

Vectorising a portion of the global forest cover map

The data can be obtained from here. <http://earthenginepartners.appspot.com/science-2013-global-forest>

Load the packages.

```
## These lines are for troubleshooting if a student has a problem
## Not run normally
system ("gdalinfo forest2000.tif")
system ("gdalinfo loss.tif")
```

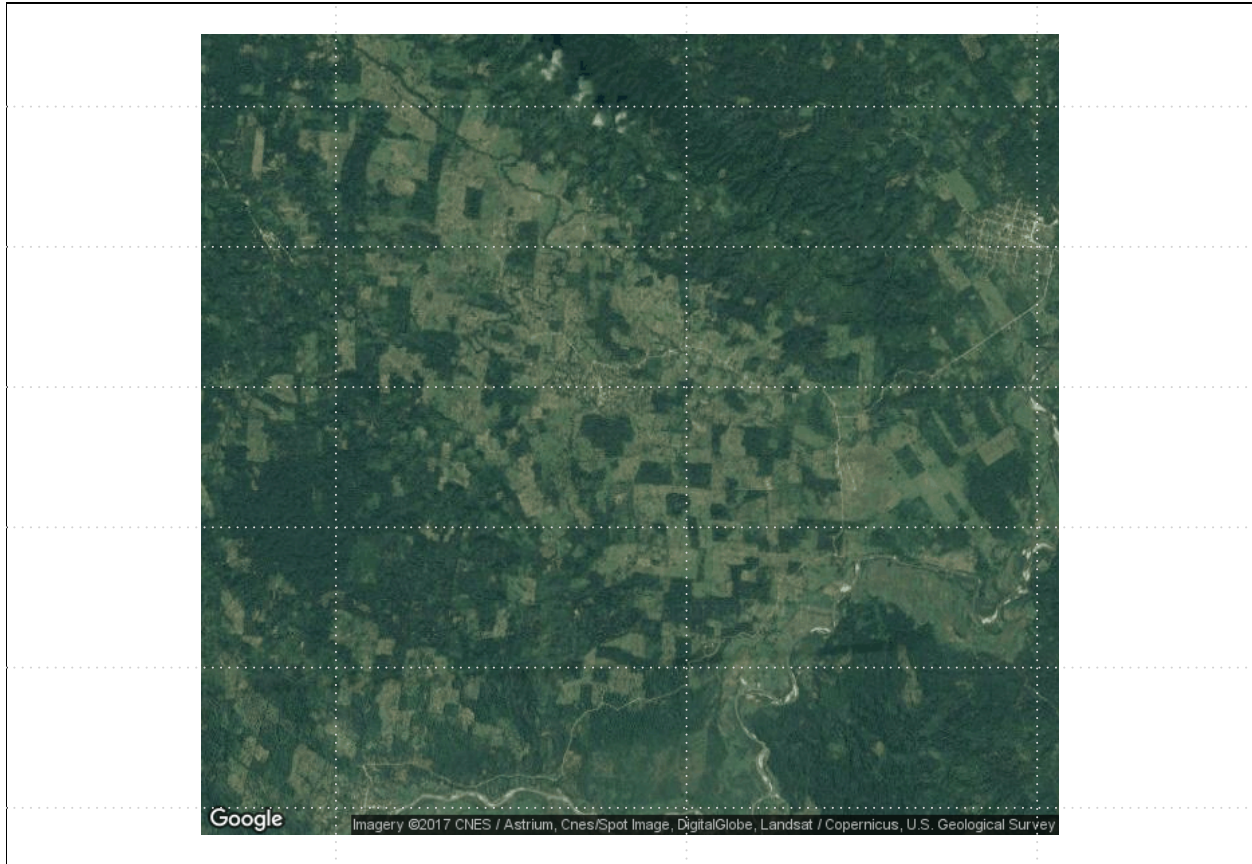
These lines should reproject if the layer is in the wrong CRS.

```
system ("gdalwarp -t_srs EPSG:3857 forest2000.tif forest2000_3857.tif")
system ("gdalwarp -t_srs EPSG:3857 loss.tif loss_3857.tif")
```

Load the data

```
forest2000<-raster("forest2000_3857.tif")
loss<-raster("loss_3857.tif")
mp<-gmap(forest2000,type="satellite")
plot(mp)
```

```
axis(1)
axis(2)
box()
grid()
```



Turn into binary forest-non forest maps

You may want to change the cut off point here. I have set it to 80%

```
percent_cover= 80
```

This is good for moist forest, but you may need a lower value for dry forest.

```
forest2000<-1*(forest2000>=percent_cover)
nonforest2000<-1-forest2000
mask<-1-loss
forest2012<-forest2000*mask
nonforest2012<-1-forest2012
```

Set the minimum size for the fragments.

