

Reproducible R code for the manuscript entitled ‘Forest loss and fire in the Dominican Republic during the 21st Century’: Data download, preparation and exploratory data analysis (EDA)

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1 Description and URLs

This is a reproducible notebook of the manuscript entitled 'Forest loss and fire in the Dominican Republic during the 21st Century' (Martínez Batlle, 2021). Useful URLs are listed below:

- This document: <https://github.com/geofis/forest-loss-fire-reproducible/data-download-preparation-eda.pdf>
- Source repo: <https://github.com/geofis/forest-loss-fire-reproducible>
- Associated preprint DOI: <https://www.biorxiv.org/content/10.1101/2021.06.15.448604>
- Associated preprint full text: <https://www.biorxiv.org/content/10.1101/2021.06.15.448604.full>
- Dataset: `forest-loss-fire-reproducible-data-repo.zip`. Download it from [ZENODO](#)
- Cite the preprint using the following format: Martínez Batlle, J. R. (2021). Forest loss and fire in the Dominican Republic during the 21st Century. *bioRxiv*. <https://doi.org/10.1101/2021.06.15.448604>

2 Instructions for downloading the source data

Visit [ZENODO](#), download `forest-loss-fire-reproducible-data-repo.zip` (preserve its name, otherwise, won't work) and place the ZIP file in this repo (e.g. in the same directory containing this document).

3 Unzip source data

```
if(any(dir.exists('out'), dir.exists('data'))) {  
  "Directories 'out' and/or 'data' already available in the repo dir. Skipping unzip."  
} else {  
  unzip('forest-loss-fire-reproducible-data-repo.zip')  
}  
## [1] "Directories 'out' and/or 'data' already available in the repo dir. Skipping unzip."
```

4 Packages and functions

4.1 Packages

```
source('R/load-packages.R')  
my_tmap_options <- tmap_options()  
my_tmap_options$legend.format$big.num.abbr <- c("MM" = 6, "BB" = 9)  
tmap_options(my_tmap_options)
```

4.2 Custom functions

```
source('R/load-functions.R')
```

5 Abbreviations

Abbreviations used in column names and maps:

```

abbr <- data.frame(
  Abbreviation = c('MM', 'PUA', 'SQM', 'SQKM', 'PCT', 'PYR'),
  Meaning = c('millions', 'per unit-area', 'square meters', 'square kilometers', 'percent', 'per year'))
knitr::kable(abbr %>% arrange(.[[1]]), format = "latex") %>%
  kable_styling(bootstrap_options = "striped", full_width = F, position = "left")

```

| Abbreviation | Meaning |
|--------------|-------------------|
| MM | millions |
| PCT | percent |
| PUA | per unit-area |
| PYR | per year |
| SQKM | square kilometers |
| SQM | square meters |

6 Common use objects

6.1 Cores for parallel computing

```
UseCores <- detectCores() -1
```

6.2 Reference layers

These layers are used as references in thematic maps and provide zones for exploratory data analysis useful for policy desing and decision makers.

6.2.1 Administrative

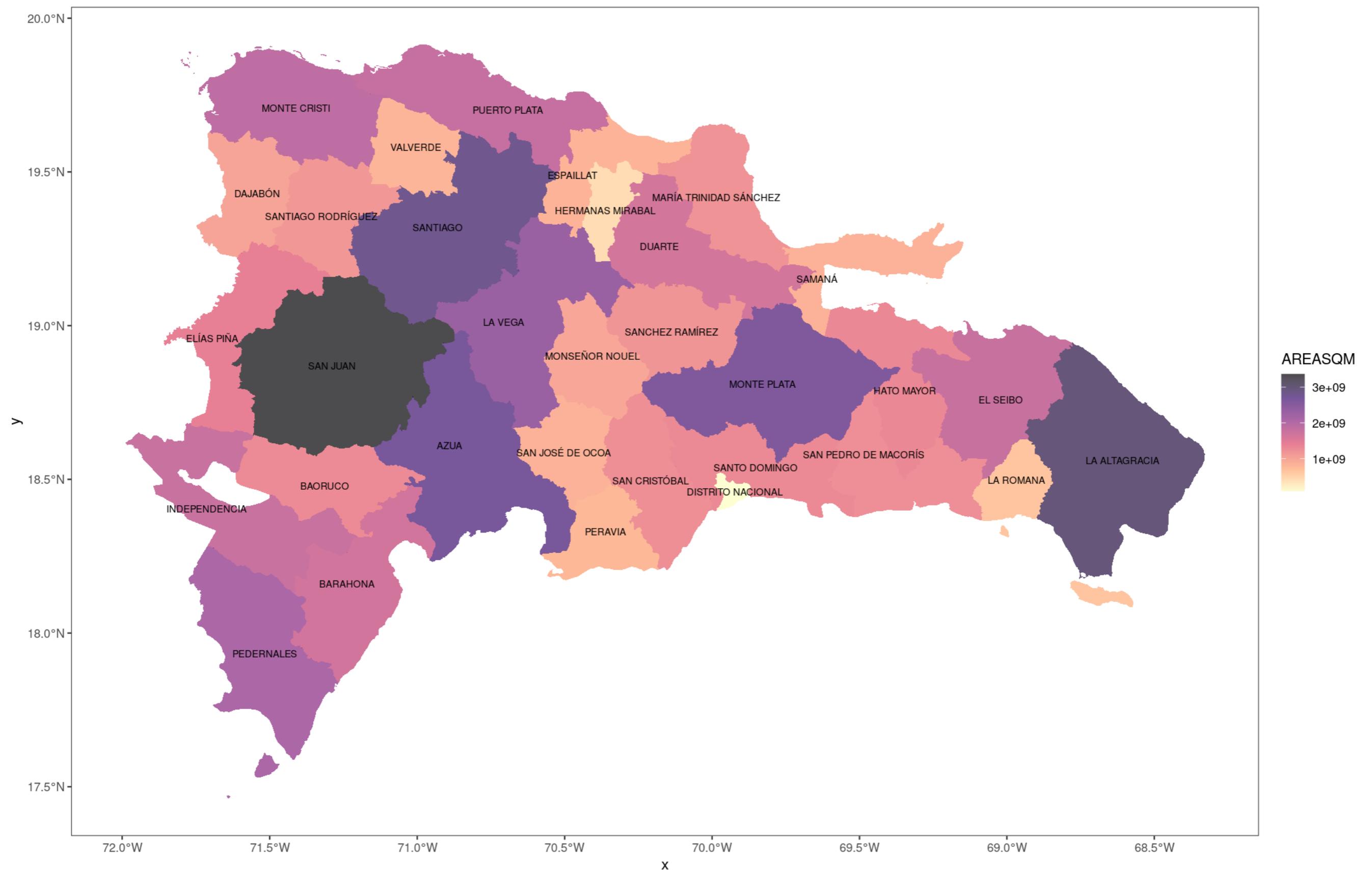
Source: Oficina Nacional de Estadística -ONE- (2015)

```

admpath <- 'data/administrative/administrative.gpkg'
st_layers(admpath)
## Driver: GPKG
## Available layers:
##   layer_name geometry_type features fields
## 1 PROVCenso2010    Polygon      32      4
## 2 MUNCenso2010    Polygon     155      5
## 3 REGCenso2010    Polygon      10      2
prov <- st_read(admpath, 'PROVCenso2010', quiet = T)
prov
## Simple feature collection with 32 features and 4 fields
## Geometry type: MULTIPOLYGON
## Dimension: XY
## Bounding box: xmin: 182215.8 ymin: 1933532 xmax: 571365.3 ymax: 2205216
## Projected CRS: WGS 84 / UTM zone 19N
## First 10 features:
##   PROV REG      TOPONIMIA ENLACE          geom
## 1 01 10 DISTRITO NACIONAL 1001 MULTIPOLYGON (((406845.9 20...
## 2 02 05          AZUA 0502 MULTIPOLYGON (((322129.5 20...
## 3 03 06        BAORUCO 0603 MULTIPOLYGON (((271940 2060...
## 4 04 06       BARAHONA 0604 MULTIPOLYGON (((291856.5 20...
## 5 05 04       DAJABÓN 0405 MULTIPOLYGON (((245433.3 21...
## 6 06 03        DUARTE 0306 MULTIPOLYGON (((374434.8 21...
## 7 07 07      ELÍAS PIÑA 0707 MULTIPOLYGON (((235630.8 21...
## 8 08 08        EL SEIBO 0808 MULTIPOLYGON (((523436.4 20...
## 9 09 01      ESPAILLAT 0109 MULTIPOLYGON (((385993.5 21...

```

```
## 10 10 06 INDEPENDENCIA 0610 MULTIPOLYGON ((205698.2 20...
prov <- prov %>% mutate(AREASQM = st_area(geom) %>% units::drop_units())
# plot(prov['AREASQM'])
prov %>% ggplot + aes(fill=AREASQM, label = TOPONIMIA) +
  geom_sf(color='transparent') +
  scale_fill_viridis_c(option = 'magma', direction = -1, alpha = 0.7) +
  geom_sf_text(size = 2.5) +
  theme_bw() +
  theme(panel.grid=element_blank())
```

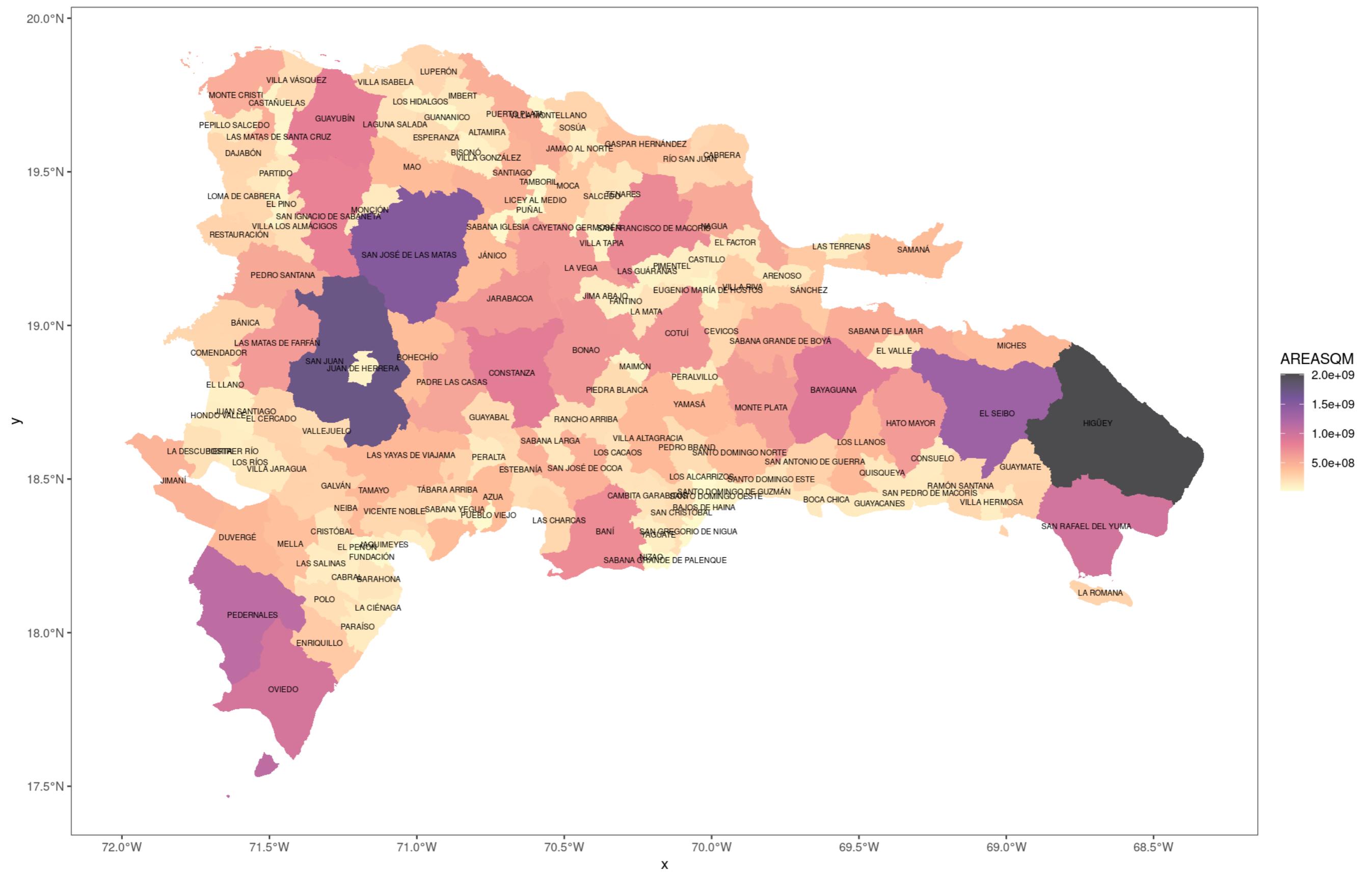


```
mun <- st_read(admpath, 'MUNCenso2010', quiet = T)
mun
## Simple feature collection with 155 features and 5 fields
## Geometry type: MULTIPOLYGON
```

```

## Dimension:      XY
## Bounding box:  xmin: 182215.8 ymin: 1933532 xmax: 571365.3 ymax: 2205216
## Projected CRS: WGS 84 / UTM zone 19N
## First 10 features:
##   PROV MUN REG          TOPONIMIA ENLACE           geom
## 1   01  01  10 SANTO DOMINGO DE GUZMÁN 100101 MULTIPOLYGON (((405218.1 20...
## 2   02  01  05             AZUA 050201 MULTIPOLYGON (((319065.3 20...
## 3   02  02  05            LAS CHARCAS 050202 MULTIPOLYGON (((341415.3 20...
## 4   02  03  05            LAS YAYAS DE VIAJAMA 050203 MULTIPOLYGON (((304058.1 20...
## 5   02  04  05            PADRE LAS CASAS 050204 MULTIPOLYGON (((312890.8 20...
## 6   02  05  05            PERALTA 050205 MULTIPOLYGON (((317370.6 20...
## 7   02  06  05            SABANA YEGUA 050206 MULTIPOLYGON (((306745.8 20...
## 8   02  07  05            PUEBLO VIEJO 050207 MULTIPOLYGON (((310447.9 20...
## 9   02  08  05            TÁBARA ARRIBA 050208 MULTIPOLYGON (((306556.7 20...
## 10  02  09  05           GUAYABAL 050209 MULTIPOLYGON (((322129.5 20...
mun <- mun %>% mutate(AREASQM = st_area(geom) %>% units::drop_units())
mun %>% ggplot + aes(fill=AREASQM, label = TOPONIMIA) +
  geom_sf(color='transparent') +
  scale_fill_viridis_c(option = 'magma', direction = -1, alpha = 0.7) +
  geom_sf_text(size = 2) +
  theme_bw() +
  theme(panel.grid=element_blank())

```



6.2.2 Protected areas

Source: UNEP-WCMC and IUCN (October 2021)

```

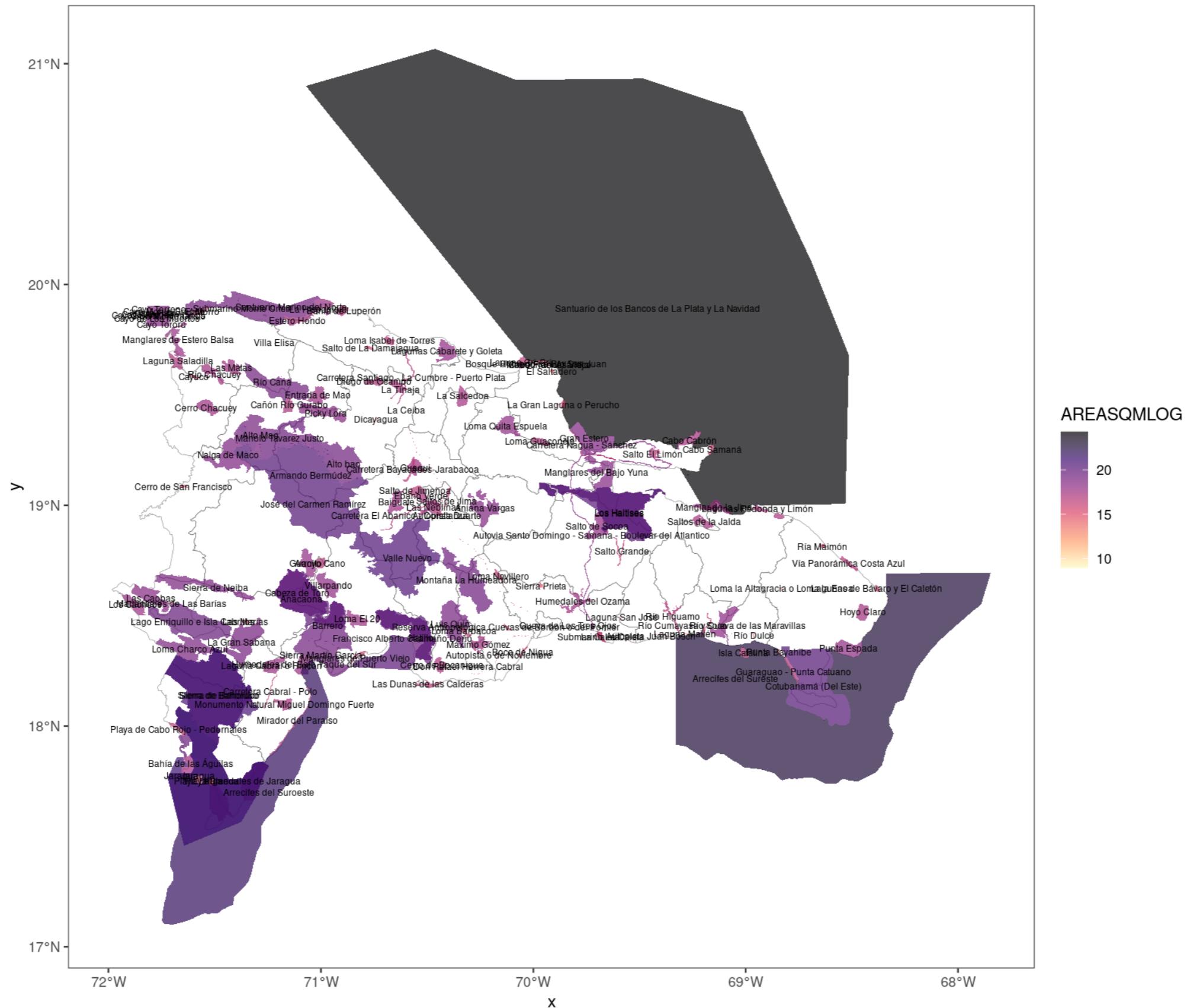
papath <- 'data/protected_areas/protected-areas.gpkg'
st_layers(papath)
## Driver: GPKG
## Available layers:
##   layer_name geometry_type features fields
## 1 Protected Areas Multi Polygon      143     30
pa <- st_read(papath, 'Protected Areas', quiet = T) %>% st_transform(32619)
pa
## Simple feature collection with 143 features and 30 fields
## Geometry type: MULTIPOLYGON
## Dimension: XY
## Bounding box: xmin: 185574.6 ymin: 1893434 xmax: 622910.8 ymax: 2333086
## Projected CRS: WGS 84 / UTM zone 19N
## First 10 features:
##   WDPAID WDPA_PID PA_DEF          NAME          ORIG_NAME
## 1    180     180      1 Cotubanamá (Del Este) Cotubanamá (Del Este)
## 2    181     181      1           Los Haitises       Los Haitises
## 3   6673    6673      1           Jaragua        Jaragua
## 4   6674    6674      1 Submarino Monte Cristi Submarino Monte Cristi
## 5   6675    6675      1 Sierra de Bahoruco Sierra de Bahoruco
## 6  478066  478066      1         Alto bao        Alto bao
## 7  478067  478067      1         Alto Mao        Alto Mao
## 8  478068  478068      1 Armando Bermúdez Armando Bermúdez
## 9  478069  478069      1       Arroyo Cano       Arroyo Cano
## 10 478070  478070      1 Bahia de Luperón Bahia de Luperón
##   DESIG          DESIG_ENG DESIG_TYPE IUCN_CAT
## 1 Parque Nacional      National Park    National      II
## 2 Parque Nacional      National Park    National      II
## 3 Parque Nacional      National Park    National      II
## 4 Parque Nacional Submarino Marine National Park National      II
## 5 Parque Nacional      National Park    National      II
## 6 Reserva Forestal      Forest Reserve National      V
## 7 Reserva Forestal      Forest Reserve National      V
## 8 Parque Nacional      National Park    National      II
## 9 Reserva Forestal      Forest Reserve National      V
## 10 Refugio de Vida Silvestre Wildlife Refuge National     IV
##   INT_CRIT MARINE REP_M_AREA  GIS_M_AREA REP_AREA  GIS_AREA
## 1 Not Applicable      1    381.78 378.5932313 796.405 801.33295
## 2 Not Applicable      0     0.00  0.5377948 631.681 635.48169
## 3 Not Applicable      1    829.18 817.7824560 1535.470 1541.74197
## 4 Not Applicable      2    246.45 238.2627059 246.450 246.28055
## 5 Not Applicable      0     0.00  0.0000000 1091.770 1097.13371
## 6 Not Applicable      0     0.00  0.0000000 307.270 263.91396
## 7 Not Applicable      0     0.00  0.0000000 457.050 211.08661
## 8 Not Applicable      0     0.00  0.0000000 802.550 806.46533
## 9 Not Applicable      0     0.00  0.0000000 23.900 24.01876
## 10 Not Applicable     1     5.49  5.0876446 18.700 18.77749
##   NO_TAKE NO_TK_AREA      STATUS STATUS_YR
## 1 Not Reported      0 Designated    2014
## 2 Not Applicable     0 Designated    2004
## 3 Not Reported      0 Designated    2004
## 4 Not Reported      0 Designated    2004
## 5 Not Applicable     0 Designated    2004
## 6 Not Applicable     0 Designated    2004
## 7 Not Applicable     0 Designated    2004
## 8 Not Applicable     0 Designated    2004
## 9 Not Applicable     0 Designated    2004

