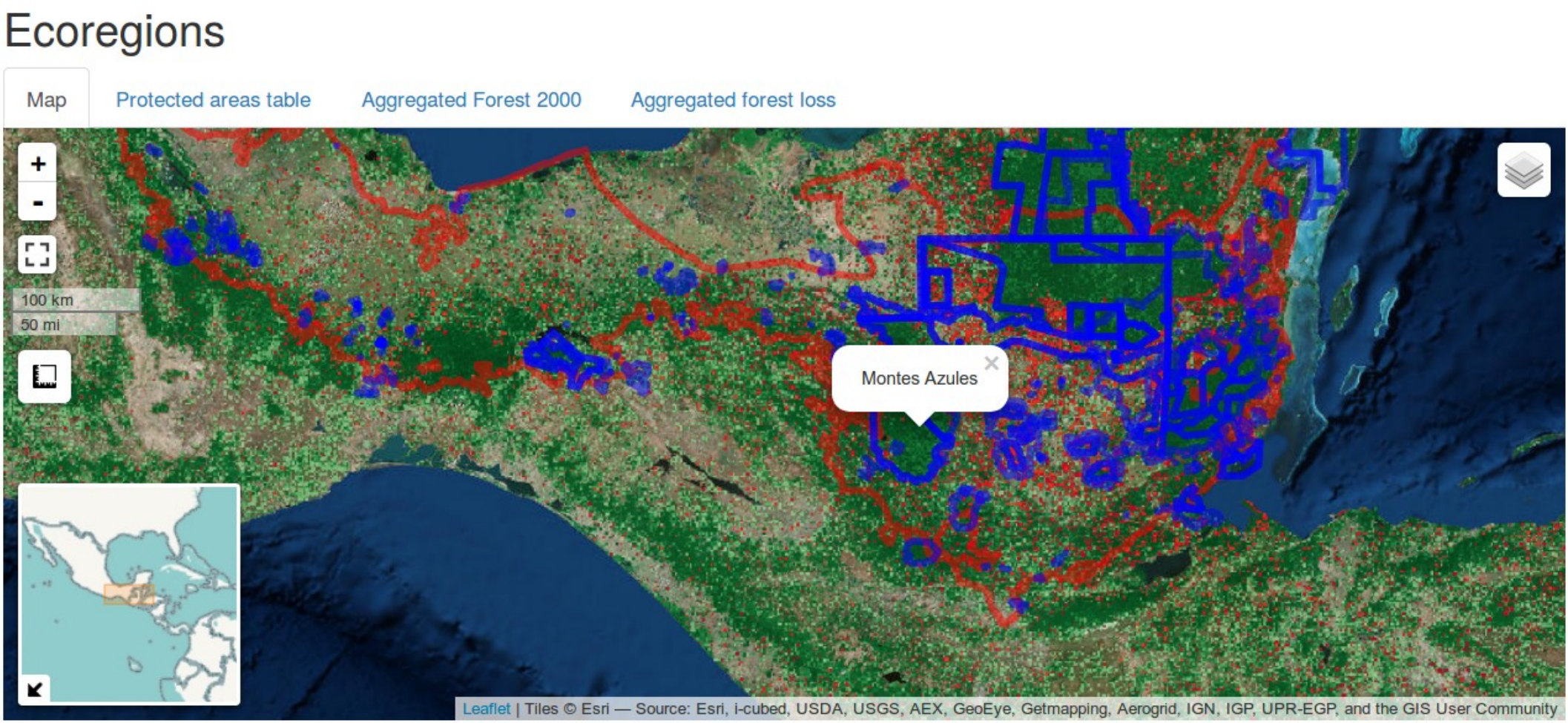
Using the tool on the server for Ecoregion forest loss assesment



Basis of the tool

- The tool uses data stored in a PostGIS data base plus geotiff raster files on the server
- Data is pulled from the database into R
- Analysis uses spatial SQL and R
- Maps are visualised using leaflet
- WMS images of Hansen's data from Geoserver included