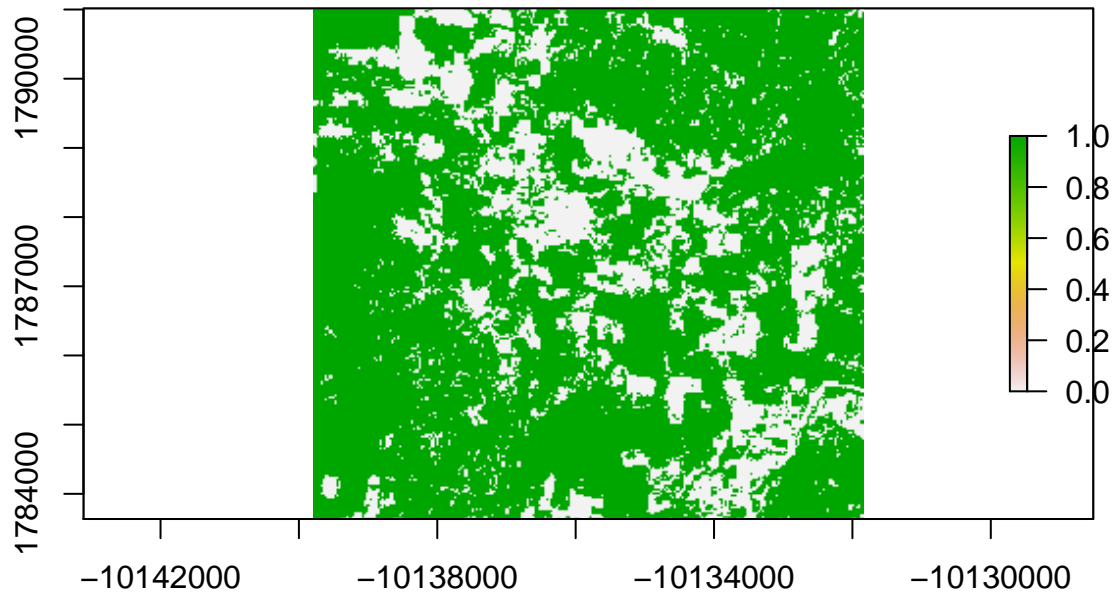
You can also change this, but don't set it too small