```

```

## 10 Not Reported 0 Designated 2004
## GOV_TYPE OWN_TYPE MANG_AUTH MANG_PLAN
## 1 Federal or national ministry or agency Not Reported Not Reported Yes, 2013
## 2 Federal or national ministry or agency Not Reported Not Reported Yes, 2013
## 3 Federal or national ministry or agency Not Reported Not Reported Yes, 2015
## 4 Federal or national ministry or agency Not Reported Not Reported No
## 5 Federal or national ministry or agency Not Reported Not Reported Yes, 2007
## 6 Federal or national ministry or agency Not Reported Not Reported No
## 7 Federal or national ministry or agency Not Reported Not Reported No
## 8 Federal or national ministry or agency Not Reported Not Reported Yes, 2005
## 9 Federal or national ministry or agency Not Reported Not Reported No
## 10 Federal or national ministry or agency Not Reported Not Reported No
## VERIF_METADATAID SUB_LOC PARENT_ISO ISO3 SUPP_INFO
## 1 State Verified 830 Not Reported DOM DOM Not Applicable
## 2 State Verified 830 Not Reported DOM DOM Not Applicable
## 3 State Verified 830 Not Reported DOM DOM Not Applicable
## 4 State Verified 830 Not Reported DOM DOM Not Applicable
## 5 State Verified 830 D0-16 DOM DOM Not Applicable
## 6 State Verified 830 D0-25 DOM DOM Not Applicable
## 7 State Verified 830 Not Reported DOM DOM Not Applicable
## 8 State Verified 830 D0-25 DOM DOM Not Applicable
## 9 State Verified 830 D0-02 DOM DOM Not Applicable
## 10 State Verified 830 Not Reported DOM DOM Not Applicable
## CONS_OBJ geom
## 1 Not Applicable MULTIPOLYGON (((522048.1 20...
## 2 Not Applicable MULTIPOLYGON (((397402.4 21...
## 3 Not Applicable MULTIPOLYGON (((217347 2001...
## 4 Not Applicable MULTIPOLYGON (((243475.9 22...
## 5 Not Applicable MULTIPOLYGON (((232865.5 20...
## 6 Not Applicable MULTIPOLYGON (((287355.2 21...
## 7 Not Applicable MULTIPOLYGON (((253093.5 21...
## 8 Not Applicable MULTIPOLYGON (((251693.4 21...
## 9 Not Applicable MULTIPOLYGON (((289126.3 20...
## 10 Not Applicable MULTIPOLYGON (((300900.2 22...
pa <- pa %>% mutate(
  AREASQM = st_area(geom) %>% units::drop_units(),
  AREASQMLOG = log(st_area(geom)) %>% units::drop_units()
)
pa %>% ggplot + aes(fill=AREASQMLOG) +
  geom_sf(data = prov, fill = 'transparent', lwd = 0.1) +
  geom_sf(color='transparent') +
  scale_fill_viridis_c(option = 'magma', direction = -1, alpha = 0.7) +
  geom_sf_text(aes(label = NAME), size = 2) +
  theme_bw() +
  theme(panel.grid=element_blank())

```



6.3 Cutline for cropping raster sources

A cutline was generated using a shapefile from Oficina Nacional de Estadística -ONE- (2015) as well as the datamask provided in Hansen et al. (2013). In detail, the cutline was generated using the following workflow: the international boundary between Haiti and the DR was extracted as a polyline from Oficina Nacional de Estadística -ONE- (2015); the remainder of the DR land area (water bodies excluded) was extracted from a vectorized version of the datamask file from Hansen et al. (2013); both layers were then joined together into a single cutline. Afterwards, cropped and warped versions (e.g., onto EPSG:32619) of the datamask, lossyear, treecover and gain files were masked using the generated cutline.

```
source('R/load-cutline.R')
## Reading layer `cutline' from data source
##   `/home/jose/Documentos/git/forest-loss-fire-reproducible/out/cutline.geojson'
##   using driver `GeoJSON'
## Simple feature collection with 222 features and 2 fields
## Geometry type: MULTIPOLYGON
## Dimension: XY
## Bounding box: xmin: 182239.3 ymin: 1933574 xmax: 571425.3 ymax: 2205219
## Projected CRS: WGS 84 / UTM zone 19N
```

7 Download and prepare forest cover and forest loss data

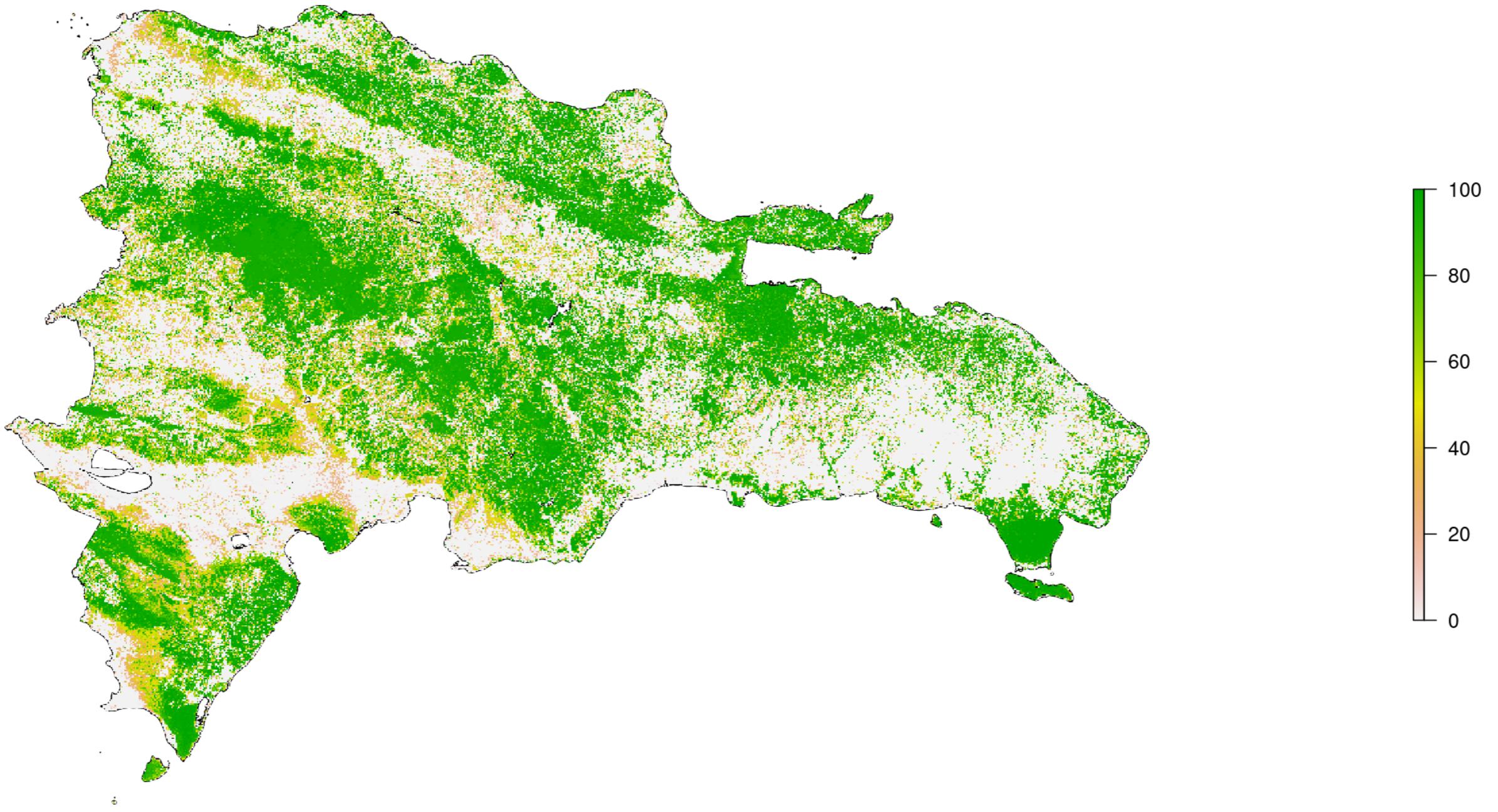
Using the R/original-script-used-to-download-and-prepare-forest-cover-and-forest-loss-data.R script many operations were accomplished to prepare the forest cover and forest loss layers generated by Hansen et al., which included downloading, mosaicking, cropping and clipping with the above mentioned cutline. The resulting files were saved in the directory named `out`, appending the suffix `_crop` to each filename (e.g. `out/treecover2000_crop.tif`)

8 Tree cover, forest loss and fire layers: importing and plotting

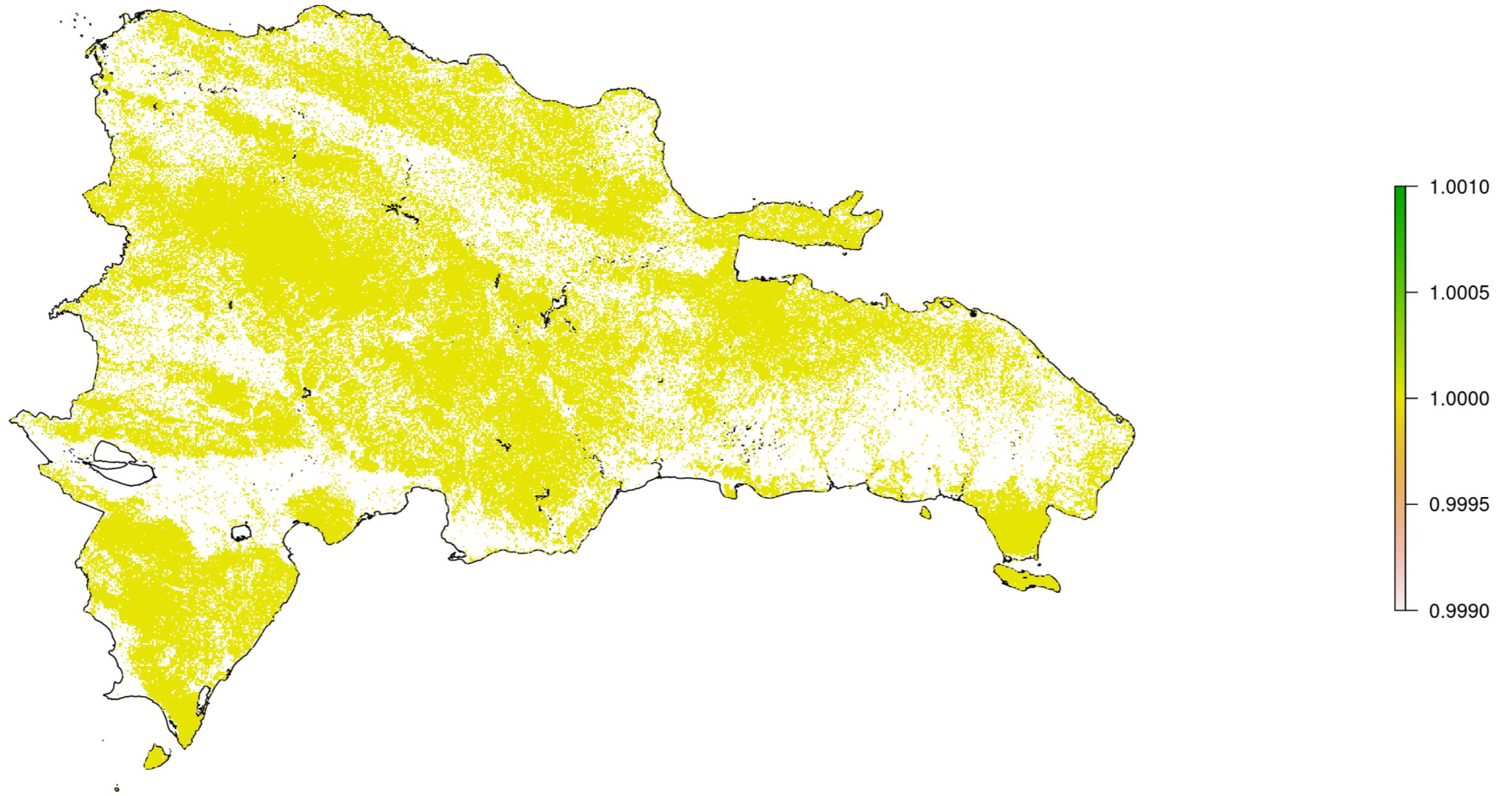
8.1 Tree canopy cover of year 2000

Set a percentage threshold above which tree-cover would be considered as forest.

```
tc <- raster('out/treecover2000_crop.tif')
names(tc) <- 'TREECOVER2000'
plot(as_Spatial(cline))
plot(tc, add = T)
```

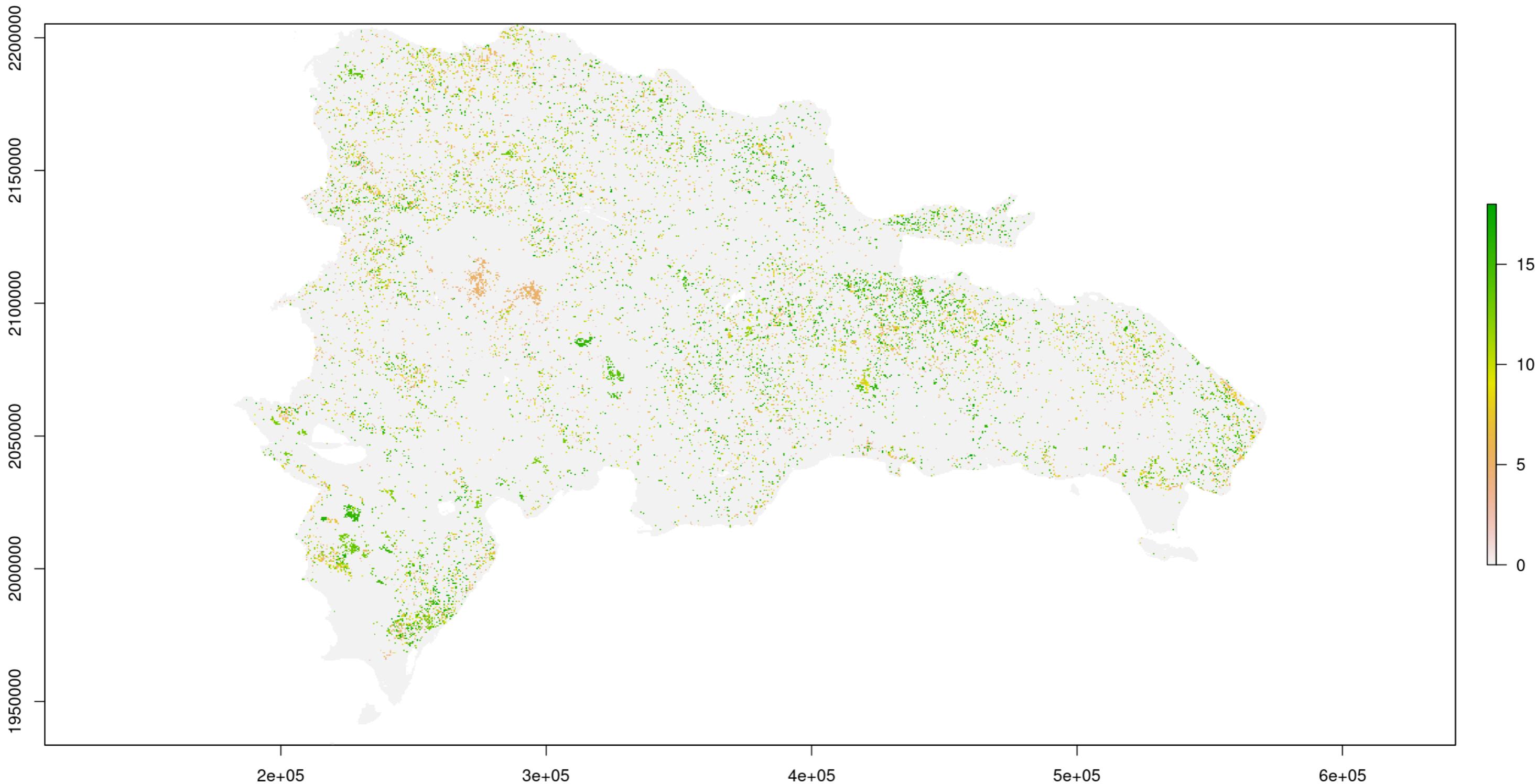


```
pctc <- 25 #25% or higher tree cover in year 2000 as a baseline is considered as "forest cover"  
tcforzonal <- tc  
tcforzonal[tcforzonal < pctc] <- NA  
tcforzonal[tcforzonal >= pctc] <- 1  
plot(as_Spatial(cline))  
plot(tcforzonal, add = T)
```