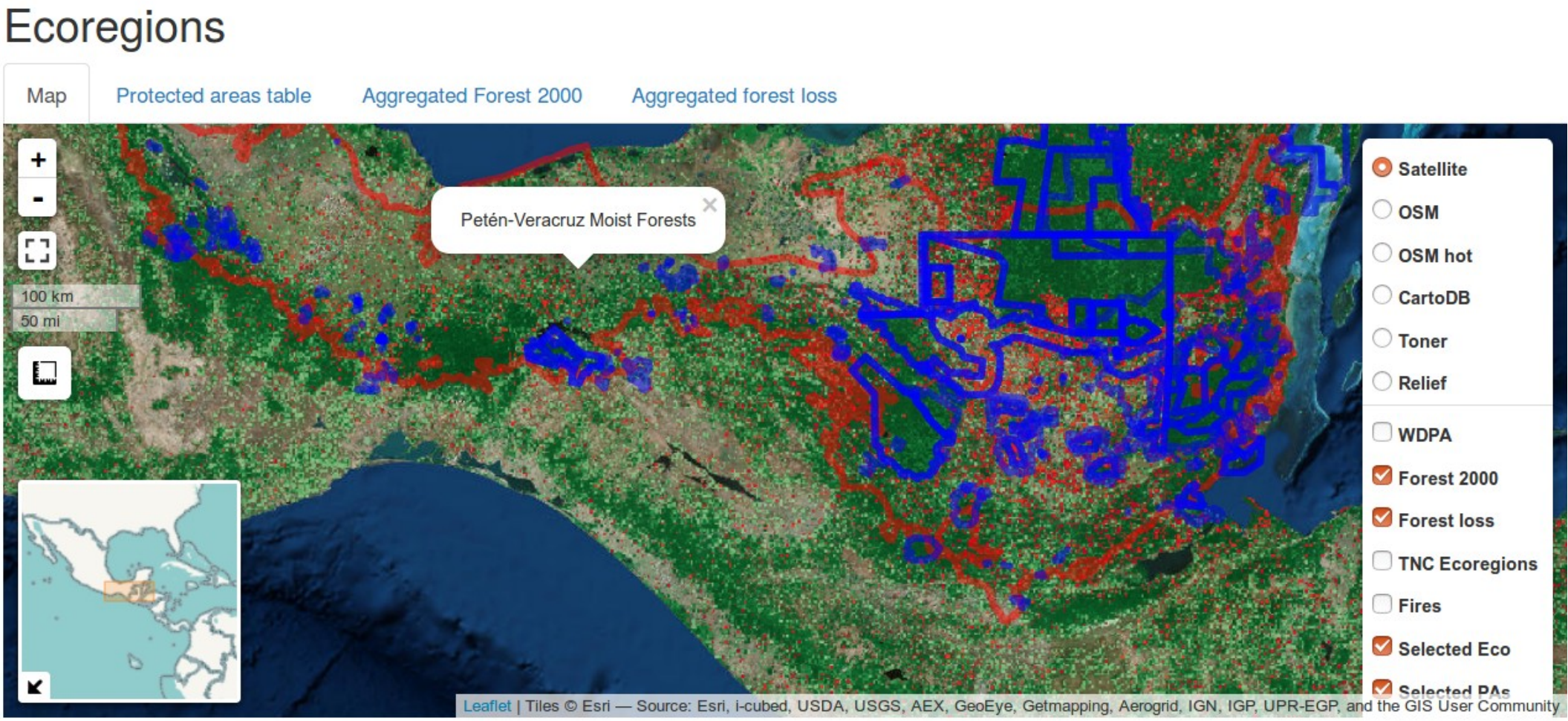
Aim of the tool

- Aims to provide some help with “big data” aspects of the assignment
- Makes some GIS analyses simple to run
- Enables data visualisation through a browser rather than desktop GIS
- Clips the server data to the selected Ecoregion
- Runs a simple fragmentation analysis at a regional scale