The size is in hectares One hectare is around 9 pixels in the original image

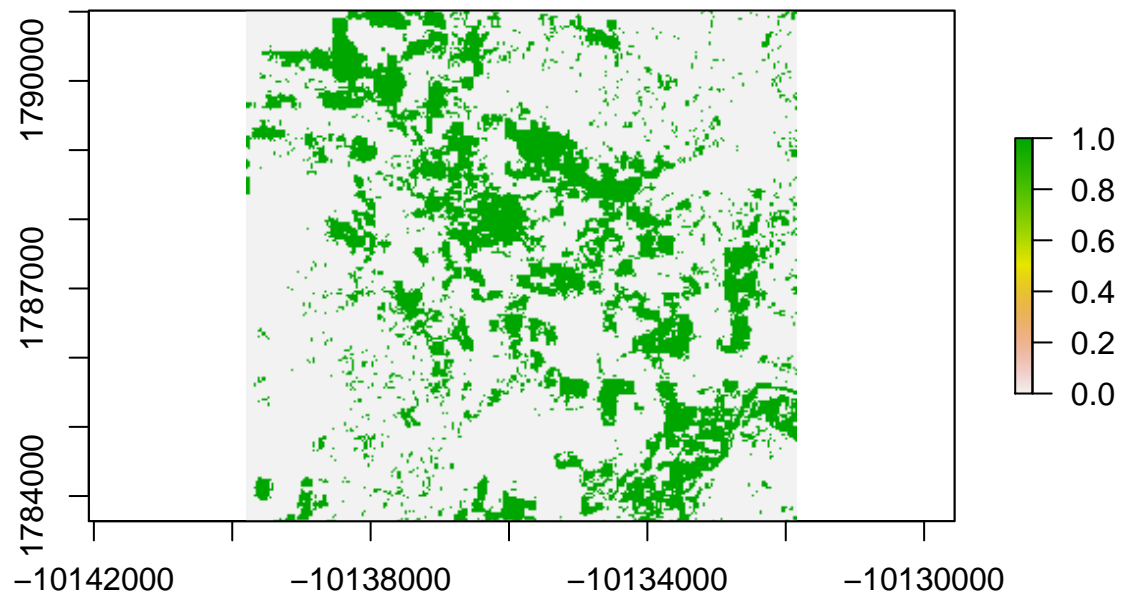
```
min_size<-4
```

Plot the layers

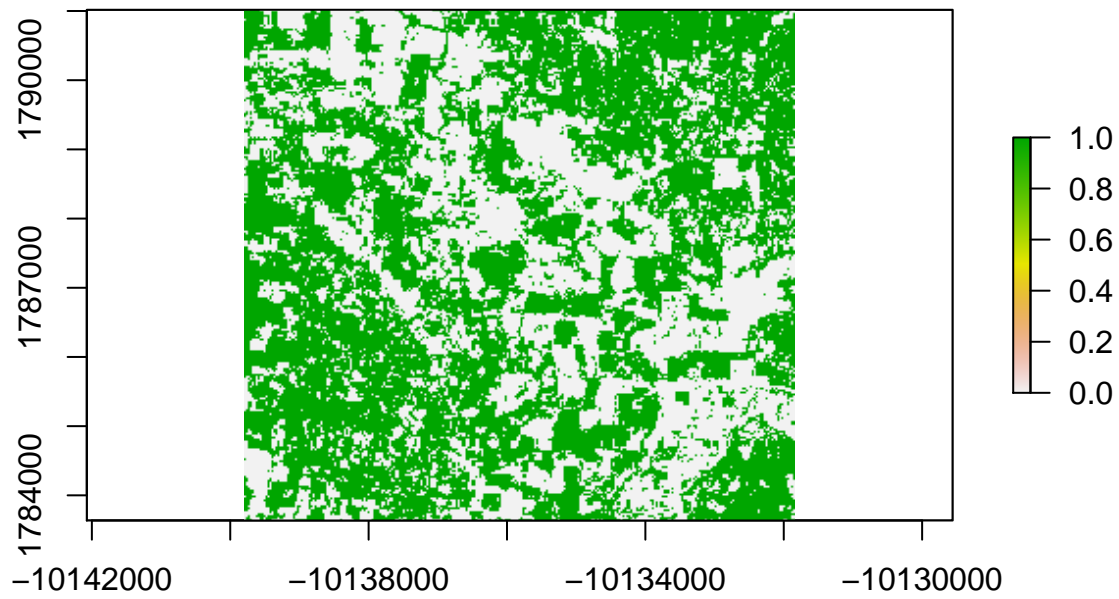
```
plot(forest2000)
```



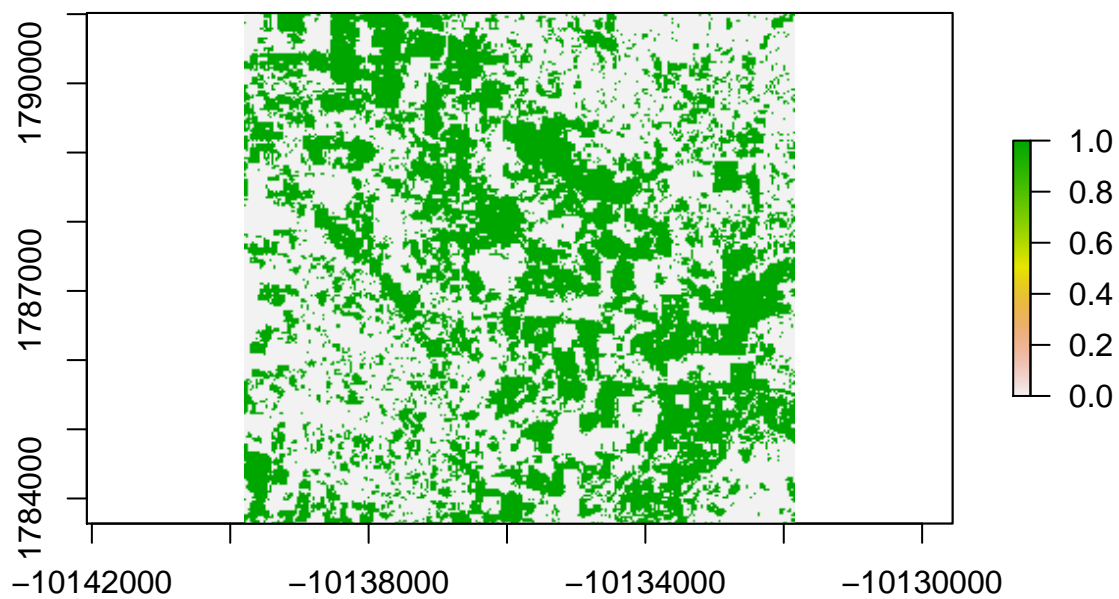
```
plot(nonforest2000)
```



```
plot(forest2012)
```



```
plot(nonforest2012)
```



Calculate the total area in hectares

```
totalarea<-(forest2000@extent@xmax-forest2000@extent@xmin)*(forest2000@extent@ymax-forest2000@extent@ymin)
totalarea
```

```
## [1] 5866.371
```