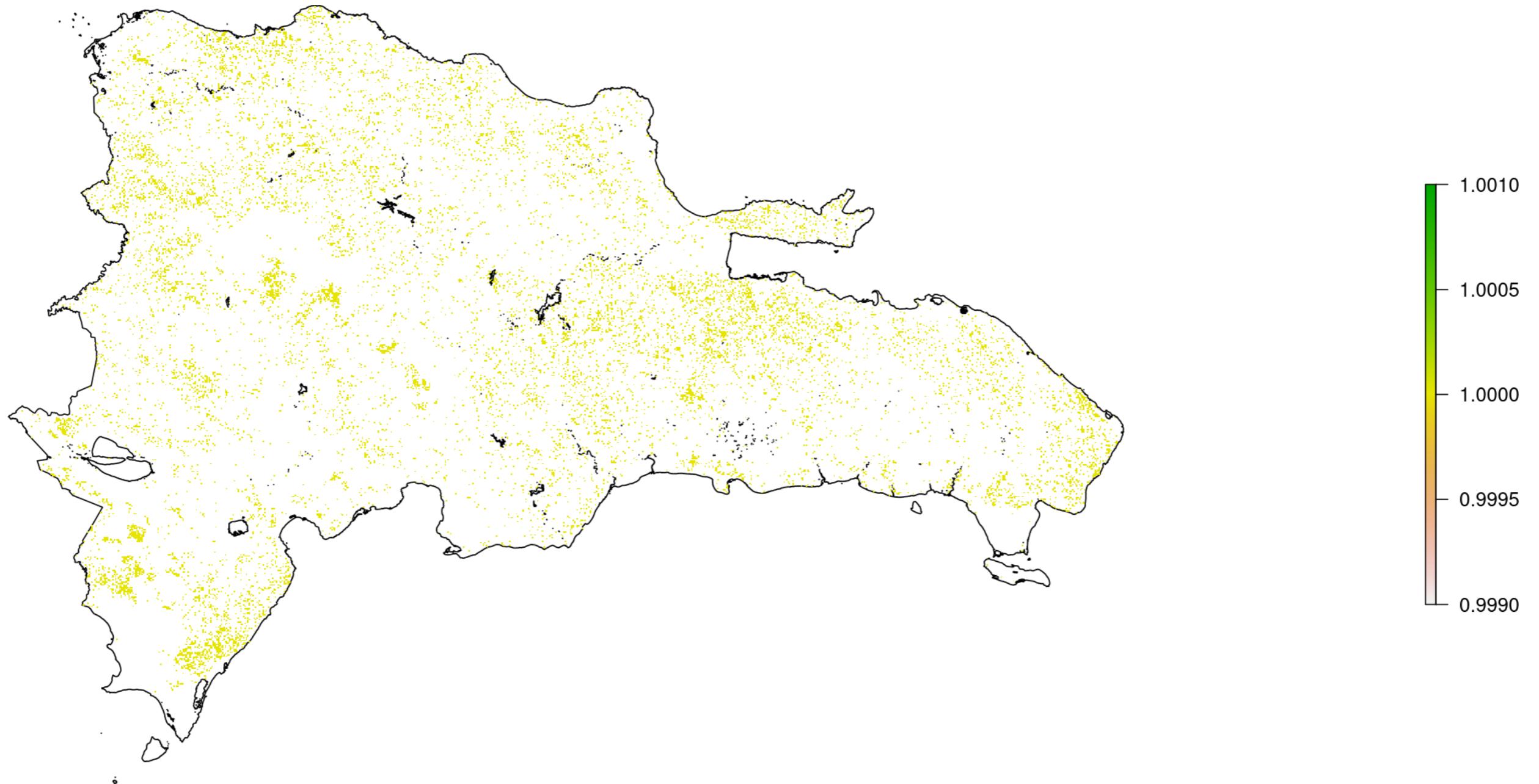


8.2 Year of gross forest cover loss (2001-2018)

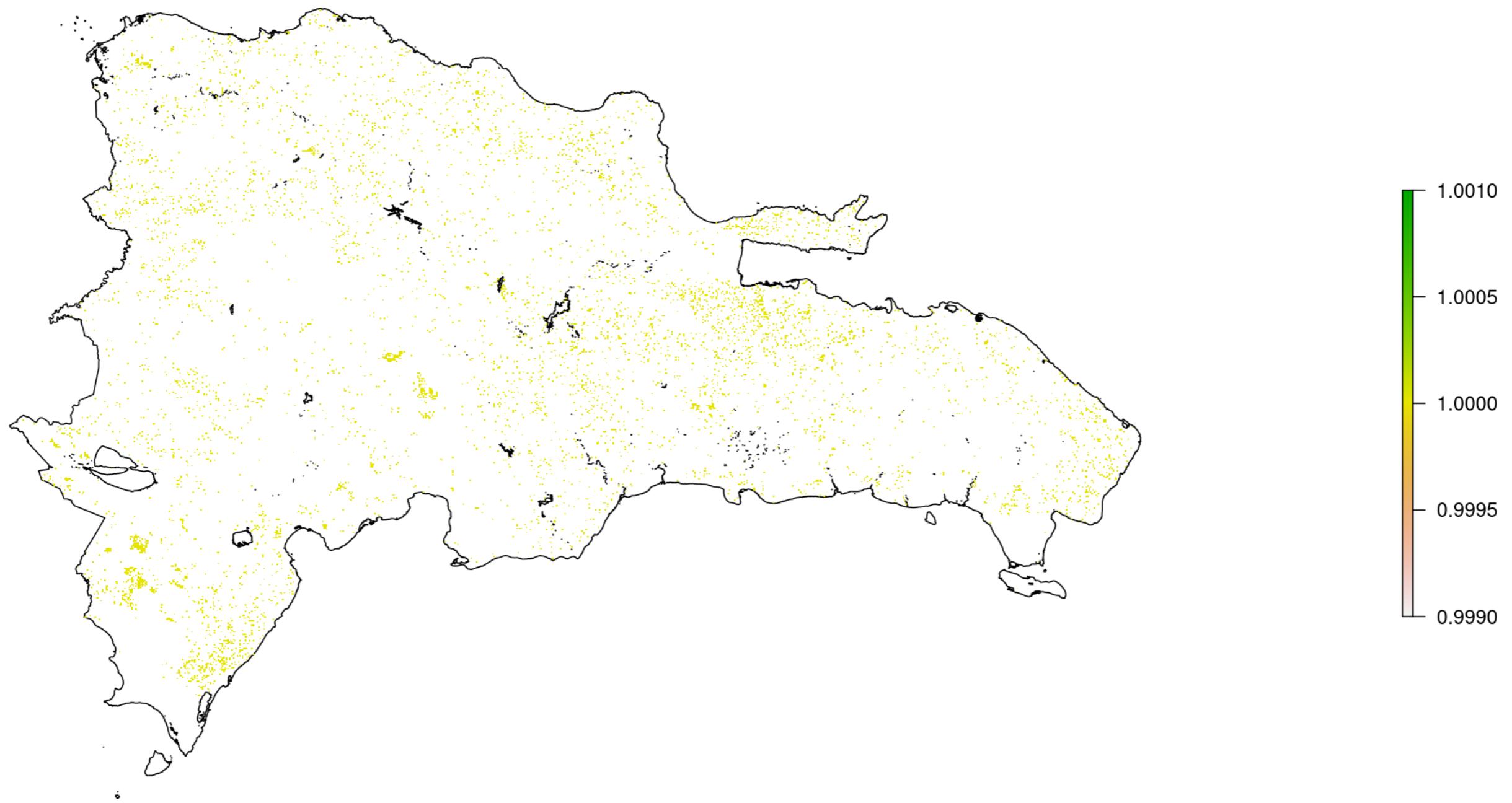
```
ly <- raster('out/lossyear_crop.tif')
names(ly) <- 'LOSSYEAR'
plot(ly)
```



```
lt <- ly
lt[lt > 0] <- 1
lt[lt == 0] <- NA
plot(as_Spatial(cline))
plot(lt, add = T)
```



```
lt1218 <- ly  
lt1218[ly <= 11] <- NA  
lt1218[ly > 11] <- 1  
plot(as_Spatial(cline))  
plot(lt1218, add = T)
```



8.3 Hotspot/fire layers (M6 and V1) for the long-term analytical approach

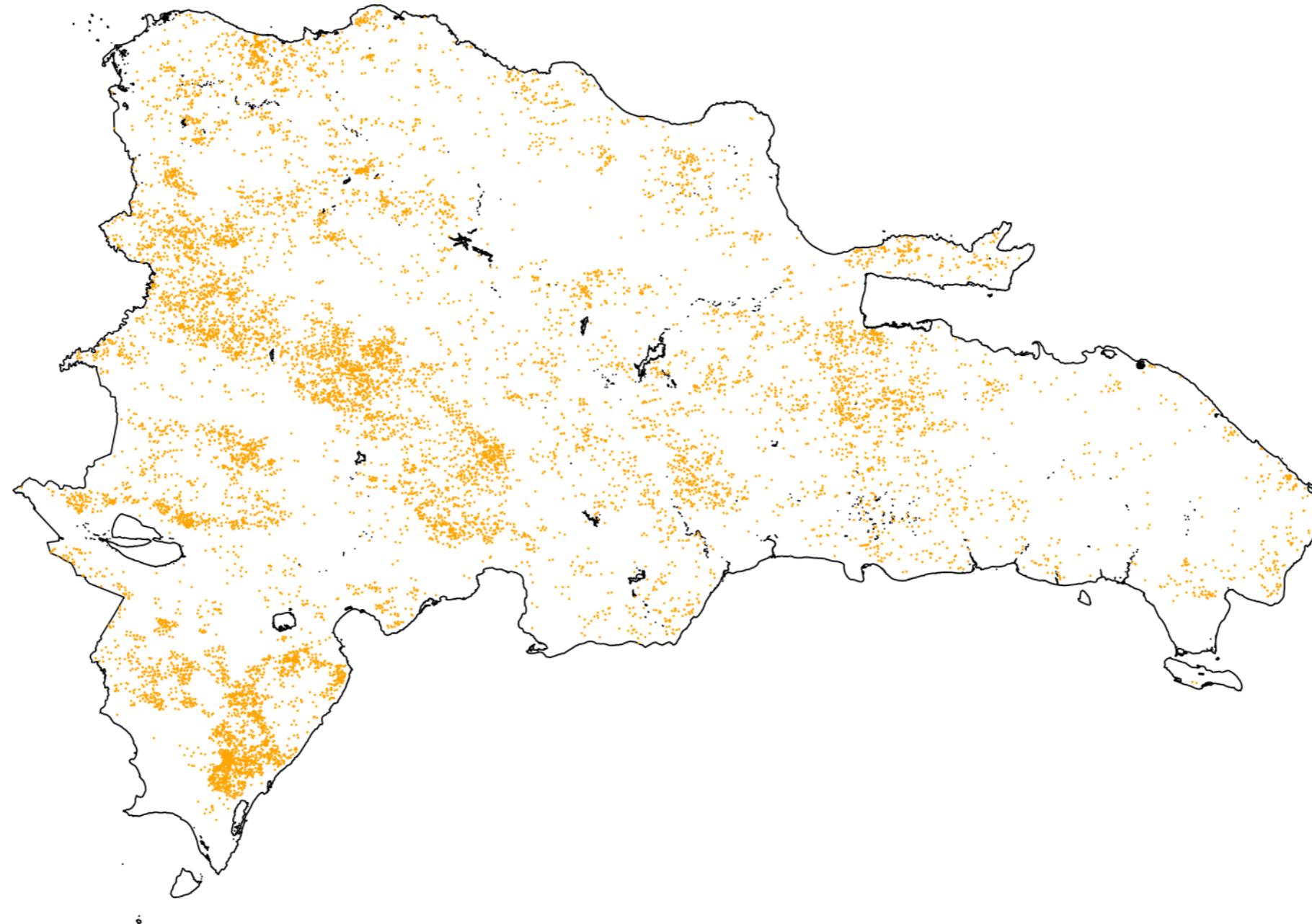
The hotspot/fire/thermal anomalies layers (M6 and V1 datasets) were created using the script `R/original-script-used-to-create-the-hotspot-fire-layers-M6-and-V1-for-long-term-approach.R`. This script was initially fed from a layer where thermal anomalies and spontaneous fires from chimneys and landfills were manually removed from each dataset, which were called “noise-free versions of MODIS and VIIRS datasets,” respectively. Then, the script filtered out points falling outside the mask (e.g. outside forest cover), as well as points recorded before 1-1-2001 and after 31-12-2018. Lastly, all points with a confidence value of less than 30% in the MODIS collection, as well as those with a “low confidence” tag in the VIIRS collection, were excluded from the dataset. For practical reasons, the fire layers are simply loaded using the `readRDS` function as follows.

```

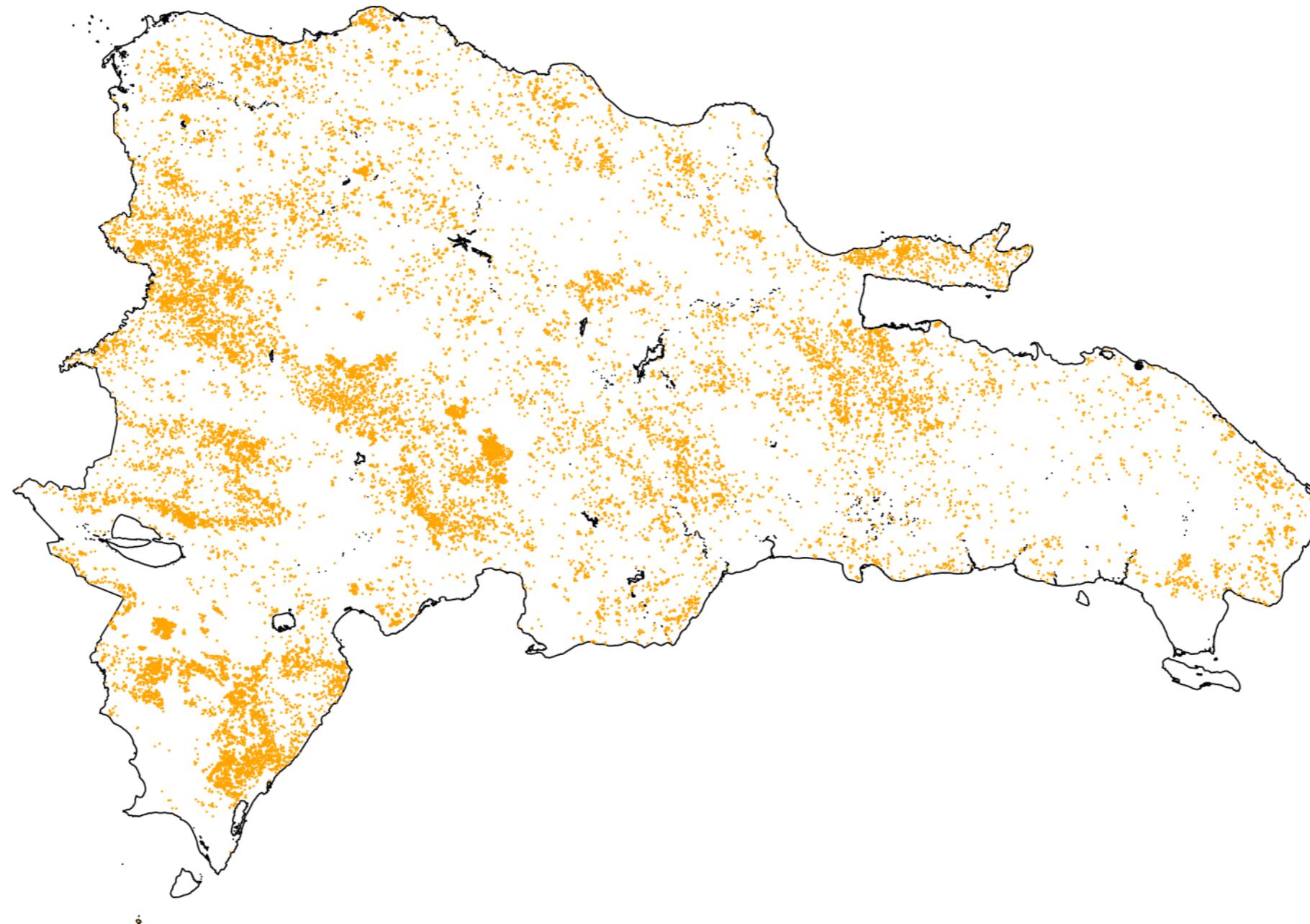
firesm6sel2 <- st_read('out/fire_archive_M6_93308_DR_firesm6sel2.geojson')
## Reading layer `fire_archive_M6_93308_DR_firesm6sel2` from data source
##   `/home/jose/Documentos/git/forest-loss-fire-reproducible/out/fire_archive_M6_93308_DR_firesm6sel2.geojson'
##   using driver `GeoJSON'
## Simple feature collection with 11861 features and 15 fields
## Geometry type: POINT
## Dimension: XY
## Bounding box: xmin: 184698.8 ymin: 1964160 xmax: 568878.1 ymax: 2203503
## Projected CRS: WGS 84 / UTM zone 19N

```

```
cline %>% as_Spatial %>% plot
plot(as_Spatial(firesm6sel2), main = "Thermal anomalies within forest M6",
     pch = 1, cex = 0.1, add = T, col = 'orange')
```



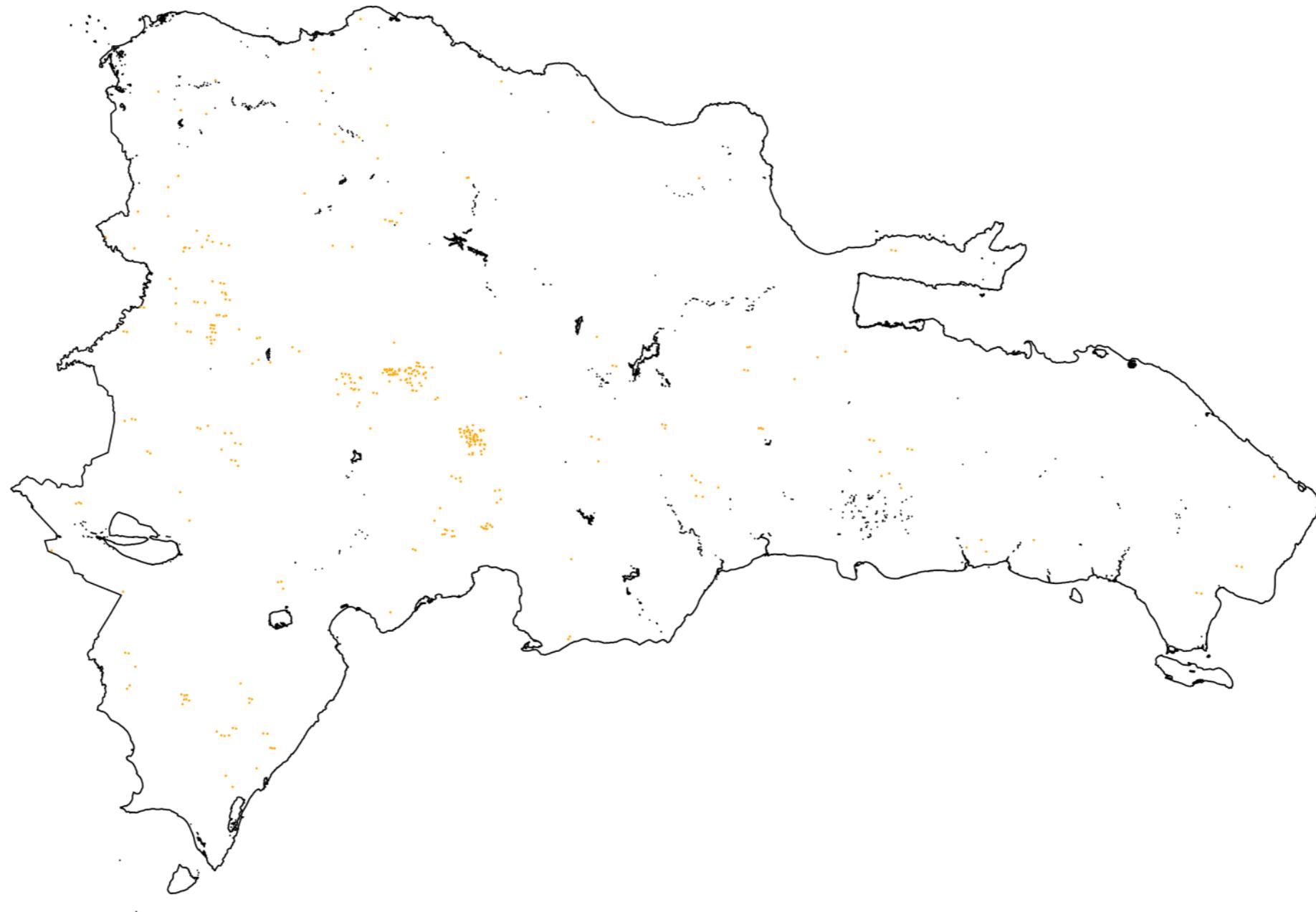
```
firesv1sel2 <- st_read('out/fire_archive_V1_93309_DR_firesv1sel2.geojson')
## Reading layer `fire_archive_V1_93309_DR_firesv1sel2' from data source
##   '/home/jose/Documentos/git/forest-loss-fire-reproducible/out/fire_archive_V1_93309_DR_firesv1sel2.geojson'
##   using driver `GeoJSON'
## Simple feature collection with 25838 features and 14 fields
## Geometry type: POINT
## Dimension:      XY
## Bounding box:  xmin: 184135.9 ymin: 1934167 xmax: 569069 ymax: 2204713
## Projected CRS: WGS 84 / UTM zone 19N
cline %>% as_Spatial %>% plot
plot(as_Spatial(firesv1sel2), main = "Thermal anomalies within forest V1",
     pch = 1, cex = 0.1, add = T, col = 'orange')
```