Getting started

- Open the link in a browser
- http://r.bournemouth.ac.uk:3838/Ecoregions_test/
- Zoom to area of interest
- Click on the map to select your ecoregion

Ecoregion shown in red: Protected areas in blue: Click to see name



Changing base maps and overlays

- Choose the layers to include in the leaflet map visualisation using the control (top right)

- Go full screen using the control on the top left

- Use the measuring tool for distances and areas

Table of protected areas

Details of the protected areas from the World Data Base of Protected Areas downloadable as a table that can be opened in Excel

Ecoregions

Map | Protected areas table | Aggregated Forest 2000 | Aggregated forest loss

Copy CSV Show 10 entries Search:

	gid	wdpaid	wdpa_pid	pa_def	name	orig_name	desig	desig_eng	desig_type	iucn_cat	int_crit
1	385	315067	315067	1	Maya	Maya	Zona de Uso Multiple	Multiple Use Zone	National	VI	Not Applicable
2	425	315070	315070	1	Río Sarstun	Río Sarstun	Zona de Uso Multiple	Multiple Use Area	National	III	Not Applicable
3	428	315071	315071	1	Maya	Maya	Zona de Amortiguamiento	Buffer Zone	National	VI	Not Applicable
4	1356	67982	67982	1	Parque Nacional Laguna del Tigre	Parque Nacional Laguna del Tigre	Ramsar Site, Wetland of International Importance	Ramsar Site, Wetland of International Importance	International	Not Reported	(i) (ii) (iii) (vii) (viii)
5	1225	902858	902858	1	Parque Nacional Yaxhá-	Parque Nacional Yaxhá-	Ramsar Site, Wetland of International	Ramsar Site, Wetland of International	International	Not Reported	(ii) (iv)

Order and search tables

Tables can be ordered by clicking on column headers. Use the full text search to filter entries

Ecoregions

Map | Protected areas table | Aggregated Forest 2000 | Aggregated forest loss

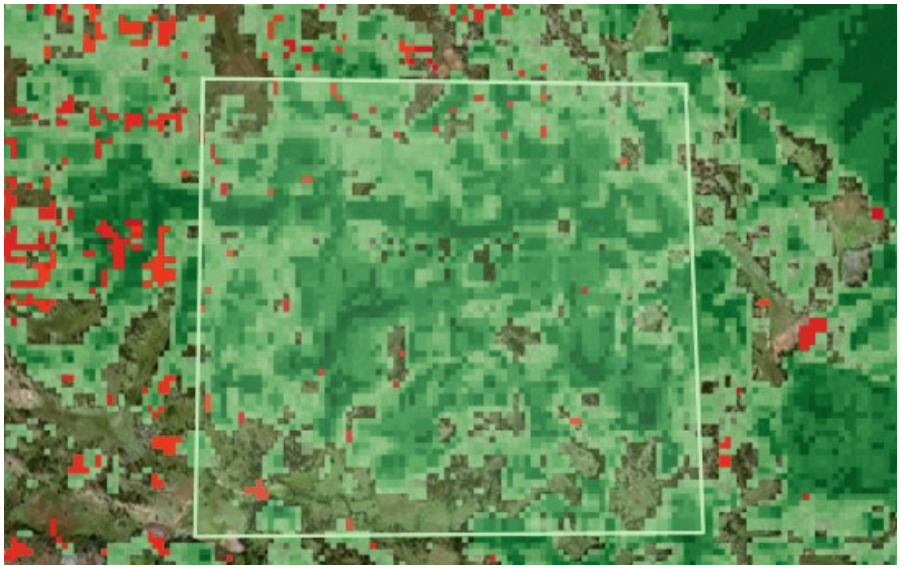
Copy CSV **Show** 10 **entries** **Search:** Tikal

	gid	wdpaid	wdpa_pid	pa_def	name	orig_name	desig	desig_eng	desig_type	iucn_cat	int_crit	mari
15	5508	193	193	1	Tikal	Tikal	Parque Nacional	National Park	National	Not Reported	Not Applicable	0
272	106297	197	197	1	Tikal National Park	Parc national de Tikal	World Heritage Site	World Heritage Site	International	Not Applicable	(i)(iii) (iv)(ix)(x)	0

Showing 1 to 2 of 2 entries (filtered from 272 total entries) Previous 1 Next

Regional scale analysis

- Hansen's raster layer is aggregated to 100 x 100 pixel grid squares
- Approximately 8 km² in area (Arne RSPB reserve = approx 4 km² New Forest national park = 571 km²)



Regional scale analysis

- Number of pixels exceeding a threshold value of within pixel estimated forest cover summed within grid squares and converted to a percentage of pixels.