Vectorisation function

```

vect<-function(){
  id <- values(cl)
  crds <- coordinates(cl)
  crds <- crds[!is.na(id), ]
  id <- id[!is.na(id)]
  crds <- data.frame(id, crds)
  coordinates(crds) <- ~x + y
  buf1 <- gBuffer(crds, width = 50, byid = T)
  buf2 <- gUnaryUnion(buf1, id)
  buf3 <- gBuffer(buf2, width = -50, byid = T)
  frags<-buf3[gArea(buf3,byid=T)>min_size*10000]
  area<-gArea(frags,byid=T)
  edge<-gBoundary(frags,byid=T)
  perims<-gLength(edge,byid=T)
  d<-data.frame(id=names(frags),area,perims)
  d$shape<-d$perims/(2*pi*sqrt(d$area/pi))
  d$area<-d$area/10000

  d$cumarea<-cumsum(d$area)
  d$ptot<-d$area/totalarea*100
  d$parea<-d$area/sum(d$area)*100
  frags<-SpatialPolygonsDataFrame(frags,data=d,match.ID=FALSE)
  proj4string(frags)<-CRS("+init=epsg:3857")
  frags
}

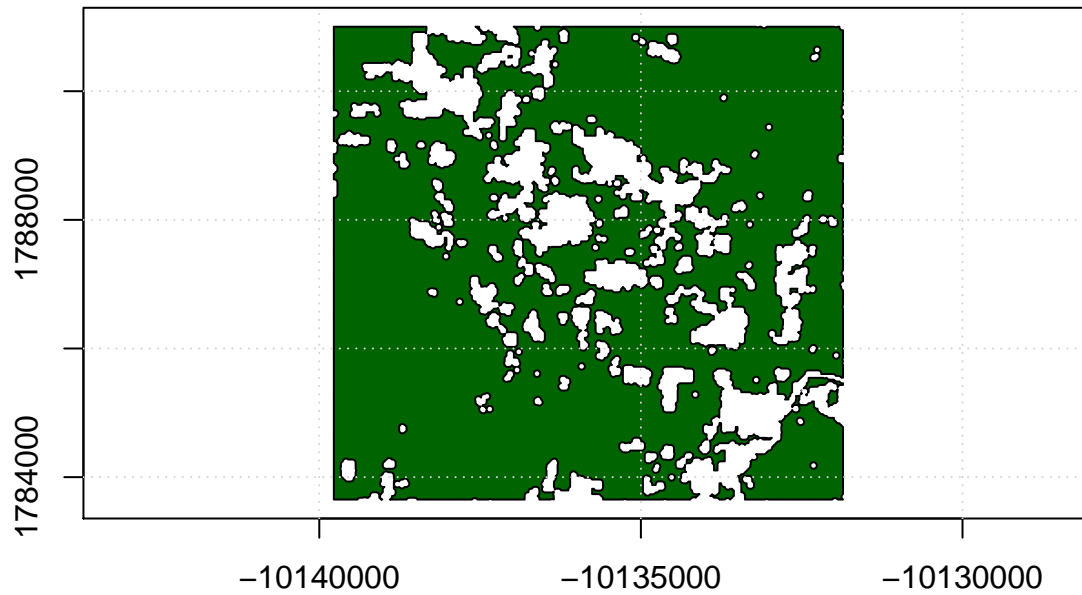
```

Vectorise forest 2000 area

```

cl<-clump(forest2000)
frags<-vect()
plot(frags,col="darkgreen")
axis(1)
axis(2)
box()
grid()

```



```
writeOGR(frags,dsn="shapefiles","forest2000",driver="ESRI Shapefile",over=TRUE)
```

