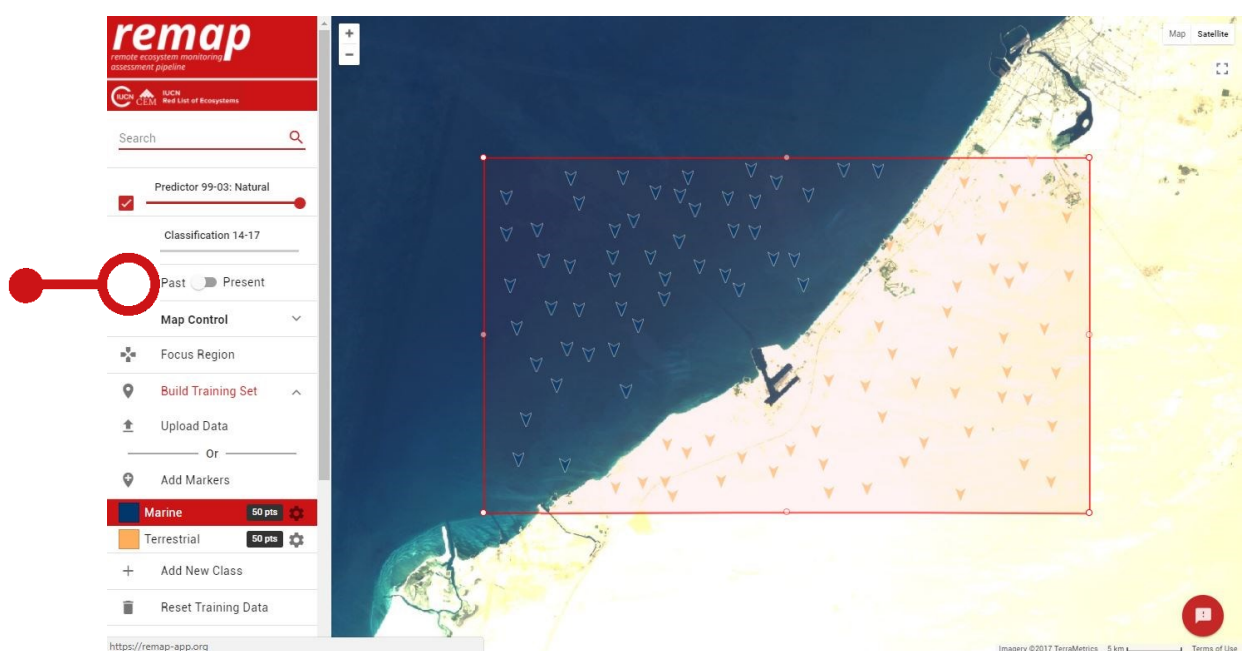
Results

Use the results and assessment functions to assess the accuracy of your classified map, record the area of each class and obtain the spatial metrics required for assessments under the IUCN Red List of Ecosystems (https://iucnrle.org).

Select time period

Repeat the above process, this time with the time toggle switched to past. Note the underlying Landsat data changes to a cloud-free Landsat image composite produced with >300,000 Landsat images acquired between 1999 and 2003. Also note that in most cases it is necessary to develop a new training set for the historical map, because land cover is likely to have changed in that time.
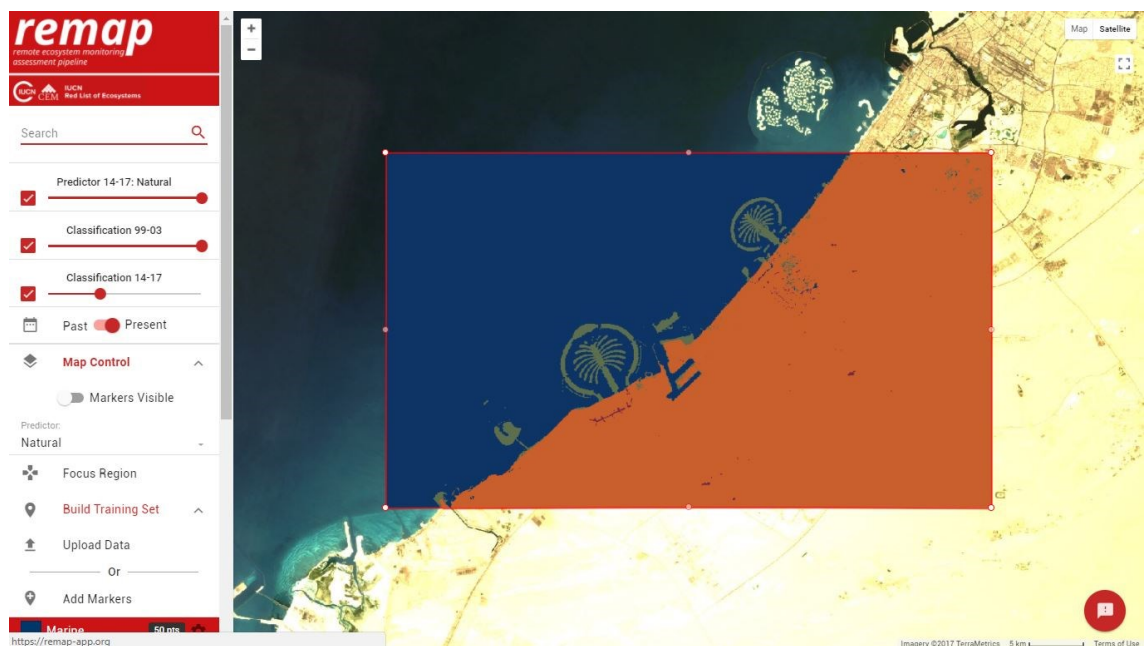
https://remap-app.org

Classify

Now classify the historical imagery to produce a map of marine and terrestrial areas with mean year 2001.

Compare the results using the transparency sliders in map control.

Export data

Remap allows you to export the data used to develop your map:

1. Download a .csv file of your training set to your local drive by clicking Export Data, Download CSV. This file can be opened in a text editor, Google Sheets or Excel to review your training set.
2. This dataset can be uploaded again via the Build Training Set tab at a later date to continue your classification

Save your workspace

Remap allows you to save your workspace to continue your work at a later date.

1. Use Export Data and Download JSON to download a remap 'workspace' file (.JSON).
2. The workspace file saves your training set, the focal region, map classes and class options such as colour.
3. This option is very useful if you want to return to working on your classification with minimal fuss. Simply upload the remap 'workspace' file (.JSON) can be uploaded again via the Build Training Set, Data Upload function, and Remap will return to where you left off.

Export map as GeoTIFF

Remap also allows you to download a spatially rectified GeoTIFF file for use in third party software such as R, ArcGIS and QGIS (Drive export GeoTIFF). To find out more about the GeoTIFF export function, refer to the Remap User Guide.

Analyse results

Now that you have two estimates of area, you can quickly and easily determine the rate of change using our new 'redlistr' R package. Similarly, you can use 'redlistr' to further analyse geoTIFFs exported from remap, such as calculating AOO while accounting for uncertainty and alternative analyses of the rates of change.

To find out more, visit the redlistr package page and follow the tutorials.

https://cran.r-project.org/package=redlistr

About remap

Remap was developed with funding from a Google Earth Engine Research Award with aim of increasing the utility of remote sensing for global environmental conservation. We thank the Google Earth Engine team for developing such a ground-breaking geospatial analysis tool.

If you use remap for any purpose, please acknowledge it by citing our paper and software:

The data used to prepare this tutorial are available at:

https://figshare.com/s/7125654aded6d9235f08

Google Earth Engine