- This is calculated for the entire Ecoregion to provide a summary table at this scale

Percentage of grid squares cut by percent pixels > threshold

Ecoregions

Map | Protected areas table | Aggregated Forest 2000 | Aggregated forest loss

% cover

20 50 90

20 30 40 50 60 70 80 90

Run analysis - this may take several minutes | Download fragmentation analysis

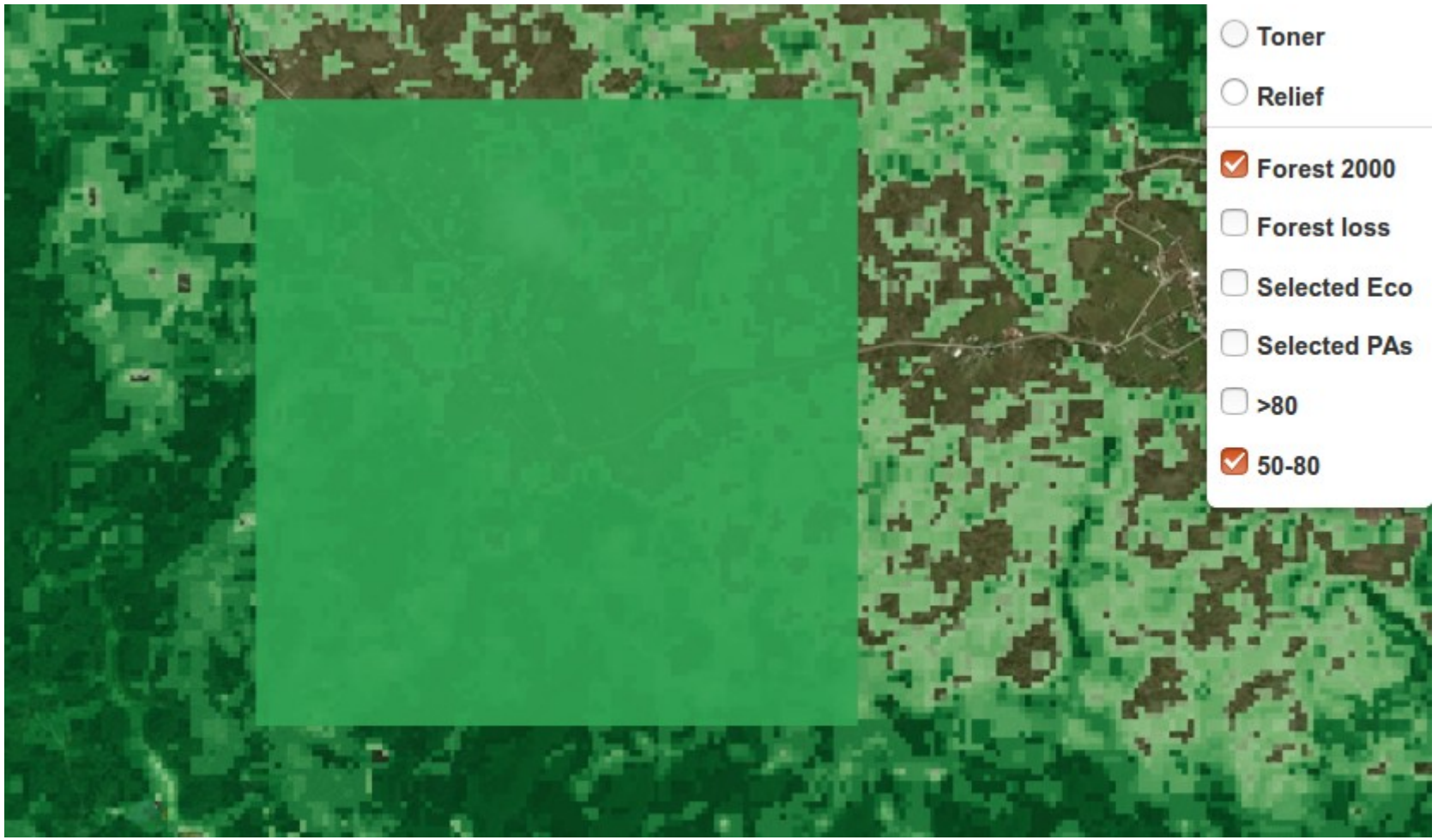
Copy | CSV | **Show** 10 **entries** | **Search:**