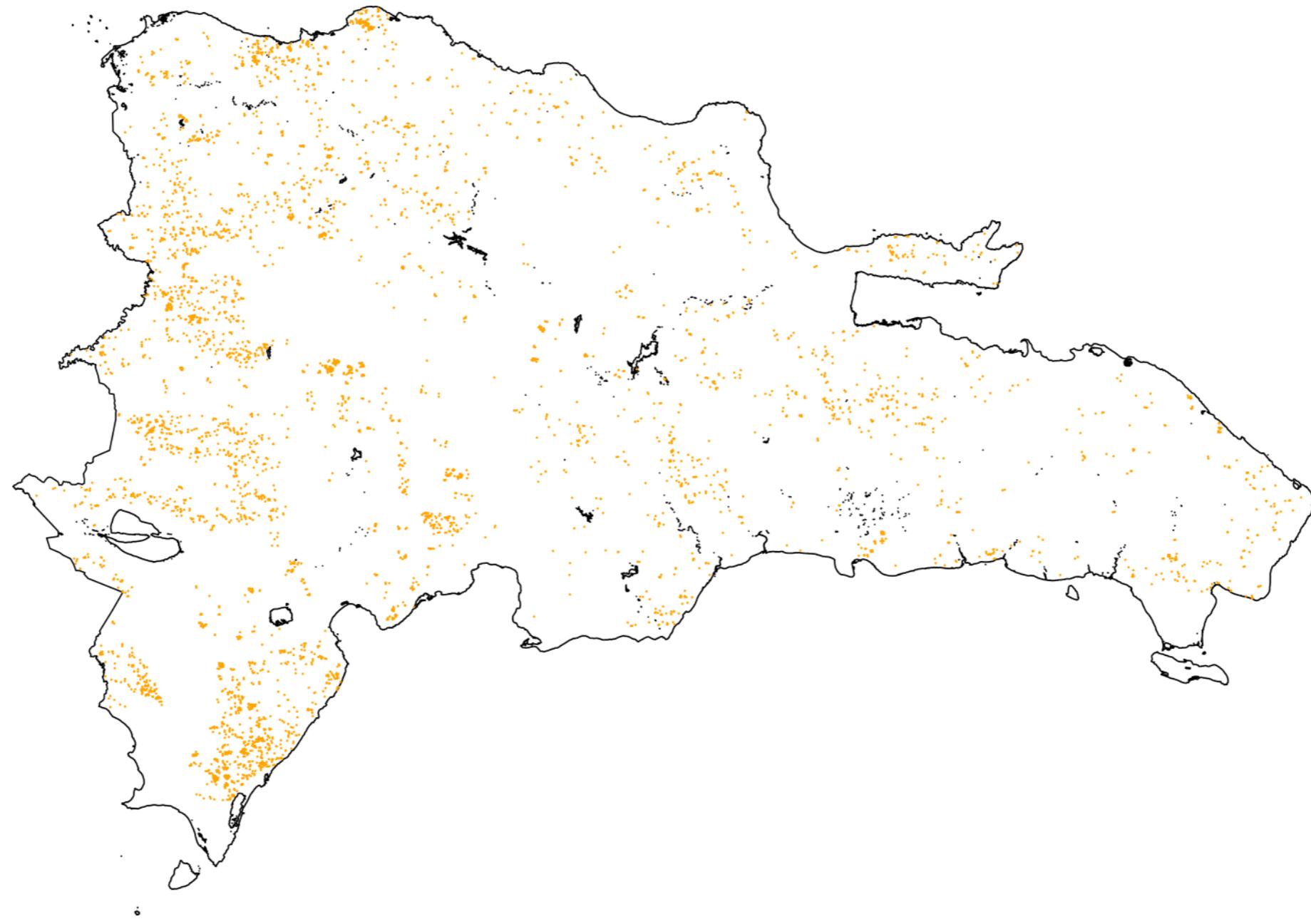
8.4 Hotspot/fire layers (M6 and V1) for the annual analytical approach

The hotspot/fire/thermal anomalies layers (M6 and V1) were created using the script `R/original-script-used-to-create-the-hotspot-fire-layers-M6-and-V1-for-annual-approach.R`. This script was initially fed from a layer where thermal anomalies and spontaneous fires from chimneys and landfills were manually removed from each dataset, which were called “noise-free versions of MODIS and VIIRS datasets,” respectively. Afterwards, annual maps of fire points using the date field of the datasets were generated. Then, from the annual maps of large clearings, buffer zones were created around the patches at a maximum distance of 2.5 km. Lastly, the corresponding annual subsets of fire points were generated by selecting only those falling within the patches and/or their buffer zones.

```
# Patches of forest loss > 1 ha. Fires M6, year 2001, intersected by forest-loss patches >1ha + 2.5 km buffer
loss1ha_firesm6_2500_year2001 <- readRDS('out/forest_loss_1ha_firesm6_2500_buffer_year_2001.RDS')
cline %>% as_Spatial %>% plot
plot(
  as_Spatial(loss1ha_firesm6_2500_year2001),
  main = "Thermal anomalies from M6 dataset intersected by forest-loss patches >1ha + 2.5 km buffer, year 2001",
  pch = 1, cex = 0.1, add = T, col = 'orange')
```



```
# Patches of forest loss > 1 ha. Fires V1, year 2012, intersected by forest-loss patches >1ha + 2.5 km buffer
loss1ha_firesv1_2500_year2012 <- readRDS('out/forest_loss_1ha_firesv1_2500_buffer_year_2012.RDS')
cline %>% as_Spatial %>% plot
plot(
  as_Spatial(loss1ha_firesv1_2500_year2012),
  main = "Thermal anomalies from V1 dataset intersected by forest-loss patches >1ha + 2.5 km buffer, year 2012",
  pch = 1, cex = 0.1, add = T, col = 'orange')
```



9 Grid layers for modelling

The models generated in this study are referred to zonal statistics computed using different regular grids for long-term and annual approaches

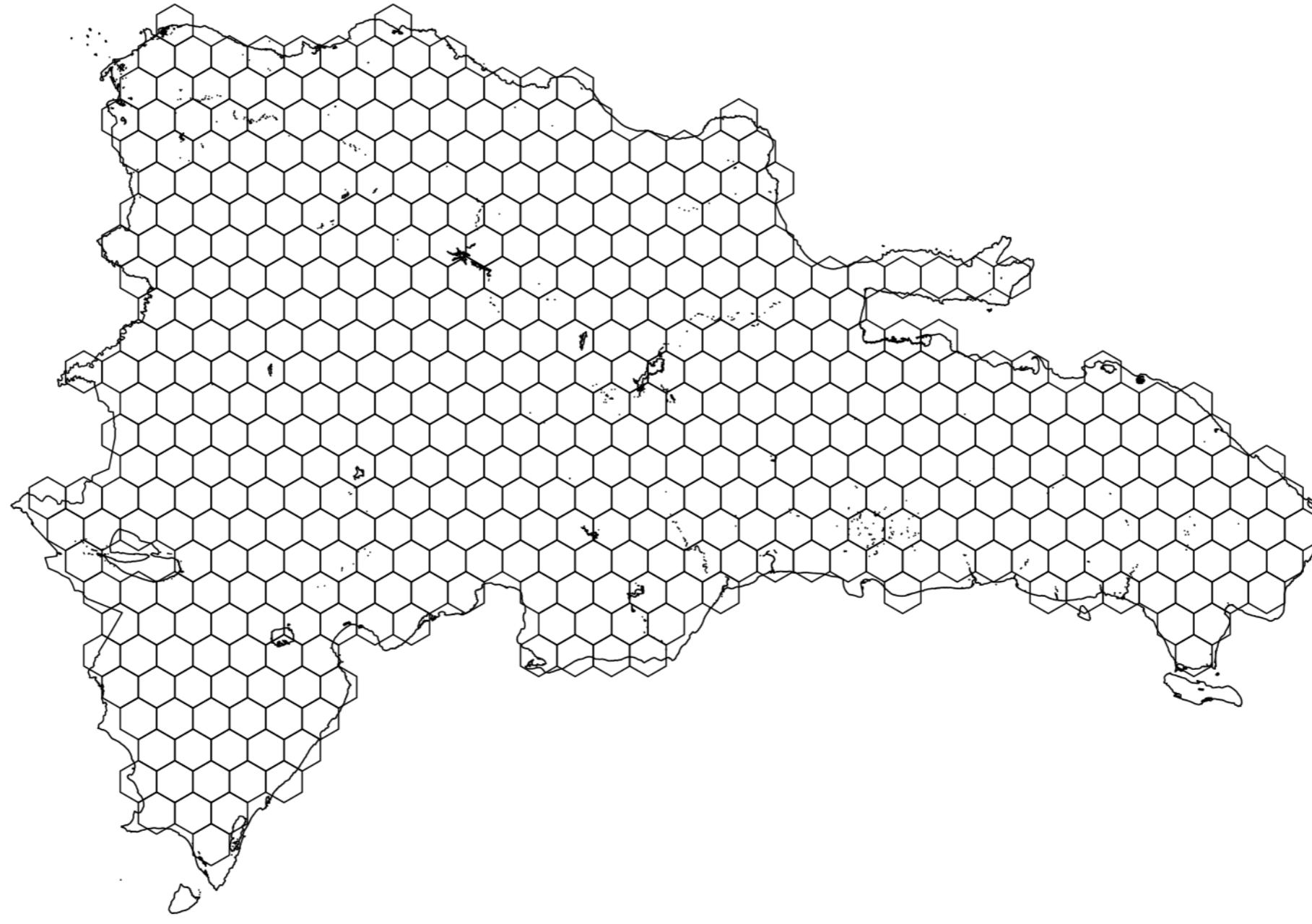
9.1 Long-term approach analysis grid

The regular grid for the long-term approach, loaded in the following code chunk, was generated using the script `R/original-script-used-to-create-the-grid-long-term-approach.R`. For practical reasons, the grid is simply loaded using the `readRDS` function.

```
grd <- readRDS('out/grd_plain_only_area_known_in_R_as_grd.RDS')
grd
## Simple feature collection with 482 features and 3 fields
## Geometry type: POLYGON
## Dimension: XY
## Bounding box: xmin: 187612.2 ymin: 1955288 xmax: 569084.5 ymax: 2209654
```

```
## Projected CRS: WGS 84 / UTM zone 19N
## First 10 features:
##   ENLACE AREASQM AREASQM_PCT           geometry
## 1     1 47325583  47.32558 POLYGON ((192985 2057655, 1...
## 2     2 99988965  99.98896 POLYGON ((198357.9 2048349, ...
## 3     3 99522753  99.52275 POLYGON ((203730.7 2039043, ...
## 4     4 65772385  65.77239 POLYGON ((203730.7 2057655, ...
## 5     5 49396881  49.39688 POLYGON ((203730.7 2094879, ...
## 6     6 62199862  62.19986 POLYGON ((209103.6 2011125, ...
## 7     7 84439177  84.43918 POLYGON ((209103.6 2029737, ...
## 8     8 92450749  92.45075 POLYGON ((209103.6 2048349, ...
## 9     9 98900253  98.90025 POLYGON ((214476.4 2001819, ...
## 10   10 68962809  68.96281 POLYGON ((214476.4 2020431, ...

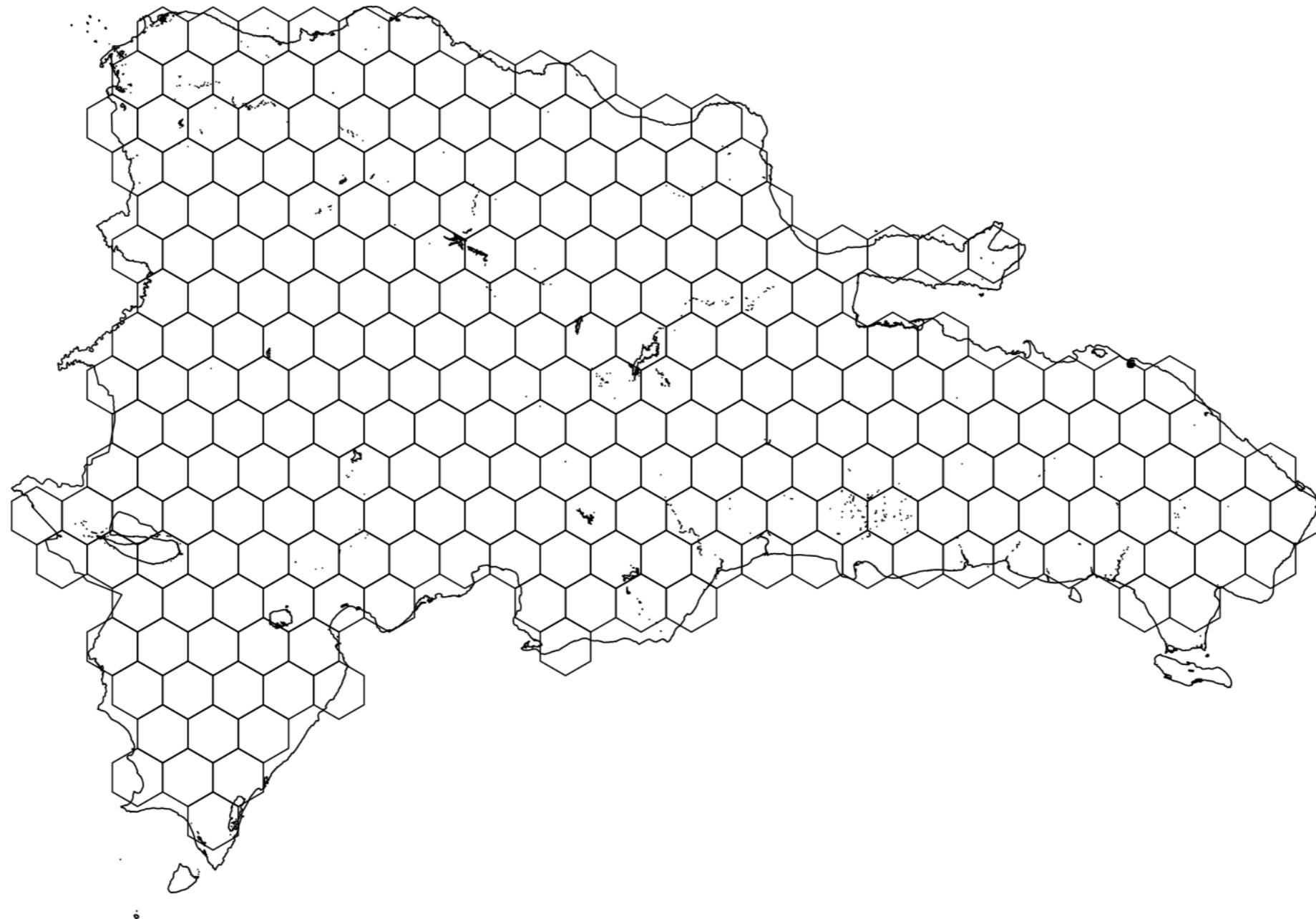
cline %>% as_Spatial %>% plot
grd %>% as_Spatial %>% plot(add=T)
```



9.2 Annual approach analysis grid

The regular grid for the long-term approach, loaded in the following code chunk, was generated using the script `R/original-script-used-to-create-the-grid-annual-approach.R`. For practical reasons, the grid is simply loaded using the `readRDS` function.

```
hexsf <- readRDS('out/honeycomb_sf.RDS')
hexsf
## Simple feature collection with 253 features and 6 fields
## Geometry type: POLYGON
## Dimension: XY
## Bounding box: xmin: 182239.3 ymin: 1953895 xmax: 572239.3 ymax: 2205042
## Projected CRS: WGS 84 / UTM zone 19N
## First 10 features:
##   ENLACE a0_square_meters AREASQM AREASQM_PCT xutm yutm
## 1 1 194855716 81359197 41.75356 189739.3 2053488
## 2 2 194855716 89453896 45.90776 197239.3 2040497
## 3 3 194855716 192920585 99.00689 204739.3 2053488
## 4 4 194855716 168639558 86.54586 212239.3 2014517
## 5 5 194855716 166723114 85.56234 212239.3 2040497
## 6 6 194855716 182554622 93.68708 212239.3 2066478
## 7 7 194855716 135315105 69.44374 212239.3 2092459
## 8 8 194855716 85442381 43.84905 212239.3 2170401
## 9 9 194855716 105127666 53.95154 219739.3 1975545
## 10 10 194855716 194855716 100.00000 219739.3 2001526
##           geometry
## 1  POLYGON ((189739.3 2044827, ...
## 2  POLYGON ((197239.3 2031837, ...
## 3  POLYGON ((204739.3 2044827, ...
## 4  POLYGON ((212239.3 2005856, ...
## 5  POLYGON ((212239.3 2031837, ...
## 6  POLYGON ((212239.3 2057818, ...
## 7  POLYGON ((212239.3 2083799, ...
## 8  POLYGON ((212239.3 2161741, ...
## 9  POLYGON ((219739.3 1966885, ...
## 10 POLYGON ((219739.3 1992866, ...
cline %>% as_Spatial %>% plot
hexsf %>% as_Spatial %>% plot(add=T)
```



10 Zonal statistic computations

Many zonal statistics were performed using different zone layers. These computations may assist policy information and decision-making processes. These tasks were performed in semi-automatic mode using R scripts. Since such scripts produced intermediate results, they are not essential to reproduce this RMarkdown. However, if one or more scripts should be run, it would be sufficient to open and run them in one go.

10.1 Zonal statistics by provinces

The script used to compute zonal statistics is stored in `R/original-script-used-to-compute-zonal-statistics-provinces.R`. For practical reasons and for future use (e.g. in the EDA section), the results of the script were saved to an RDS file located at `out/prov_zonal_statistics.RDS`.