Tabular data

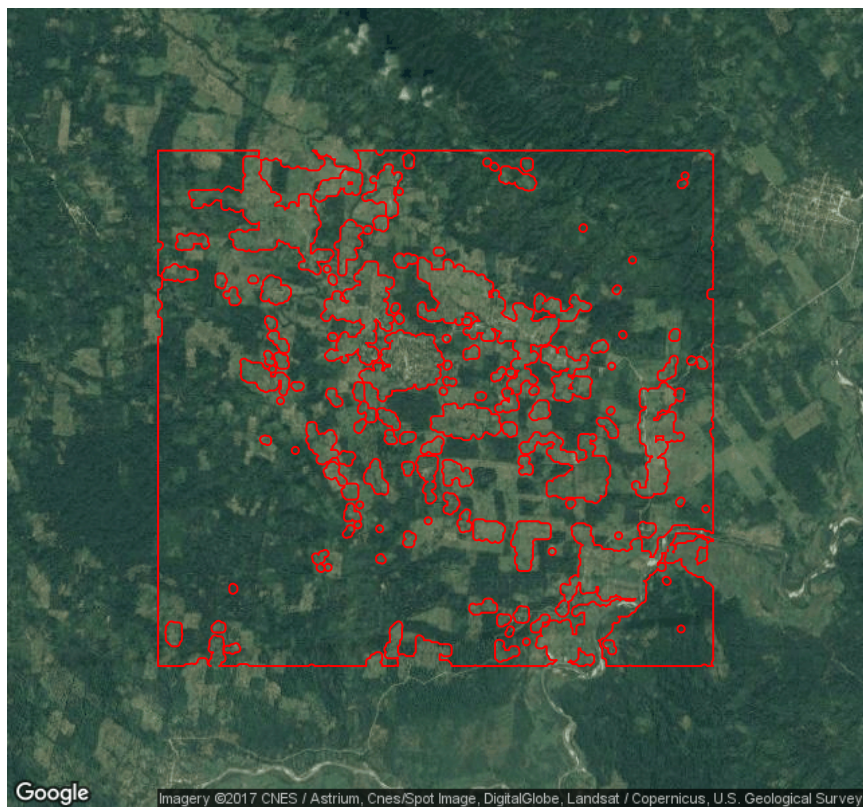
The table includes the percentage of the total study site area for each fragment and the percentage of the landscape class. This is particularly useful when looking at the largest patch.

```
frags@data
```

##	id	area	perims	shape	cumarea	ptot	parea
## 1	1	4269.363302	183791.568	7.934857	4269.363	72.77690867	95.97803391
## 80	80	174.584559	10322.879	2.203906	4443.948	2.97602326	3.92477320
## 121	121	4.323403	1143.461	1.551328	4448.271	0.07369809	0.09719289

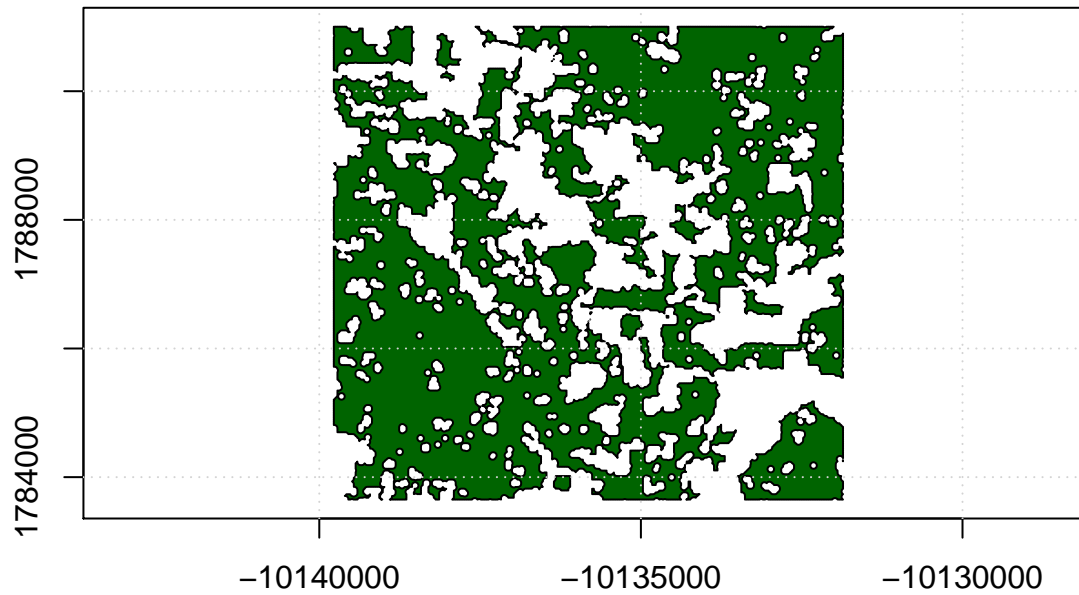
```
plot(mp)
```

```
plot(frag, add = T, border = "red", col = "transparent")
```



Vectorise forest 2012

```
cl<-clump(forest2012)
frags<-vect()
plot(frags,col="darkgreen")
axis(1)
axis(2)
box()
grid()
```