	cut	Percent
1	<20	17.5
2	20-50	29.3
3	50-80	27.7
4	>80	25.3
5		0.1

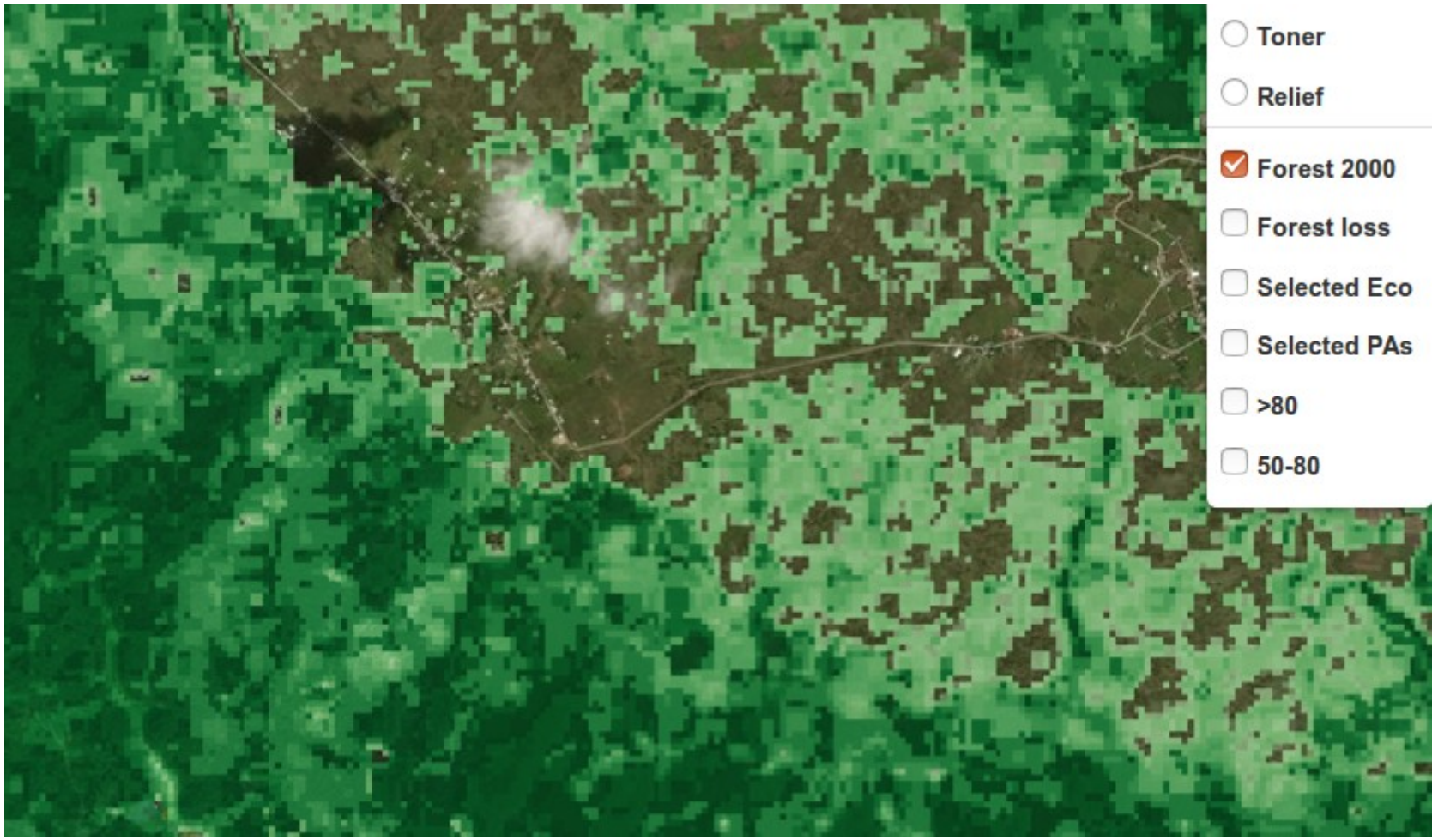
Showing 1 to 5 of 5 entries

Previous | 1 | Next

Grid square as shown on the original map



Grid square as shown on the original map



Regional scale

- Extent = extent of Ecoregion
- Grain = 8 km²

- Identifies the large areas of undisturbed forest at this scale
- Many trees and small areas of fragmented woodland are missed
- The “matrix” may be very heterogeneous and include well preserved habitat outside the areas of contiguous, undisturbed forest

Characteristics

- Analysis looks only at fragmentation of large areas of “pristine” undisturbed forest
- Shows loss of “wilderness” forest as a result of fragmentation