10.2 Zonal statistics by municipalities

The script used to compute zonal statistics is stored in `R/original-script-used-to-compute-zonal-statistics-municipalities.R`. For practical reasons and for future use (e.g. in the EDA section), the results of the script were saved to an RDS file located at `out/mun_zonal_statistics.RDS`.

10.3 Zonal statistics by protected areas

The script used to compute zonal statistics is stored in R/original-script-used-to-compute-zonal-statistics-protected-areas.R. It is worth mentioning that protected areas with less than 3 sq. km and less than 30% within cutline, were excluded in the script. For practical reasons and for future use (e.g. in the EDA section), the results of the script were saved to an RDS file located at out/pa_zonal_statistics.RDS.

10.4 Zonal statistics by grid used in the long-term analytical approach

The script used to compute zonal statistics is stored in R/original-script-used-to-compute-zonal-statistics-grid-long-term-approach.R. For practical reasons and for future use (e.g. in the EDA section), the results of the script were saved to an RDS file located at out/grd_zonal_statistics.RDS.

10.5 Zonal statistics by grid used in the annual analytical approach

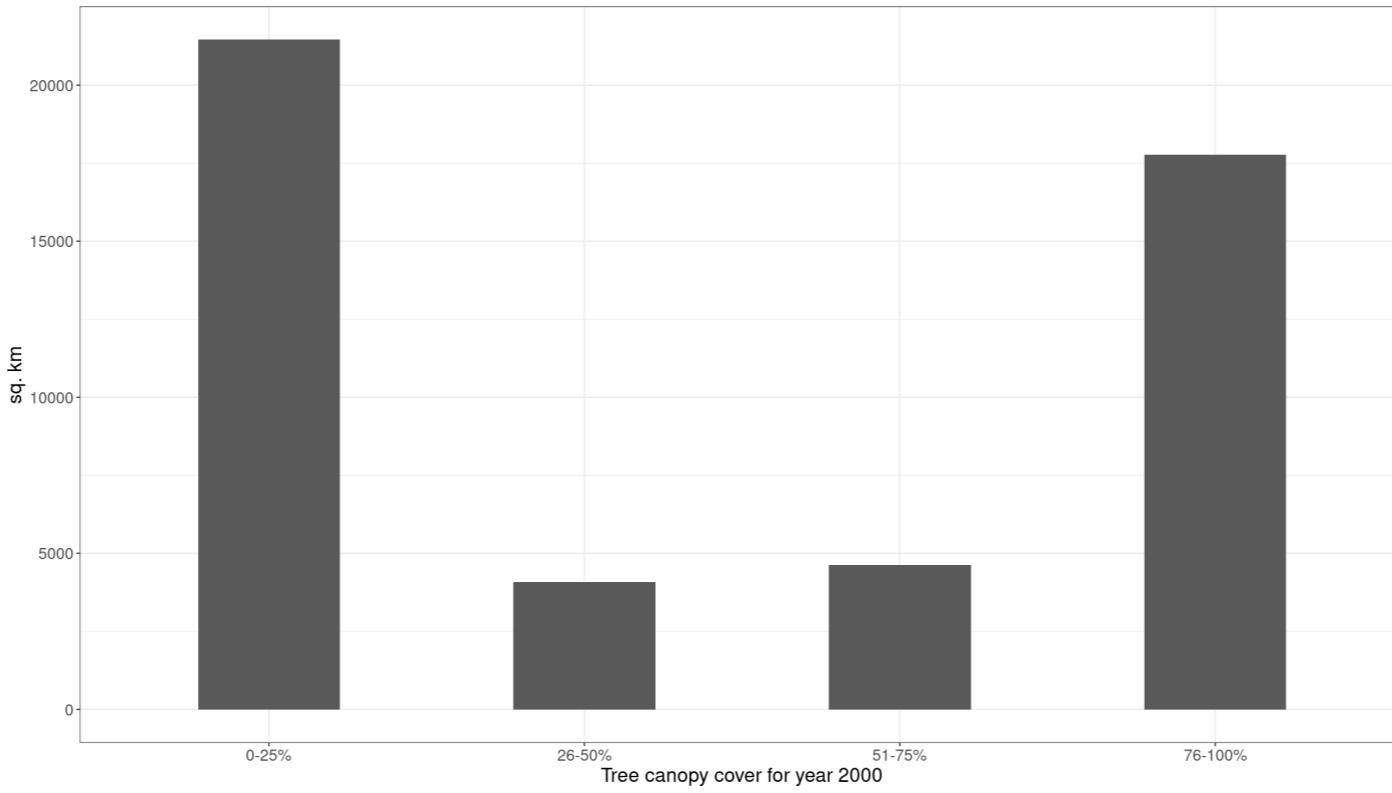
The script used to compute zonal statistics is stored in R/original-script-used-to-compute-zonal-statistics-grid-annual-approach.R. For practical reasons and for future use (e.g. in the EDA section), the results of the script were saved to an RDS file located at out/hex_zonal_statistics.RDS.

11 Exploratory data analysis (EDA)

11.1 At National level, no zonal analysis

11.1.1 Tree canopy cover of year 2000 classes: area in km² and percentages

```
tct <- table(tc[])
tcsun <- tct %>% as.data.frame %>%
  mutate(
    treecover = as.numeric(as.character(Var1)),
    `sq. km` = Freq*prod(res(tc))/1000000,
    pct = Freq/sum(Freq)*100) %>%
  dplyr::select(-Var1, -Freq) %>%
  mutate(`Tree canopy cover for year 2000` = case_when(
    treecover <= 25 ~ '0-25%',
    treecover >= 26 & treecover <= 50 ~ '26-50%',
    treecover >= 51 & treecover <= 75 ~ '51-75%',
    treecover >= 76 ~ '76-100%'
  )) %>%
  group_by(`Tree canopy cover for year 2000`) %>%
  summarise_each(funsum(.), (`sq. km`:pct))
tcsun
## # A tibble: 4 x 3
##   `Tree canopy cover for year 2000` `sq. km`   pct
##   <chr>                      <dbl> <dbl>
## 1 0-25%                      21455.  44.8 
## 2 26-50%                      4076.   8.50 
## 3 51-75%                      4631.   9.66 
## 4 76-100%                     17762.  37.1
```



11.1.2 Year of gross forest cover loss (2001-2018): area in km² and percentages

- By year

```

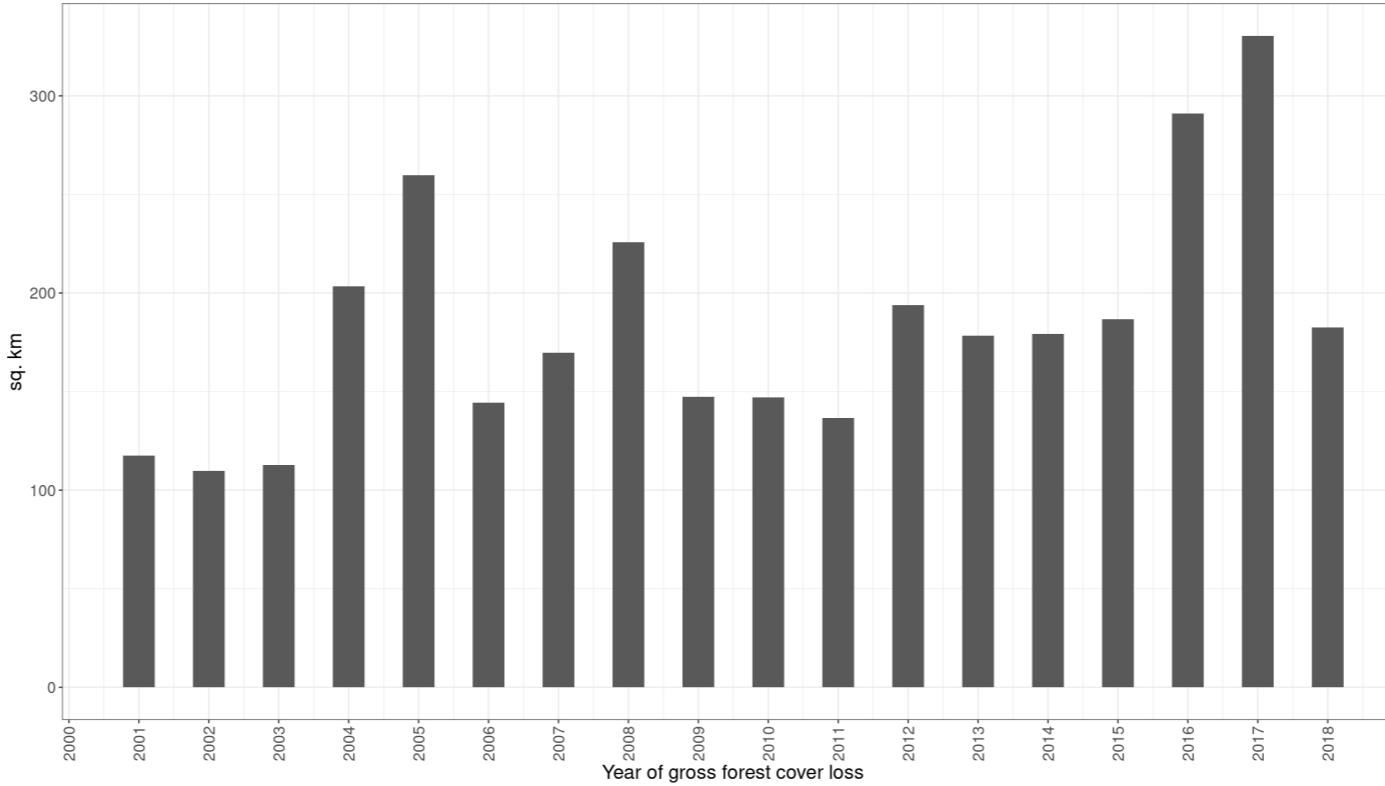
lyt <- table(lty[])
lysum <- lyt %>% as.data.frame %>%
  mutate(
    `Year of gross forest cover loss` = as.numeric(as.character(Var1)) + 2000,
    `sq. km` = Freq*prod(res(lty))/1000000,
    pct = Freq/sum(Freq)*100) %>%
  dplyr::select(-Var1, -Freq)
lysum
##   Year of gross forest cover loss   sq. km      pct
## 1                         2000 44608.0329 93.0816470
## 2                         2001 117.4182 0.2450114
## 3                         2002 109.6281 0.2287562
## 4                         2003 112.7959 0.2353664
## 5                         2004 203.3267 0.4242729
## 6                         2005 259.6146 0.5417266
## 7                         2006 144.4874 0.3014955
## 8                         2007 169.8247 0.3543659
## 9                         2008 225.6897 0.4709369
## 10                        2009 147.2277 0.3072137
## 11                        2010 146.8974 0.3065245
## 12                        2011 136.6796 0.2852035
## 13                        2012 193.7474 0.4042844
## 14                        2013 178.2085 0.3718599
## 15                        2014 179.2863 0.3741089
## 16                        2015 186.6761 0.3895290
## 17                        2016 291.0449 0.6073108
## 18                        2017 330.4609 0.6895584

```

```

## 19          2018   182.5063  0.3808280
lysum %>% dplyr::filter(`Year of gross forest cover loss` > 2000) %>%
  ggplot() + aes(x = `Year of gross forest cover loss`, y = `sq. km`) +
  theme_bw() + geom_col(width = 0.45) +
  scale_x_continuous(breaks = lysum$`Year of gross forest cover loss`) +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5), text = element_text(size = 16))

```

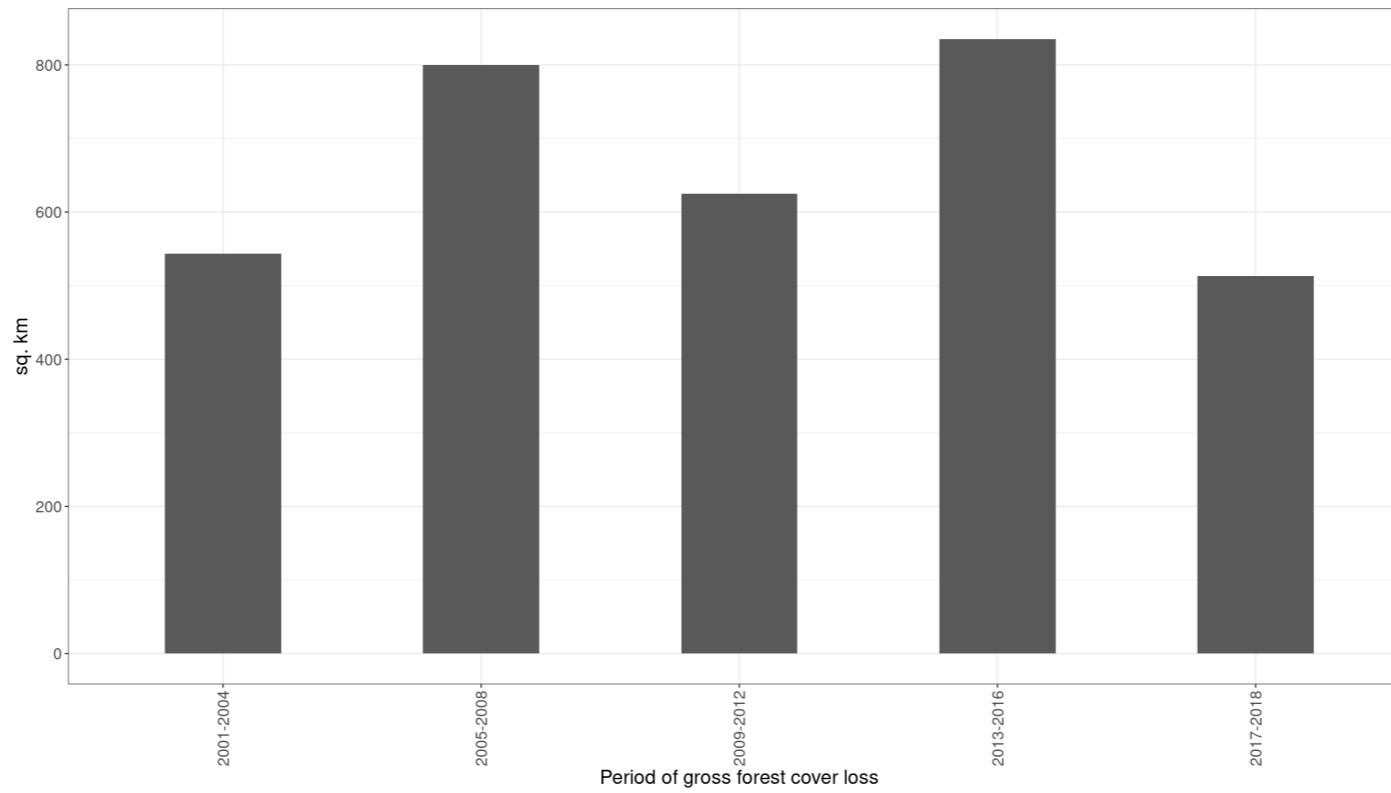


- By 4-year periods

```

lysum %>% dplyr::filter(`Year of gross forest cover loss` > 2000) %>%
  mutate(`Period of gross forest cover loss` = case_when(
    `Year of gross forest cover loss` <= 2004 ~ '2001-2004',
    `Year of gross forest cover loss` >= 2005 &
      `Year of gross forest cover loss` <= 2008 ~ '2005-2008',
    `Year of gross forest cover loss` >= 2009 &
      `Year of gross forest cover loss` <= 2012 ~ '2009-2012',
    `Year of gross forest cover loss` >= 2013 &
      `Year of gross forest cover loss` <= 2016 ~ '2013-2016',
    `Year of gross forest cover loss` >= 2017 ~ '2017-2018')) %>%
  group_by(`Period of gross forest cover loss`) %>%
  summarise_each(funs(sum(.)), (`sq. km`:pct)) %>%
  ggplot() + aes(x = `Period of gross forest cover loss`, y = `sq. km`) +
  theme_bw() + geom_col(width = 0.45) +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5), text = element_text(size = 16))

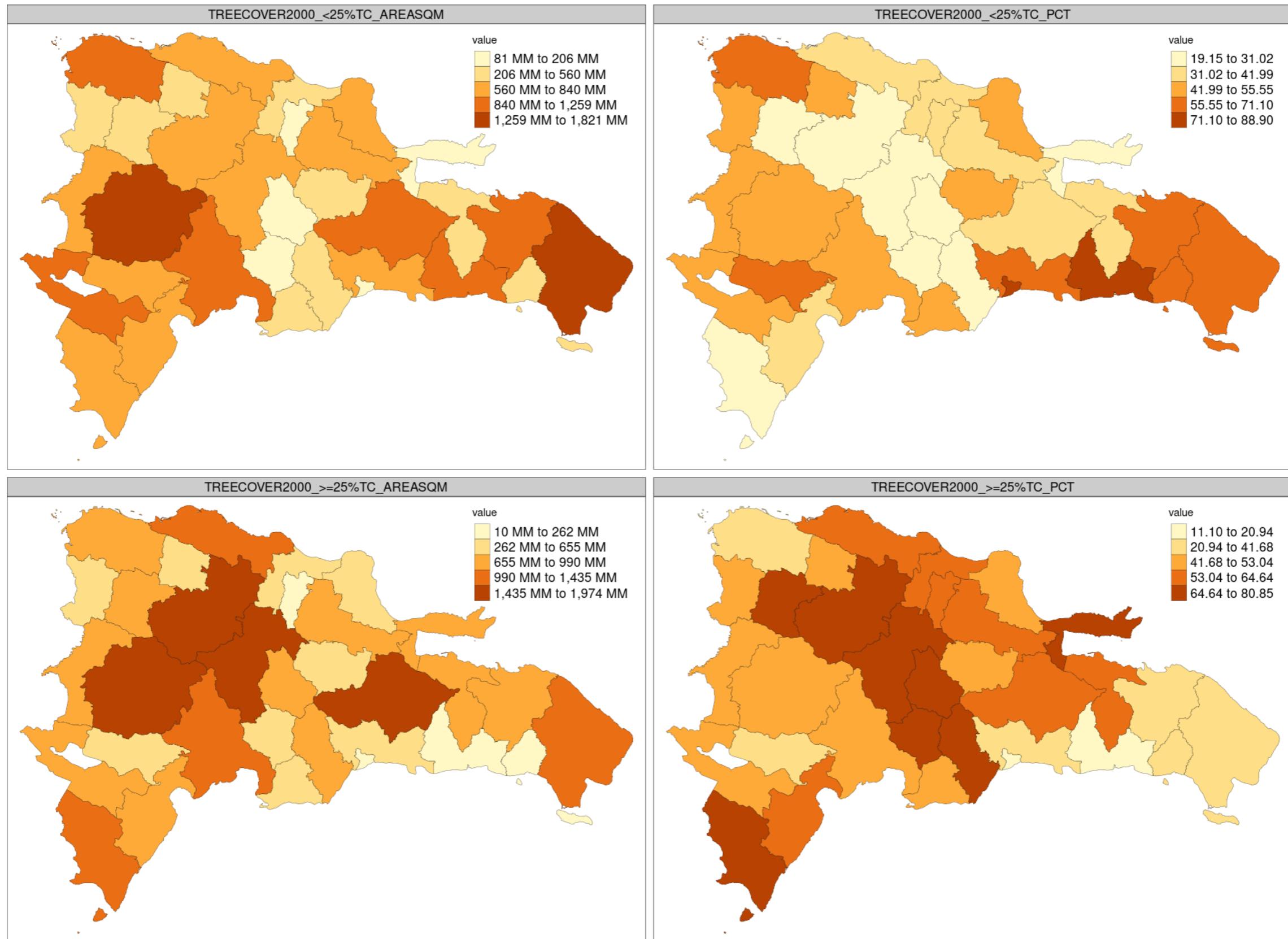
```