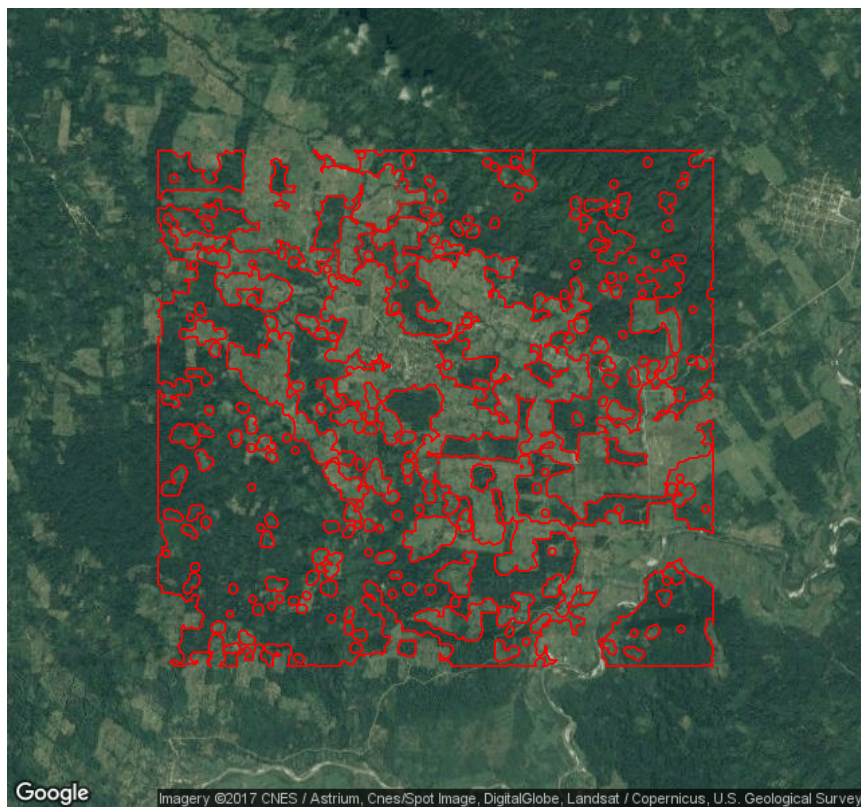
```
frags@data
```

##	id	area	perims	shape	cumarea	ptot
## 1	1	50.970718	5367.9142	2.120998	50.97072	0.86886288
## 3	3	2772.036103	237559.6306	12.728237	2823.00682	47.25299865
## 6	6	10.602583	2442.7159	2.116227	2833.60940	0.18073496
## 75	75	47.961879	8280.2056	3.372781	2881.57128	0.81757326
## 105	105	10.595111	2429.0610	2.105139	2892.16639	0.18060760
## 134	134	176.539458	22712.7272	4.822180	3068.70585	3.00934709
## 155	155	10.435650	2085.8937	1.821493	3079.14150	0.17788937
## 174	174	8.862721	1323.0739	1.253706	3088.00422	0.15107673
## 242	242	146.506433	10738.1661	2.502631	3234.51066	2.49739471
## 294	294	4.985708	893.5299	1.128862	3239.49636	0.08498794
##	parea					
## 1	1.5734149					
## 3	85.5699711					
## 6	0.3272911					
## 75	1.4805350					
## 105	0.3270604					
## 134	5.4495958					
## 155	0.3221380					
## 174	0.2735833					
## 242	4.5225065					
## 294	0.1539038					

```
writeOGR(frag,dsn="shapefiles","forest2012",driver="ESRI Shapefile",over=TRUE)
```

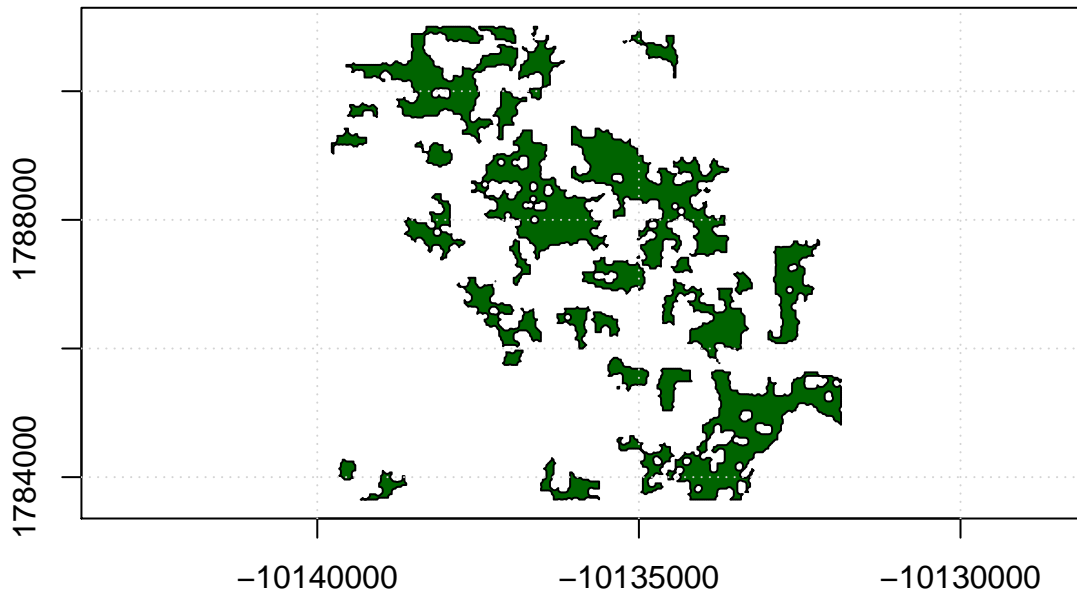
```
plot(mp)
```

```
plot(frag, add = T, border = "red", col = "transparent")
```