- Underestimates the importance of small forest fragments
- Quick to run analyses at the regional extent, once the pixel aggregation has run

Fragmentation analysis

- HTML file can be downloaded and saved locally

Saved HTML file contains interactive map and tables

Method

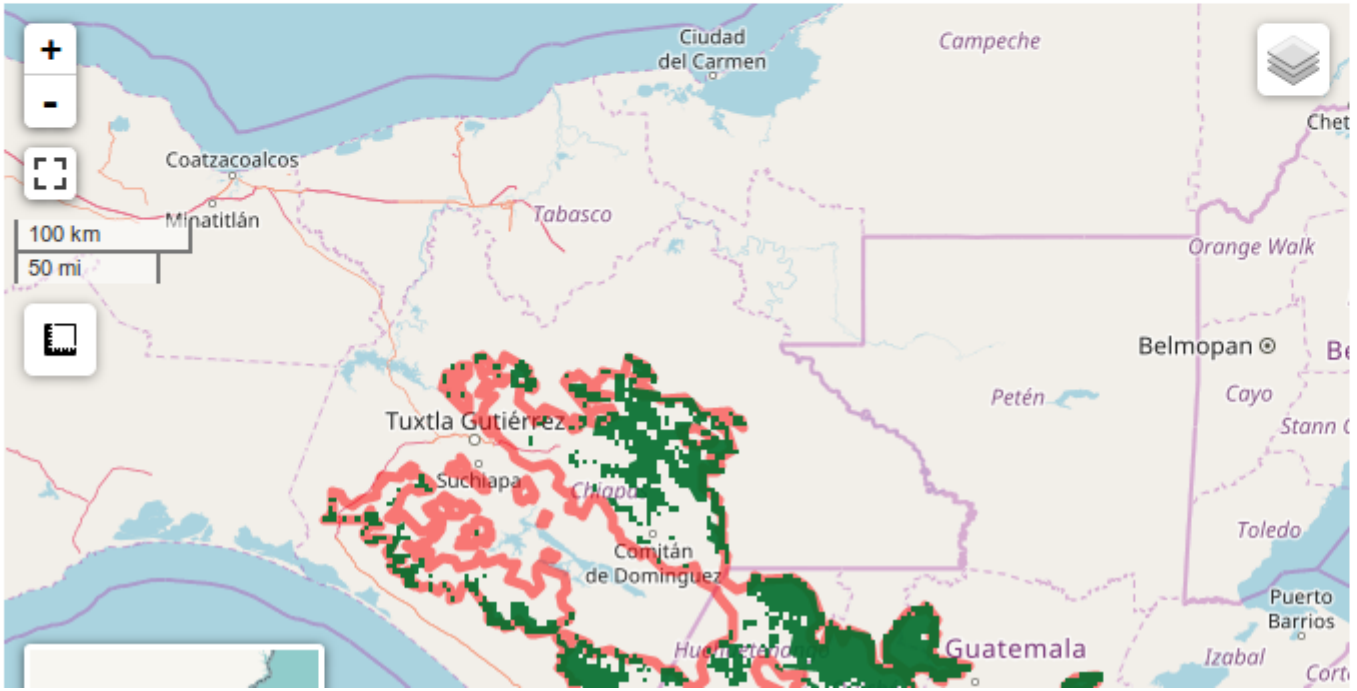
Hansen's map of forest cover in the year 2000 was aggregated to 100 x 100 pixel grid squares. Within each of these square the number of pixels exceding the threshold of 50% estimated cover was counted. This was expressed as a percentage of the grid cell area. The number of pixels lost to deforestation was subbtracted in order to estimate intact forest cover within each cell for the year 2016