11.2 Zonal, by provinces

```
#Zonal statistics object
provzonal <- readRDS('out/prov_zonal_statistics.RDS')

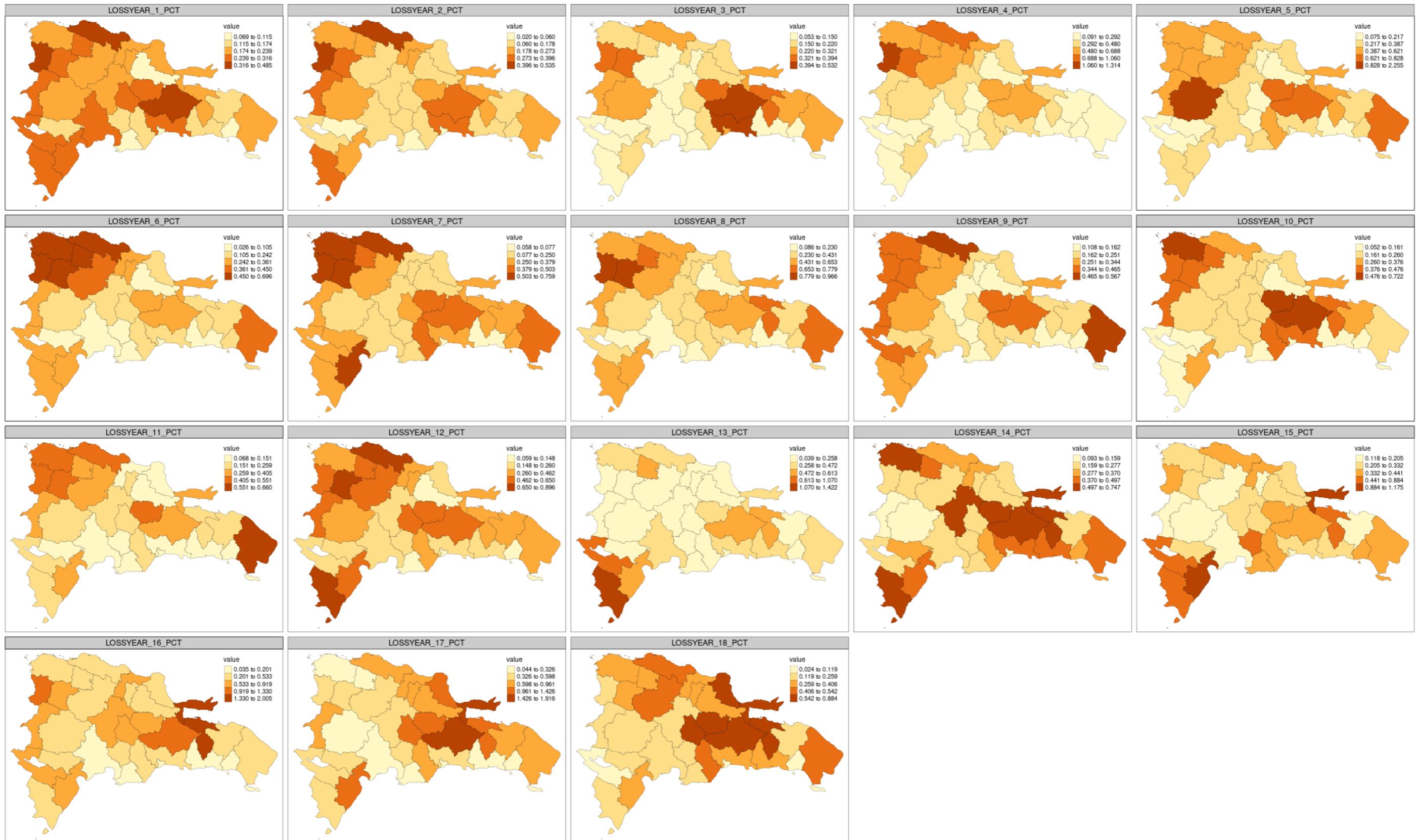
# Tree cover for pctc threshold
provzonal %>% select(matches('^TREECOVER2000')) %>%
  gather(variable, value, -geom) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 2, nrow = 2, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



```
# Top twenty sorted descending by column 2
stripped_table(provzonal %>% select(TOPONIMIA, matches('`^TREECOVER2000`')))
```

| TOPONIMIA | TREECOVER2000_>=25%TC_PCT | TREECOVER2000_<25%TC_PCT | TREECOVER2000_>=25%TC_AREASQM | TREECOVER2000_<25%TC_AREASQM |
|----------------------|---------------------------|--------------------------|-------------------------------|------------------------------|
| 1 SAMANÁ | 80.85482 | 19.14518 | 697688722 | 165201971 |
| 2 MONSEÑOR NOUEL | 79.24722 | 20.75278 | 786118604 | 205863963 |
| 3 SAN JOSÉ DE OCOA | 76.76925 | 23.23075 | 655338410 | 198308635 |
| 4 SAN CRISTÓBAL | 73.34135 | 26.65865 | 909995521 | 330771898 |
| 5 SANTIAGO RODRÍGUEZ | 71.24034 | 28.75966 | 817955801 | 330208089 |
| 6 SANTIAGO | 70.33967 | 29.66033 | 1974345122 | 832527766 |
| 7 LA VEGA | 69.57361 | 30.42639 | 1595092664 | 697576339 |
| 8 PEDERNALES | 68.98473 | 31.01527 | 1434924143 | 645136293 |
| 9 HATO MAYOR | 64.64493 | 35.35507 | 851745302 | 465829547 |
| 10 MONTE PLATA | 62.66562 | 37.33438 | 1630805609 | 971587235 |
| 11 PUERTO PLATA | 62.25984 | 37.74016 | 1124498325 | 681639068 |
| 12 BARAHONA | 59.64874 | 40.35126 | 990426487 | 670005055 |
| 13 HERMANAS MIRABAL | 58.42910 | 41.57090 | 249509302 | 177519888 |
| 14 ESPAILLAT | 58.12143 | 41.87857 | 489330733 | 352580341 |
| 15 DUARTE | 58.01404 | 41.98596 | 956931584 | 692551115 |
| 16 AZUA | 53.04008 | 46.95992 | 1422559629 | 1259486713 |
| 17 SAN JUAN | 52.85447 | 47.14553 | 1778257738 | 1586183858 |
| 18 DAJABÓN | 52.80924 | 47.19076 | 539049686 | 481699091 |
| 19 SANCHEZ RAMÍREZ | 52.80050 | 47.19950 | 626044975 | 559635063 |
| 20 ELÍAS PIÑA | 52.62086 | 47.37914 | 734376775 | 661223287 |

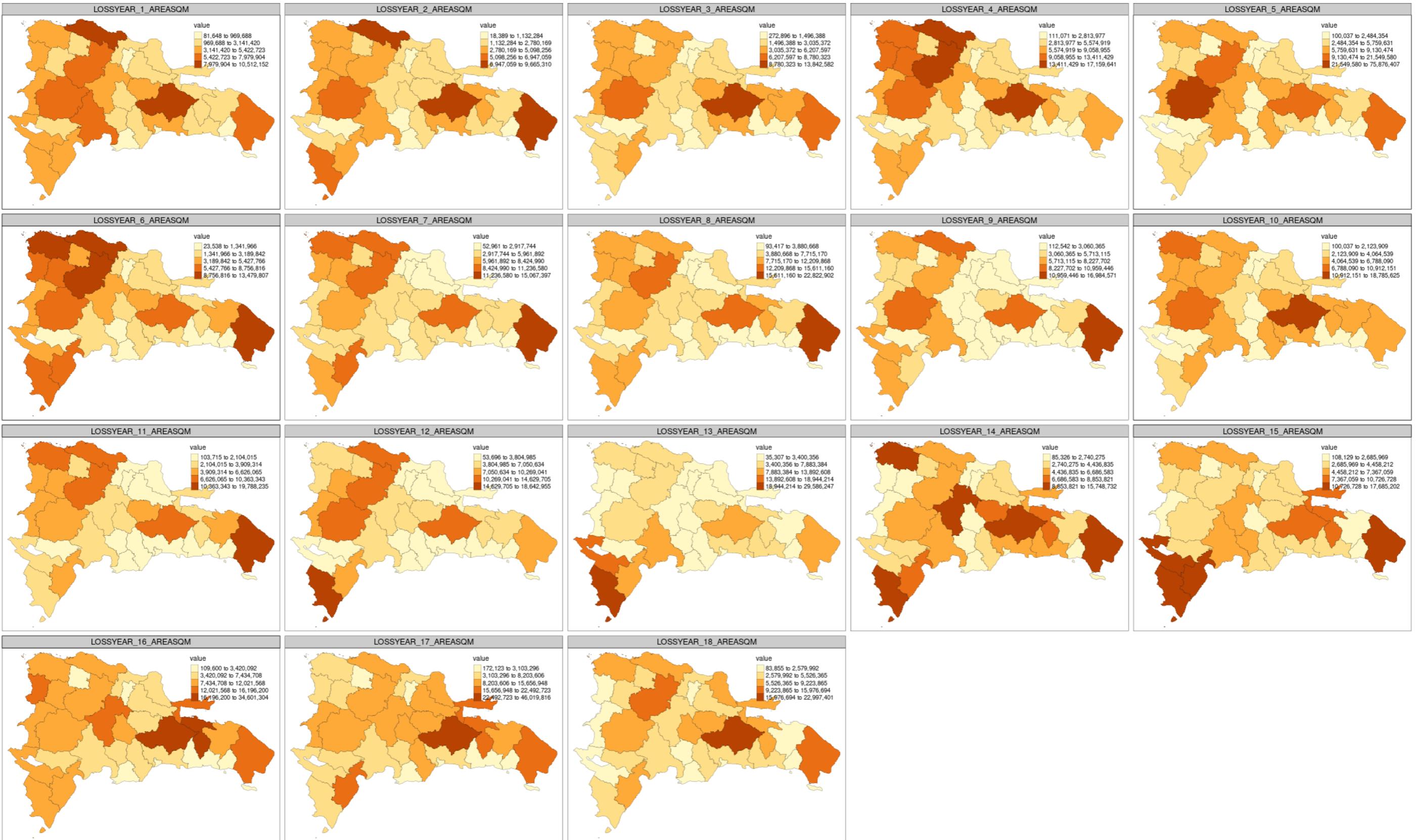
```
# Loss year
# * PCT
provzonal %>% select(matches('`LOSSYEAR_[1-9].*_PCT$')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 5, nrow = 4, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 0.75)
```



```
# Top twenty sorted descending by column 2
stripped_table(provzonal %>% select(TOPONIMIA, matches('`LOSSYEAR_[1-9].*_PCT$')))
```

| TOPONIMIA | LOSSYEAR_1_PCT | LOSSYEAR_2_PCT | LOSSYEAR_3_PCT | LOSSYEAR_4_PCT | LOSSYEAR_5_PCT | LOSSYEAR_6_PCT | LOSSYEAR_7_PCT | LOSSYEAR_8_PCT | LOSSYEAR_9_PCT | LOSSYEAR_10_PCT | LOSSYEAR_11_PCT | LOSSYEAR_12_PCT | LOSSYEAR_13_PCT | LOSSYEAR_14_PCT | LOSSYEAR_15_PCT | LOSSYEAR_16_PCT | LOSSYEAR_17_PCT | LOSSYEAR_18_PCT |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1 PUERTO PLATA | 0.4854033 | 0.5351371 | 0.3030461 | 0.9500740 | 0.5055249 | 0.6957841 | 0.5974570 | 0.6533006 | 0.5522852 | 0.2971400 | 0.4568094 | 0.7188384 | 0.3663436 | 0.3215384 | 0.4078903 | 0.4661778 | 0.7320356 | 0.4957085 |
| 2 MONTE PLATA | 0.4039418 | 0.3434452 | 0.5319174 | 0.5990856 | 0.8280679 | 0.3364909 | 0.4261050 | 0.5998771 | 0.4211296 | 0.7218597 | 0.3840966 | 0.5049202 | 0.5338398 | 0.6051635 | 0.4013127 | 1.3295957 | 1.7683654 | 0.8837021 |
| 3 DAJABÓN | 0.3859482 | 0.4994623 | 0.3857320 | 1.3138814 | 0.5642555 | 0.6333730 | 0.7586350 | 0.9663479 | 0.4653721 | 0.4743090 | 0.5288679 | 0.5945260 | 0.1581270 | 0.2243617 | 0.4136240 | 1.3073949 | 0.5980575 | 0.2201814 |
| 4 SÁNCHEZ RAMÍREZ | 0.3155063 | 0.2208855 | 0.3544095 | 0.5330888 | 0.6887159 | 0.3173057 | 0.5028247 | 0.5889452 | 0.3766842 | 0.5659880 | 0.4704985 | 0.5568671 | 0.3777390 | 0.7467294 | 0.3760017 | 0.6270417 | 1.0814081 | 0.7779388 |
| 5 BARAHONA | 0.2998575 | 0.2703060 | 0.2199753 | 0.3992784 | 0.3350358 | 0.3610873 | 0.5961263 | 0.5263456 | 0.3440741 | 0.3436310 | 0.3990568 | 0.6184561 | 0.5691888 | 0.4556789 | 1.0650967 | 0.6482735 | 1.3546311 | 0.3753093 |
| 6 MONSEÑOR NOUEL | 0.2824113 | 0.1507726 | 0.1862965 | 0.2836721 | 0.2126243 | 0.1842200 | 0.3424089 | 0.4217629 | 0.2037989 | 0.2141075 | 0.2493348 | 0.5413130 | 0.1340119 | 0.2562319 | 0.2707678 | 0.9194683 | 1.2140422 | 0.7173010 |
| 7 SANTIAGO RODRIGUEZ | 0.2736038 | 0.3961808 | 0.3497259 | 1.0600704 | 0.4575014 | 0.5693137 | 0.5800144 | 0.8622043 | 0.3819560 | 0.4693554 | 0.5423378 | 0.7058593 | 0.1944061 | 0.2220847 | 0.3113444 | 0.7409728 | 0.5158745 | 0.3121133 |
| 8 INDEPENDENCIA | 0.2711904 | 0.1089000 | 0.1474574 | 0.2677834 | 0.1403110 | 0.3065486 | 0.2943748 | 0.3793840 | 0.3731932 | 0.1135119 | 0.2082021 | 0.2052521 | 0.10699287 | 0.1967346 | 0.8844539 | 0.6789524 | 0.3517540 | 0.1188717 |
| 9 AZUA | 0.2701846 | 0.1700380 | 0.1122706 | 0.1476552 | 0.2497767 | 0.0937280 | 0.2104697 | 0.1600261 | 0.2511208 | 0.2280522 | 0.0995157 | 0.1711078 | 0.4719864 | 0.2066843 | 0.2048191 | 0.1874834 | 0.2329348 | 0.1510016 |
| 10 SANTO DOMINGO | 0.2655681 | 0.3163866 | 0.4769824 | 0.4041745 | 0.3869900 | 0.1863160 | 0.2981847 | 0.2011263 | 0.4078488 | 0.1434113 | 0.2302381 | 0.3510948 | 0.4365084 | 0.2905534 | 0.3616655 | 0.5426678 | 0.3521688 | |
| 11 VALVERDE | 0.2611979 | 0.2553856 | 0.1753540 | 0.5959891 | 0.2612874 | 0.5922335 | 0.4354789 | 0.7788545 | 0.2929423 | 0.4686540 | 0.3940771 | 0.6503569 | 0.6132473 | 0.4969110 | 0.2831954 | 0.4157169 | 0.2378591 | 0.3705595 |
| 12 PEDERNALES | 0.2607003 | 0.3339835 | 0.1316057 | 0.2915415 | 0.2447845 | 0.2928501 | 0.3791489 | 0.5344514 | 0.3382631 | 0.1614212 | 0.1706524 | 0.8962699 | 1.4223744 | 0.6685683 | 0.6581700 | 0.4487539 | 0.3943927 | 0.1971433 |
| 13 ELÍAS PINA | 0.2534464 | 0.3174933 | 0.3209197 | 0.4796927 | 0.5114789 | 0.3298810 | 0.2870776 | 0.5510140 | 0.3946658 | 0.4270846 | 0.4050504 | 0.5805863 | 0.0637306 | 0.1014734 | 0.1503388 | 0.7099978 | 0.7971332 | 0.1848662 |
| 14 SANTIAGO | 0.2385887 | 0.1776507 | 0.1409831 | 0.5236214 | 0.6205194 | 0.3952453 | 0.3488538 | 0.5477083 | 0.2863432 | 0.2289697 | 0.3224604 | 0.5212101 | 0.1757898 | 0.2382218 | 0.1588320 | 0.3998058 | 0.4230540 | 0.5417849 |
| 15 SAN JUAN | 0.2371836 | 0.2004045 | 0.2609741 | 0.3329798 | 2.2552452 | 0.1875471 | 0.2504127 | 0.3398458 | 0.3150932 | 0.2595091 | 0.1693107 | 0.3840813 | 0.1896463 | 0.1592740 | 0.1317662 | 0.3455967 | 0.3258296 | 0.2154485 |
| 16 HERMANAS MIRABAL | 0.2270777 | 0.2651537 | 0.1335245 | 0.4107385 | 0.2105379 | 0.3142563 | 0.2108825 | 0.3275226 | 0.1616077 | 0.1917584 | 0.2198416 | 0.3094322 | 0.1193967 | 0.2770417 | 0.1807318 | 0.5185918 | 0.7267176 | 0.3337250 |
| 17 LA VEGA | 0.2215651 | 0.1126597 | 0.0835562 | 0.3951270 | 0.3431451 | 0.1919161 | 0.1580316 | 0.2788415 | 0.1133335 | 0.1772841 | 0.1705137 | 0.2238754 | 0.0601001 | 0.5803689 | 0.3087151 | 0.6971679 | 0.4252573 | 0.1800116 |
| 18 MONTE CRISTI | 0.2206413 | 0.2545229 | 0.2071980 | 0.6881459 | 0.4269014 | 0.6814243 | 0.5968959 | 0.6485977 | 0.4370619 | 0.5796620 | 0.5505089 | 0.3745352 | 0.3531979 | 0.7201909 | 0.3214656 | 0.5196754 | 0.2361948 | 0.4062284 |
| 19 LA ALTAGRACIA | 0.2199468 | 0.2731973 | 0.2878811 | 0.2529765 | 0.7061977 | 0.4499186 | 0.5029080 | 0.7617653 | 0.5668980 | 0.2265677 | 0.6604766 | 0.3419018 | 0.4177518 | 0.4235467 | 0.4413736 | 0.5330860 | 0.7415321 | 0.5332578 |
| 20 MARÍA TRINIDAD SÁNCHEZ | 0.2186695 | 0.1393362 | 0.1892168 | 0.4124596 | 0.3075154 | 0.2367192 | 0.2088519 | 0.4097156 | 0.2200720 | 0.2120838 | 0.1359824 | 0.2602569 | 0.1933023 | 0.2573299 | 0.2494027 | 0.4291678 | 0.2977478 | 0.6553986 |