Vectorise non forest 2000

```
cl<-clump(nonforest2000)
frags<-vect()
plot(frags,col="darkgreen")
axis(1)
axis(2)
box()
grid()
```



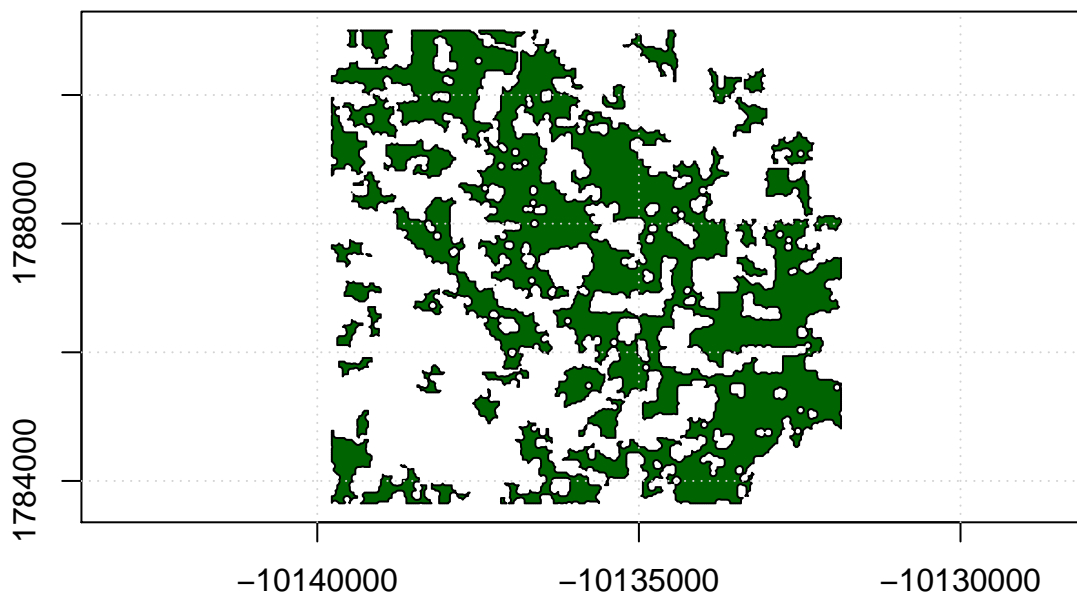
```
frags@data
```

##	id	area	perims	shape	cumarea	ptot	parea
## 1	1	130.558472	14901.1265	3.678846	130.5585	2.22554074	12.3380371
## 2	2	7.489026	1519.0692	1.565885	138.0475	0.12766030	0.7077280
## 3	3	23.635242	4617.8734	2.679520	161.6827	0.40289377	2.2335777
## 13	13	13.876151	3175.3653	2.404663	175.5589	0.23653724	1.3113241
## 107	107	14.672965	2492.2588	1.835394	190.2319	0.25011997	1.3866246
## 134	134	5.186847	1463.4856	1.812724	195.4187	0.08841663	0.4901675
## 177	177	181.230938	20455.1569	4.286292	376.6496	3.08931953	17.1266866
## 180	180	7.222006	1819.6693	1.910111	383.8716	0.12310859	0.6824941
## 188	188	149.801515	16018.3873	3.691950	533.6732	2.55356371	14.1565433
## 210	210	9.988054	1920.4659	1.714199	543.6612	0.17025952	0.9438912
## 287	287	27.966586	5385.3135	2.872674	571.6278	0.47672721	2.6428984
## 352	352	7.246474	2020.3884	2.117223	578.8743	0.12352568	0.6848063
## 354	354	53.805209	6645.8757	2.555849	632.6795	0.91718050	5.0847000
## 369	369	28.136028	4127.8152	2.195250	660.8155	0.47961557	2.6589110
## 372	372	4.162871	995.9909	1.377064	664.9784	0.07096161	0.3933997
## 397	397	5.317115	1113.9540	1.362775	670.2955	0.09063722	0.5024781
## 406	406	37.366325	6919.7845	3.193357	707.6618	0.63695811	3.5311925
## 409	409	59.711542	8178.1577	2.985530	767.3734	1.01786172	5.6428604
## 451	451	12.731896	2653.3331	2.097685	780.1053	0.21703189	1.2031896
## 455	455	8.498351	1636.8200	1.583903	788.6036	0.14486556	0.8031112
## 502	502	4.667434	1007.8529	1.315992	793.2710	0.07956255	0.4410819
## 514	514	14.821402	2215.4352	1.623340	808.0925	0.25265027	1.4006521
## 545	545	17.719510	2288.4261	1.533579	825.8120	0.30205233	1.6745291
## 552	552	177.358456	20669.9469	4.378330	1003.1704	3.02330799	16.7607294
## 641	641	19.588779	4961.7159	3.162447	1022.7592	0.33391648	1.8511788
## 673	673	20.558705	3992.7047	2.484073	1043.3179	0.35045014	1.9428388
## 675	675	5.415338	1042.8067	1.264114	1048.7332	0.09231155	0.5117602
## 693	693	9.445391	2404.0405	2.206617	1058.1786	0.16100911	0.8926084

```
writeOGR( frags, dsn="shapefiles", "nonforest2000", driver="ESRI Shapefile", over=TRUE)
```