Grid cells with over 80% reaching or exceding the threshold values were then considered to be intact forest at this scale.

The cells were clumped to form polygons for which the area and perimeter of each polygon were calculated.The shape index was calculated using the fomula.

$$shape = \frac{perimeter}{4\sqrt{area}}$$

The core areas of each polygon were calculated by subtracting the area falling within a 1 km negative buffer from the polygon area.



Saved file

- Map can be taken full screen in order to look at fragments
- Large fragments based on “threshold” criteria of >80% intact forest cover
- Simple patch metrics are calculated for each fragment at this coarse, regional scale
- Change in fragmentation summarised at the ecoregional scale

Table of all fragments

Forest fragments in 2000

Copy CSV Show 10 entries Search:

	areakm2	perimeter	shape	core	corep	percent_total_forest
1	7.9	11.3	1.0	0.7	8.0	0.0
2	7.9	11.3	1.0	0.7	8.0	0.0
3	15.9	16.8	1.1	3.0	19.0	0.0
4	23.8	22.6	1.2	5.5	23.0	0.1
5	23.8	22.6	1.2	5.5	23.0	0.1
6	23.9	22.6	1.2	5.5	23.0	0.1
7	8.0	11.3	1.0	0.7	8.0	0.0
8	8.0	11.3	1.0	0.7	8.0	0.0
9	8.0	11.3	1.0	0.7	8.0	0.0
10	15.9	16.9	1.1	3.1	19.0	0.0