```
# * AREASQM
provzonal %>% select(matches('`^LOSSYEAR_[1-9].*_AREASQM$`)) %>%
  gather(variable, value, -geom) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 5, nrow = 4, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 0.75)
```

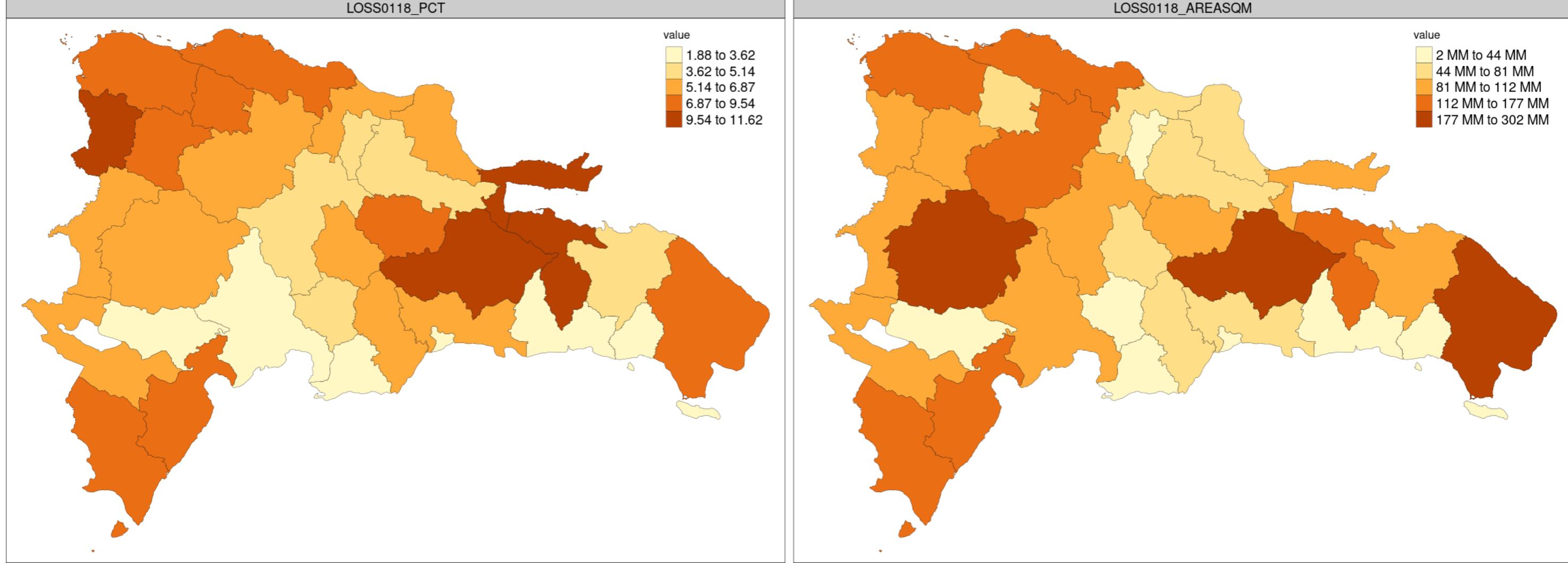


```
# Top twenty sorted descending by column 2
stripped_table(provzonal %>% select(TOPONIMIA, matches('`LOSSYEAR_[1-9].*_AREASQM$`')))
```

| TOPONIMIA | LOSSYEAR_1_AREASQM | LOSSYEAR_2_AREASQM | LOSSYEAR_3_AREASQM | LOSSYEAR_4_AREASQM | LOSSYEAR_5_AREASQM | LOSSYEAR_6_AREASQM | LOSSYEAR_7_AREASQM | LOSSYEAR_8_AREASQM | LOSSYEAR_9_AREASQM | LOSSYEAR_10_AREASQM | LOSSYEAR_11_AREASQM | LOSSYEAR_12_AREASQM | LOSSYEAR_13_AREASQM | LOSSYEAR_14_AREASQM | LOSSYEAR_15_AREASQM | LOSSYEAR_16_AREASQM | LOSSYEAR_17_AREASQM | LOSSYEAR_18_AREASQM |
|---------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1 MONTE PLATA | 10512152 | 8932794 | 13842582 | 15590561 | 21549580 | 8756816 | 11088926 | 15611160 | 10959446 | 18785625 | 9995703 | 13140006 | 13892608.0 | 15748732 | 10443733 | 34601304 | 46019816 | 22997401 |
| 2 PUERTO PLATA | 8767050 | 9665310 | 5473429 | 17159641 | 9130474 | 12566616 | 10790895 | 11795030 | 5366756 | 8250606 | 12983209 | 6616669.4 | 5807426 | 7367059 | 8419811 | 13221568 | 8953176 | |
| 3 SAN JUAN | 7979904 | 6742493 | 8780323 | 11202912 | 75876407 | 6309914 | 8424990 | 11433915 | 10601127 | 8731032 | 5696358 | 12922192 | 6380539.4 | 5358682 | 4433199 | 11627398 | 10962345 | 7248640 |
| 4 AZUA | 7246475 | 4560498 | 3011150 | 3960180 | 6699127 | 2513828 | 5644894 | 4291973 | 6735176 | 6116467 | 2669057 | 4589189 | 12658893.6 | 5543370 | 5493343 | 5028392 | 6247418 | 4049934 |
| 5 SANTIAGO | 6696882 | 4986430 | 3957215 | 14697387 | 17417191 | 11094034 | 9791882 | 15373476 | 8037289 | 6426888 | 9051054 | 14629705 | 4934196.5 | 6686583 | 4458212 | 11222042 | 11874389 | 15207213 |
| 6 LA ALTAGRACIA | 6574744 | 8185140 | 8625075 | 6980102 | 21158066 | 13479807 | 15067397 | 22822902 | 16984571 | 6788090 | 19788235 | 10243564 | 12516069.9 | 12689690 | 13223791 | 15971544 | 22216705 | 15976694 |
| 7 PEDERNALES | 5422723 | 6947059 | 2737478 | 6064239 | 5091665 | 6091459 | 7886527 | 11116913 | 7036077 | 3357659 | 3549673 | 18642955 | 29586246.8 | 13906625 | 13690334 | 9334352 | 8203606 | 4100700 |
| 8 LA VEGA | 5079754 | 2582913 | 1915667 | 9058955 | 7867181 | 4400001 | 3623141 | 6392912 | 2598362 | 4064539 | 3009314 | 5132721 | 1377897.0 | 13305938 | 7077815 | 15983752 | 9749743 | 4127070 |
| 9 BARAHONA | 4978929 | 4488245 | 3685239 | 6629744 | 59563041 | 5995607 | 9888269 | 5713115 | 5705758 | 6626065 | 10269041 | 9450588.6 | 7566236 | 17685202 | 10764138 | 22492723 | 6231753 | |
| 10 INDEPENDENCIA | 4801712 | 1928189 | 2610889 | 4741387 | 2484354 | 5427766 | 5212215 | 6717394 | 6607779 | 2009848 | 3686438 | 3634205 | 18944213.5 | 3483393 | 15660187 | 12021568 | 628174 | 2104749 |
| 11 MONGA | 7077050 | 8800000 | 13441429 | 598256 | 3937354 | 5759361 | 6465147 | 7743758 | 9863985 | 87526428 | 10912404 | 66406248 | 1003415 | 664079.9 | 13276169 | 6222042 | 13452118 | 6304665 |
| 12 DIAJABON | 3939561 | 5088256 | 6344442 | 13441429 | 4478755 | 8165896 | 30762320 | 5864892 | 6983005 | 4466269 | 6710887 | 5578606 | 6602663 | 447665 | 8853821 | 7437008 | 12822940 | 923665 |
| 13 SANCHEZ RAMIREZ | 3740896 | 2618995 | 4202163 | 6344442 | 4478755 | 7138200 | 4006455 | 7689952 | 5507956 | 5960393 | 5452883 | 8102662 | 889424.2 | 1416163 | 2098730 | 11124792 | 2579992 | |
| 14 ELIAS PINA | 3537998 | 4430936 | 4478755 | 6694591 | 7138200 | 4403819 | 4706091 | 3880668 | 2637519 | 5303870 | 1866399 | 2946390 | 4569256.2 | 5680856 | 3781352 | 4706827 | 7062447 | 4583234 |
| 15 SANTO DOMINGO | 3456185 | 4117554 | 6207997 | 5260052 | 5036498 | 2424774 | 4706091 | 3880668 | 2637519 | 5303870 | 1866399 | 2946390 | 4569256.2 | 5680856 | 3781352 | 4706827 | 7062447 | 4583234 |
| 16 SANTIAGO RODRIGUEZ | 3114120 | 4015426 | 13171346 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | 6536454 | |
| 17 MONSERRAT NOUEL | 2801471 | 1389638 | 1884899 | 2833097 | 2109996 | 1827430 | 2896636 | 4183814 | 2021690 | 2122899 | 2073387 | 5369731 | 1329374.4 | 2541776 | 2688969 | 9120865 | 12043987 | 7115500 |
| 18 EL SEIBO | 2645538 | 2780169 | 5113774 | 4597320 | 5246934 | 3735093 | 5257969 | 7715170 | 4418548 | 5937010 | 4638519 | 3203925.5 | 4108823 | 2656780 | 7928520 | 1188734 | 2555784 | |
| 19 MARIA TRINIDAD SANCHEZ | 2638183 | 1681051 | 2282845 | 4976205 | 3710083 | 2859947 | 2519737 | 4943099 | 2655104 | 2558729 | 1640588 | 3139924 | 2332136.3 | 3104610 | 3008971 | 5177284 | 15656948 | 7907193 |
| 20 HATO MAYOR | 2563792 | 3420105 | 5190115 | 5891939 | 7558955 | 3189842 | 3473809 | 9824067 | 3060365 | 6267864 | 2582919 | 6084683 | 7883383.6 | 8226203 | 10726728 | 26411836 | 18794028 | 8975846 |

Total loss 2001-2018

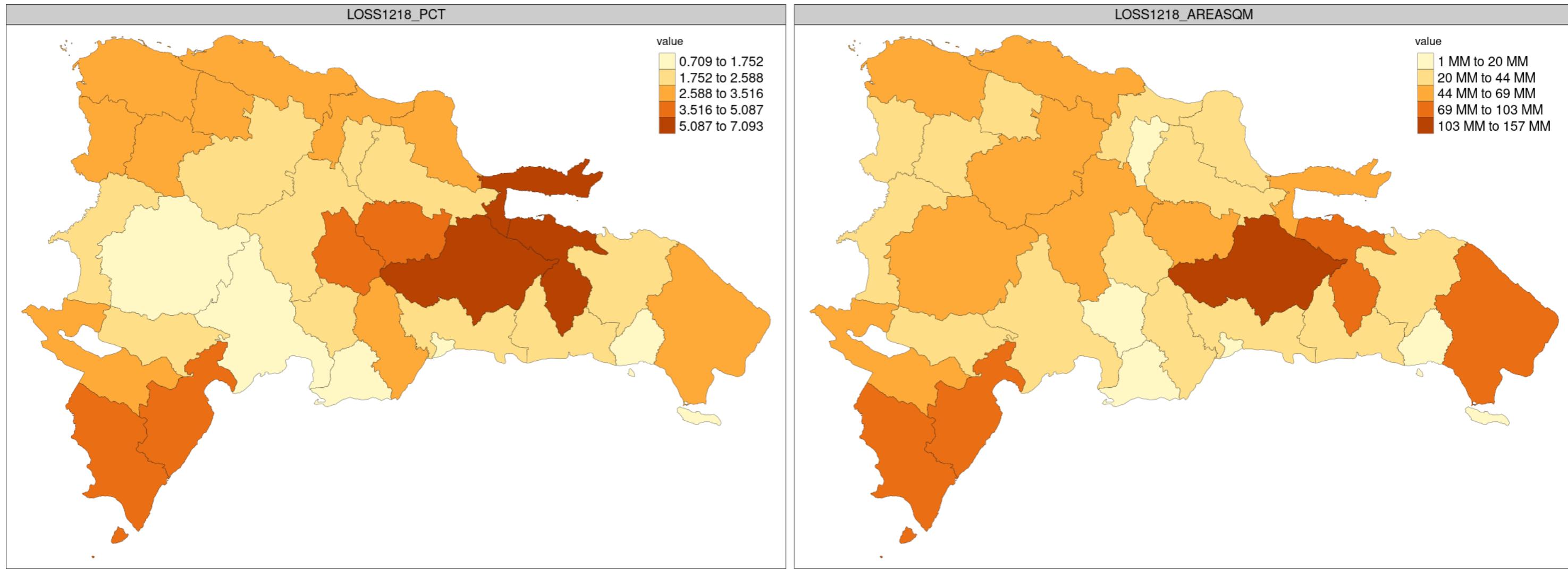
```
provzonal %>% select(matches('`LOSS0118`')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



```
# Top twenty sorted descending by column 2
stripped_table(provzonal %>% select(TOPONIMIA, matches('^LOSS0118')) %>% select(-matches('<NA>')))
```

| | TOPONIMIA | LOSS0118_PCT | LOSS0118_AREASQM |
|----|------------------------|--------------|------------------|
| 1 | MONTE PLATA | 11.622916 | 302473946 |
| 2 | SAMANÁ | 11.232321 | 96922649 |
| 3 | HATO MAYOR | 10.635182 | 140126481 |
| 4 | DAJABÓN | 10.492457 | 107101625 |
| 5 | PUERTO PLATA | 9.540494 | 172314432 |
| 6 | SANCHEZ RAMÍREZ | 9.480578 | 112409320 |
| 7 | BARAHONA | 9.181408 | 152451002 |
| 8 | SANTIAGO RODRÍGUEZ | 8.949919 | 102759738 |
| 9 | LA ALTAGRACIA | 8.320683 | 249292186 |
| 10 | MONTE CRISTI | 8.223049 | 154799087 |
| 11 | PEDERNALES | 7.825075 | 162766292 |
| 12 | VALVERDE | 7.579301 | 62354694 |
| 13 | ELÍAS PIÑA | 6.865931 | 95820932 |
| 14 | MONSEÑOR NOUEL | 6.784546 | 67301511 |
| 15 | SAN JUAN | 6.560149 | 220712371 |
| 16 | SAN CRISTÓBAL | 6.542953 | 81182825 |
| 17 | SANTIAGO | 6.289643 | 176542269 |
| 18 | INDEPENDENCIA | 6.116804 | 108304461 |
| 19 | ESPAILLAT | 6.052755 | 50958817 |
| 20 | MARÍA TRINIDAD SÁNCHEZ | 6.033228 | 72789136 |

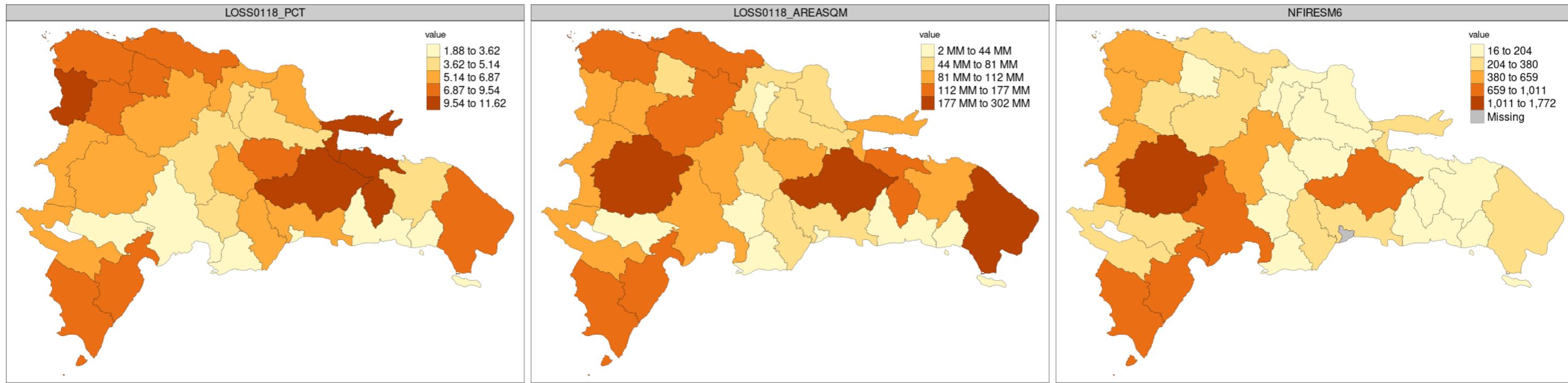
```
# Total loss 2012-2018
provzonal %>% select(matches('^LOSS1218')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



```
# Top twenty sorted descending by column 2
stripped_table(provzonal %>% select(TOPONIMIA, matches('`LOSS1218`')) %>% select(-matches('<NA>')))
```

| | TOPONIMIA | LOSS1218_PCT | LOSS1218_AREASQM |
|----|------------------------|--------------|------------------|
| 1 | SAMANÁ | 7.092585 | 61201256 |
| 2 | HATO MAYOR | 6.610836 | 87102708 |
| 3 | MONTE PLATA | 6.026899 | 156843601 |
| 4 | BARAHONA | 5.086634 | 84460081 |
| 5 | PEDERNALES | 4.685672 | 97464819 |
| 6 | SANCHEZ RAMÍREZ | 4.543726 | 53874049 |
| 7 | MONSEÑOR NOUEL | 4.053136 | 40206403 |
| 8 | DAJABÓN | 3.516272 | 35892309 |
| 9 | PUERTO PLATA | 3.508532 | 63368918 |
| 10 | INDEPENDENCIA | 3.505947 | 62076489 |
| 11 | LA ALTAGRACIA | 3.432450 | 102838057 |
| 12 | MARÍA TRINIDAD SÁNCHEZ | 3.342606 | 40327565 |
| 13 | ESPAILLAT | 3.308128 | 27851494 |
| 14 | SAN CRISTÓBAL | 3.174297 | 39385647 |
| 15 | VALVERDE | 3.067846 | 25239085 |
| 16 | SANTIAGO RODRÍGUEZ | 3.007655 | 34532810 |
| 17 | MONTE CRISTI | 2.931488 | 55185337 |
| 18 | ELÍAS PIÑA | 2.588126 | 36119894 |
| 19 | SANTO DOMINGO | 2.564897 | 33380362 |
| 20 | LA VEGA | 2.475496 | 56754936 |

```
# Fires M6
provzonal %>% select(matches('`^LOSS0118|NFIRESM6`')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 3, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



```
# Top twenty sorted descending by column 2
stripped_table(provzonal %>% select(TOPONIMIA, matches('`^LOSS0118|NFIRESM6`')) %>% select(-matches('<NA>')))
```