Vectorise non forest 2012

```
cl<-clump(nonforest2012)
frags<-vect()
plot(frags,col="darkgreen")
axis(1)
axis(2)
box()
grid()
```



```
frags@data
```

##	id	area	perims	shape	cumarea	ptot	parea
## 1	1	15.546536	2832.294	2.026360	15.54654	0.26501114	0.7356680
## 3	3	189.543462	15719.520	3.220920	205.09000	3.23101743	8.9692687
## 4	4	8.549327	1778.660	1.716019	213.63933	0.14573452	0.4045574
## 5	5	1342.393769	126068.716	9.706495	1556.03309	22.88286608	63.5225836
## 9	9	17.711788	4059.805	2.721254	1573.74488	0.30192070	0.8381285
## 88	88	10.413247	2355.405	2.059054	1584.15813	0.17750747	0.4927588
## 90	90	6.328186	1357.908	1.522741	1590.48631	0.10787224	0.2994521
## 112	112	6.174712	1614.453	1.832788	1596.66103	0.10525607	0.2921897
## 133	133	23.381431	3904.085	2.277607	1620.04246	0.39856722	1.1064182
## 147	147	29.370531	3954.382	2.058343	1649.41299	0.50065930	1.3898247
## 148	148	11.779420	2379.102	1.955448	1661.19241	0.20079569	0.5574066
## 228	228	14.739174	3275.797	2.406997	1675.93158	0.25124859	0.6974633
## 238	238	32.061371	4491.223	2.237529	1707.99295	0.54652820	1.5171562
## 303	303	22.668999	3310.715	1.961556	1730.66195	0.38642288	1.0727057
## 308	308	14.526923	2991.393	2.214021	1745.18887	0.24763050	0.6874195
## 335	335	119.228017	15510.878	4.007212	1864.41689	2.03239824	5.6419151

##	368	368	6.077406	1330.170	1.522100	1870.49430	0.10359738	0.2875852
##	372	372	6.098714	1650.749	1.885632	1876.59301	0.10396060	0.2885935
##	399	399	8.046109	2085.274	2.073792	1884.63912	0.13715650	0.3807449
##	409	409	6.131884	1399.834	1.594684	1890.77100	0.10452601	0.2901631
##	450	450	9.709488	1725.273	1.561906	1900.48049	0.16551099	0.4594567
##	458	458	6.989914	2009.480	2.144090	1907.47041	0.11915227	0.3307654
##	478	478	4.234287	1469.087	2.013967	1911.70469	0.07217899	0.2003681
##	495	495	6.104166	1521.269	1.736952	1917.80886	0.10405353	0.2888515
##	572	572	5.458603	1586.149	1.915130	1923.26746	0.09304907	0.2583032
##	581	581	27.155885	3097.948	1.677016	1950.42335	0.46290776	1.2850268
##	586	586	5.312575	2043.524	2.501049	1955.73592	0.09055982	0.2513931
##	598	598	6.059424	2232.035	2.557881	1961.79535	0.10329085	0.2867343
##	634	634	9.119427	1757.683	1.641919	1970.91477	0.15545261	0.4315347
##	653	653	16.156948	2964.391	2.080420	1987.07172	0.27541642	0.7645529
##	671	671	4.739522	1121.703	1.453468	1991.81124	0.08079139	0.2242760
##	684	684	54.698653	9782.259	3.731177	2046.50990	0.93241044	2.5883611
##	709	709	36.743096	4081.217	1.899315	2083.25299	0.62633436	1.7386973
##	773	773	23.060812	4614.887	2.710933	2106.31381	0.39310186	1.0912464
##	809	809	6.940555	1847.878	1.978660	2113.25436	0.11831089	0.3284297

```
writeOGR(frags,dsn="shapefiles","nonforest2012",driver="ESRI Shapefile",over=TRUE)
```