Showing 1 to 10 of 342 entries Previous 1 2 3 4 5 … 35 Next

Summary by fragment size class

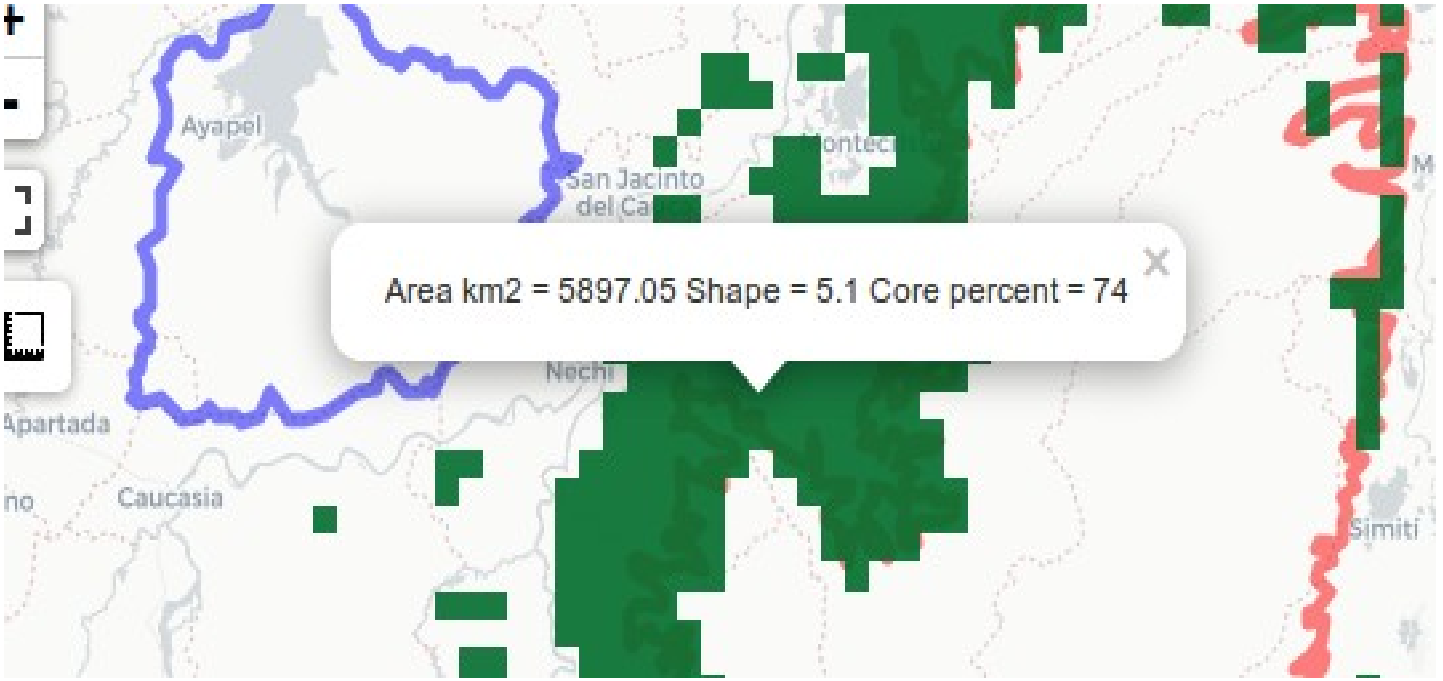
Summary forest fragments 2000

Copy CSV Show 10 entries Search:

	size_class	npatches	percent_total	per_core
1	<10	159	3.5	0.5
2	10-100	131	11.4	5.5
3	100-1000	43	30.1	28.4
4	1000 -10,000	9	55.0	65.6

Showing 1 to 4 of 4 entries Previous 1 Next

Click on each fragment to see individual patch metrics



Percent of pixels meeting criteria within protected areas

- The code also calculates the percentage of pixels within each protected area reaching the overall (Hansen estimate) of forest cover in 2000 as set on the interface before compiling HTML
- Percent of pixels registered as loss also calculated

Percent forest cover within protected areas

Mean forest cover within each reserve

Copy CSV Show 10 entries Search:

	name	mean
1	a Outside protected area	49.1
2	Agalta	82.7
3	Amayo o Santa Barbara	23.9
4	Antigua Estancia de los Leones	45.8
5	Apaneca-Llamatepec	64.8
6	Astillero Cerro Nimachay	65.3
7	Astillero Municipal de Tecpán	77.9
8	Astillero Municipal Sunpango, El Rejon, Chirres y Los Encuentros	56.0

Fires within protected areas

- The count of fires occurring each year within protected areas are tabulated
- An overall graph of fires within protected areas is added

Advice for assignment

- There are many possible analyses
- Do **not** try to include too much in one report
- Pick the most relevant aspects
- Complement any analyses run through the interface with additional work using a desktop GIS, if you are comfortable using GIS independently
- Look at visual patterns and pick out key aspects of the change due to deforestation
- Be aware of scaling issues. Patterns at the regional extent obscure local patterns due to lowering the resolution.

Putting maps together to form figures

- You may use screenshots of leaflet maps to compile figures
- Do always try to include a measure of scale (leaflet maps have a scale bar)
- Do place several maps together to show contrasting patterns and changes
- Annotate all figures with **informative** captions