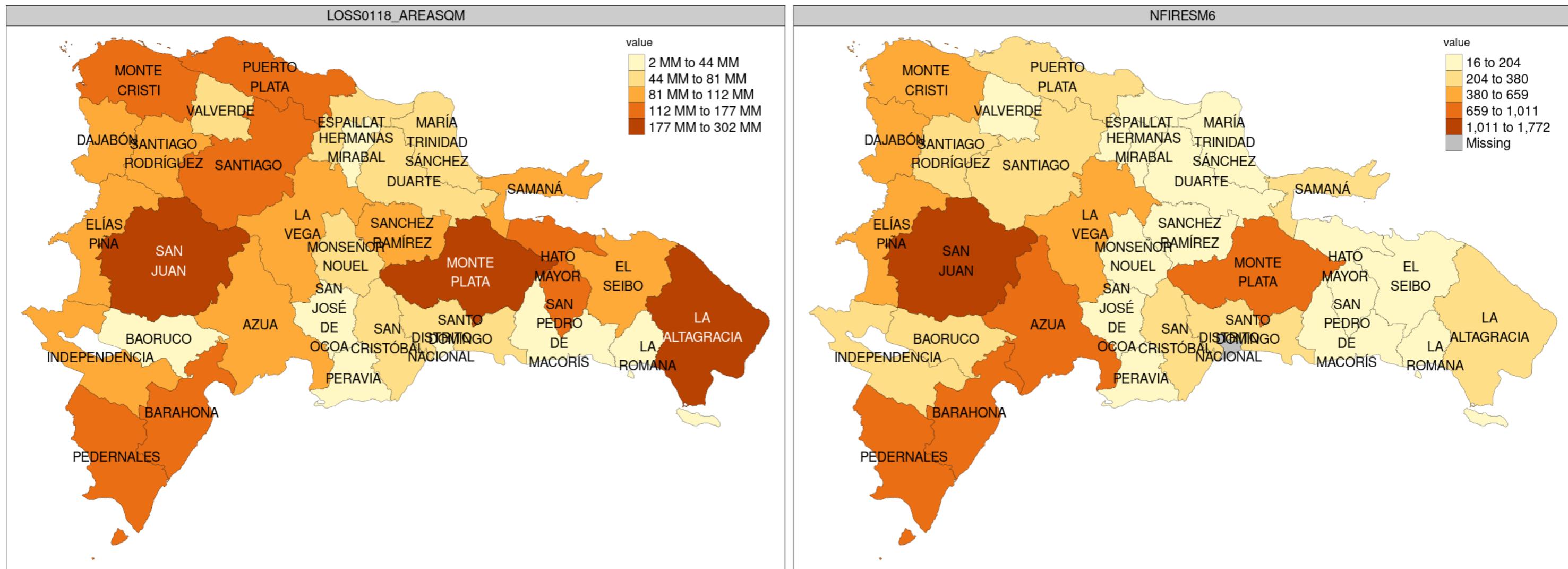
| | TOPONIMIA | LOSS0118_PCT | LOSS0118_AREASQM | NFIRESM6 |
|----|------------------------|--------------|------------------|----------|
| 1 | MONTE PLATA | 11.622916 | 302473946 | 791 |
| 2 | SAMANÁ | 11.232321 | 96922649 | 248 |
| 3 | HATO MAYOR | 10.635182 | 140126481 | 193 |
| 4 | DAJABÓN | 10.492457 | 107101625 | 444 |
| 5 | PUERTO PLATA | 9.540494 | 172314432 | 289 |
| 6 | SANCHEZ RAMÍREZ | 9.480578 | 112409320 | 204 |
| 7 | BARAHONA | 9.181408 | 152451002 | 1006 |
| 8 | SANTIAGO RODRÍGUEZ | 8.949919 | 102759738 | 349 |
| 9 | LA ALTAGRACIA | 8.320683 | 249292186 | 230 |
| 10 | MONTE CRISTI | 8.223049 | 154799087 | 554 |
| 11 | PEDERNALES | 7.825075 | 162766292 | 1011 |
| 12 | VALVERDE | 7.579301 | 62354694 | 183 |
| 13 | ELÍAS PIÑA | 6.865931 | 95820932 | 659 |
| 14 | MONSEÑOR NOUEL | 6.784546 | 67301511 | 168 |
| 15 | SAN JUAN | 6.560149 | 220712371 | 1772 |
| 16 | SAN CRISTÓBAL | 6.542953 | 81182825 | 226 |
| 17 | SANTIAGO | 6.289643 | 176542269 | 380 |
| 18 | INDEPENDENCIA | 6.116804 | 108304461 | 363 |
| 19 | ESPAILLAT | 6.052755 | 50958817 | 58 |
| 20 | MARÍA TRINIDAD SÁNCHEZ | 6.033228 | 72789136 | 136 |

```
# Fires M6. Only AREASQM and FIRESM6
provzonal %>% select(matches('`^LOSS0118_AREASQM|NFIRESM6|TOPONIMIA`')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom, -TOPONIMIA) %>%
mutate(TOPONIMIA=gsub(' ', '\n', TOPONIMIA)) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
```

```

tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1) +
tm_text(text = 'TOPONIMIA')

```



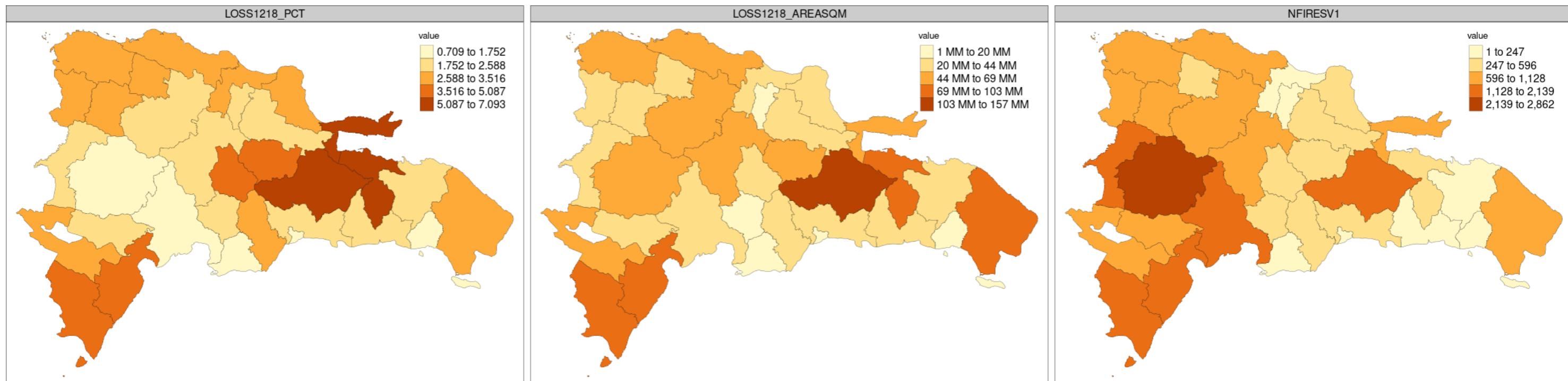
```

# Top twenty sorted descending by column 2
stripped_table(provzonal %>% select(matches('`^LOSS0118_AREASQM|NFIRESM6|TOPONIMIA`')) %>% select(-matches('<NA>')))

```

| | TOPONIMIA | LOSS0118_AREASQM | NFIRESM6 |
|----|--------------------|------------------|----------|
| 1 | MONTE PLATA | 302473946 | 791 |
| 2 | LA ALTAGRACIA | 249292186 | 230 |
| 3 | SAN JUAN | 220712371 | 1772 |
| 4 | SANTIAGO | 176542269 | 380 |
| 5 | PUERTO PLATA | 172314432 | 289 |
| 6 | PEDERNALES | 162766292 | 1011 |
| 7 | MONTE CRISTI | 154799087 | 554 |
| 8 | BARAHONA | 152451002 | 1006 |
| 9 | HATO MAYOR | 140126481 | 193 |
| 10 | SANCHEZ RAMÍREZ | 112409320 | 204 |
| 11 | INDEPENDENCIA | 108304461 | 363 |
| 12 | LA VEGA | 108247674 | 475 |
| 13 | DAJABÓN | 107101625 | 444 |
| 14 | SANTIAGO RODRÍGUEZ | 102759738 | 349 |
| 15 | AZUA | 97059365 | 908 |
| 16 | SAMANÁ | 96922649 | 248 |
| 17 | ELÍAS PIÑA | 95820932 | 659 |
| 18 | EL SEIBO | 89985798 | 75 |
| 19 | SAN CRISTÓBAL | 81182825 | 226 |
| 20 | SANTO DOMINGO | 78261478 | 258 |

```
# Fires V1
provzonal %>% select(matches('`^LOSS1218|NFIRESV1`')) %>% select(-matches('<NA>')) %>%
  gather(variable, value, -geom) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 3, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



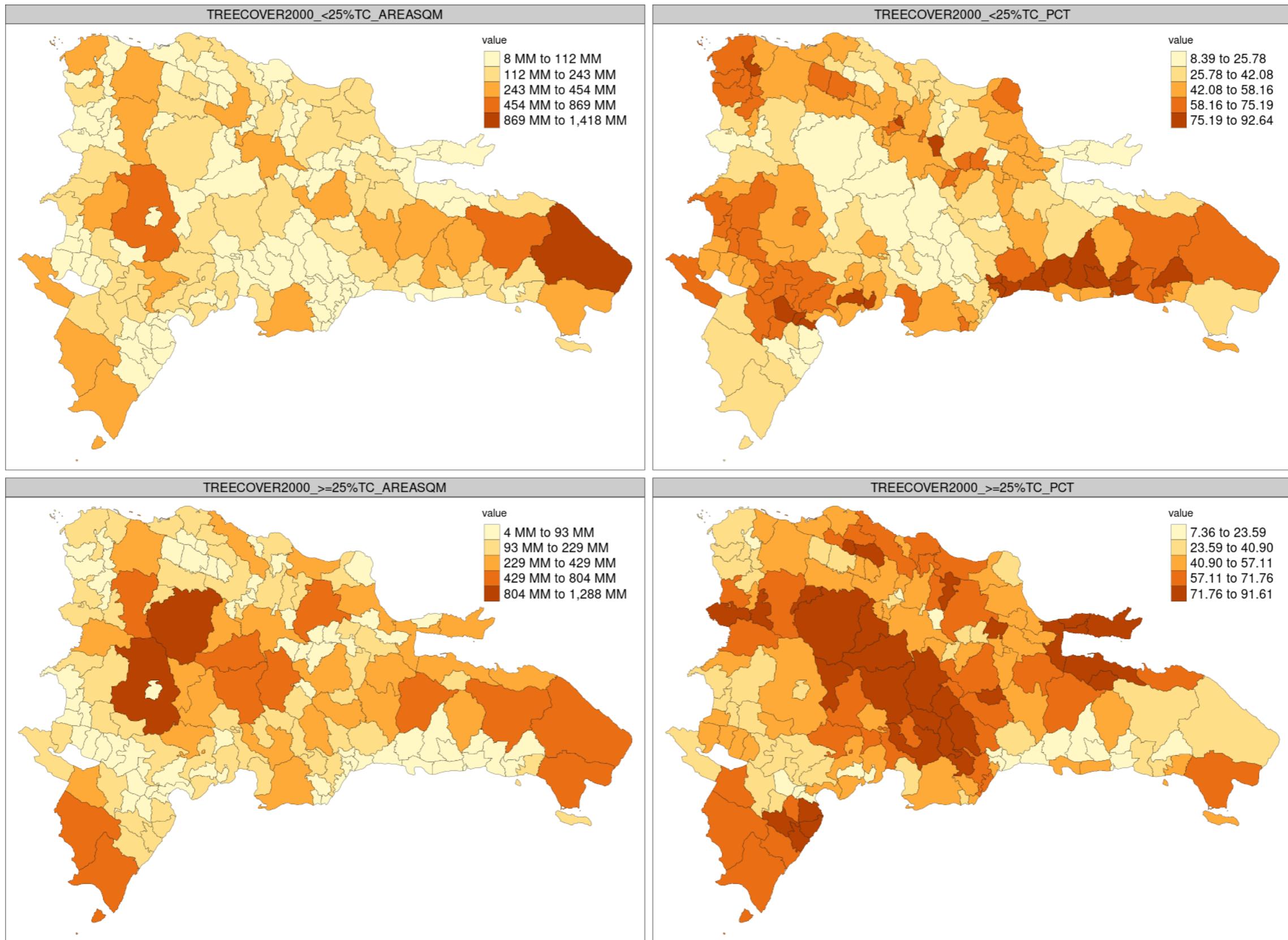
```
# Top twenty sorted descending by column 2
stripped_table(provzonal %>% select(TOPONIMIA, matches('`^LOSS1218|NFIRESV1`')) %>% select(-matches('`<NA>`')))
```

| | TOPONIMIA | LOSS1218_PCT | LOSS1218_AREASQM | NFIRESV1 |
|----|------------------------|--------------|------------------|----------|
| 1 | SAMANÁ | 7.092585 | 61201256 | 835 |
| 2 | HATO MAYOR | 6.610836 | 87102708 | 555 |
| 3 | MONTE PLATA | 6.026899 | 156843601 | 1589 |
| 4 | BARAHONA | 5.086634 | 84460081 | 2139 |
| 5 | PEDERNALES | 4.685672 | 97464819 | 1894 |
| 6 | SANCHEZ RAMÍREZ | 4.543726 | 53874049 | 376 |
| 7 | MONSEÑOR NOUEL | 4.053136 | 40206403 | 387 |
| 8 | DAJABÓN | 3.516272 | 35892309 | 931 |
| 9 | PUERTO PLATA | 3.508532 | 63368918 | 883 |
| 10 | INDEPENDENCIA | 3.505947 | 62076489 | 897 |
| 11 | LA ALTAGRACIA | 3.432450 | 102838057 | 794 |
| 12 | MARÍA TRINIDAD SÁNCHEZ | 3.342606 | 40327565 | 348 |
| 13 | ESPAILLAT | 3.308128 | 27851494 | 187 |
| 14 | SAN CRISTÓBAL | 3.174297 | 39385647 | 596 |
| 15 | VALVERDE | 3.067846 | 25239085 | 390 |
| 16 | SANTIAGO RODRÍGUEZ | 3.007655 | 34532810 | 807 |
| 17 | MONTE CRISTI | 2.931488 | 55185337 | 1123 |
| 18 | ELÍAS PIÑA | 2.588126 | 36119894 | 1624 |
| 19 | SANTO DOMINGO | 2.564897 | 33380362 | 502 |
| 20 | LA VEGA | 2.475496 | 56754936 | 1128 |

11.3 Zonal, by municipalities

```
#Zonal statistics object
munzonal <- readRDS('out/mun_zonal_statistics.RDS')

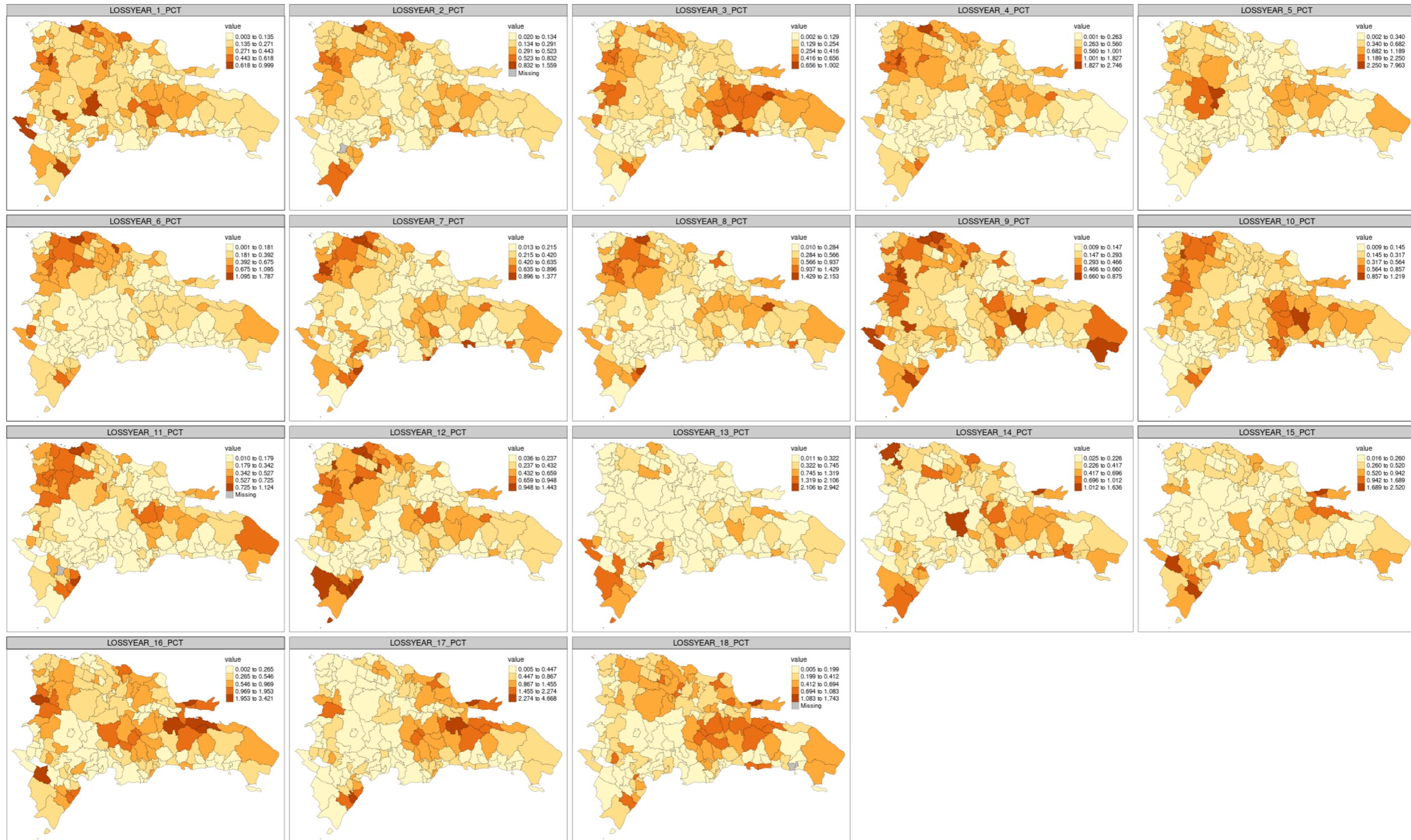
# Tree cover for pctc threshold
munzonal %>% select(matches('`^TREECOVER2000`')) %>%
gather(variable, value, -geom) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 2, nrow = 2, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



```
# Top twenty sorted descending by column 2
stripped_table(munzonal %>% select(TOPONIMIA, matches('`TREECOVER2000`')))
```

| TOPONIMIA | TREECOVER2000_>=25%TC_PCT | TREECOVER2000_<25%TC_PCT | TREECOVER2000_>=25%TC_AREASQM | TREECOVER2000_<25%TC_AREASQM |
|-------------------------|---------------------------|--------------------------|-------------------------------|------------------------------|
| 1 LOS CACAOS | 91.61025 | 8.389754 | 170310186 | 15597171 |
| 2 CAMBITA GARABITOS | 88.01608 | 11.983923 | 152082966 | 20707019 |
| 3 GUANANICO | 86.68482 | 13.315184 | 51772418 | 7952480 |
| 4 LA CIÉNAGA | 86.25875 | 13.741251 | 100812553 | 16059711 |
| 5 SAN JOSÉ DE LAS MATAS | 84.83461 | 15.165392 | 1288326327 | 230306637 |
| 6 ALTAMIRA | 84.81078 | 15.189217 | 150498020 | 26953497 |
| 7 JARABACOA | 83.88671 | 16.113288 | 565469306 | 108617561 |
| 8 SABANA DE LA MAR | 83.82227 | 16.177732 | 428565345 | 82713285 |
| 9 EL VALLE | 81.81502 | 18.184984 | 133096980 | 29583401 |
| 10 MONCIÓN | 81.57768 | 18.422318 | 113607682 | 25655507 |
| 11 SAMANÁ | 81.37407 | 18.625933 | 334161130 | 76487058 |
| 12 POLO | 81.24050 | 18.759498 | 167925531 | 38776208 |
| 13 SÁNCHEZ | 81.01879 | 18.981205 | 275912749 | 64641255 |
| 14 BONAO | 80.30119 | 19.698809 | 544425648 | 133553899 |
| 15 CASTILLO | 80.11398 | 19.886025 | 106634362 | 26468959 |
| 16 RANCHO ARRIBA | 79.64393 | 20.356072 | 163233018 | 41720483 |
| 17 PIEDRA BLANCA | 79.41746 | 20.582538 | 183684957 | 47605432 |
| 18 CONSTANZA | 78.95450 | 21.045497 | 671456447 | 178978201 |
| 19 VILLA ALTAGRACIA | 78.83552 | 21.164480 | 336034321 | 90213039 |
| 20 PARAÍSO | 78.76318 | 21.236825 | 107250173 | 28917742 |

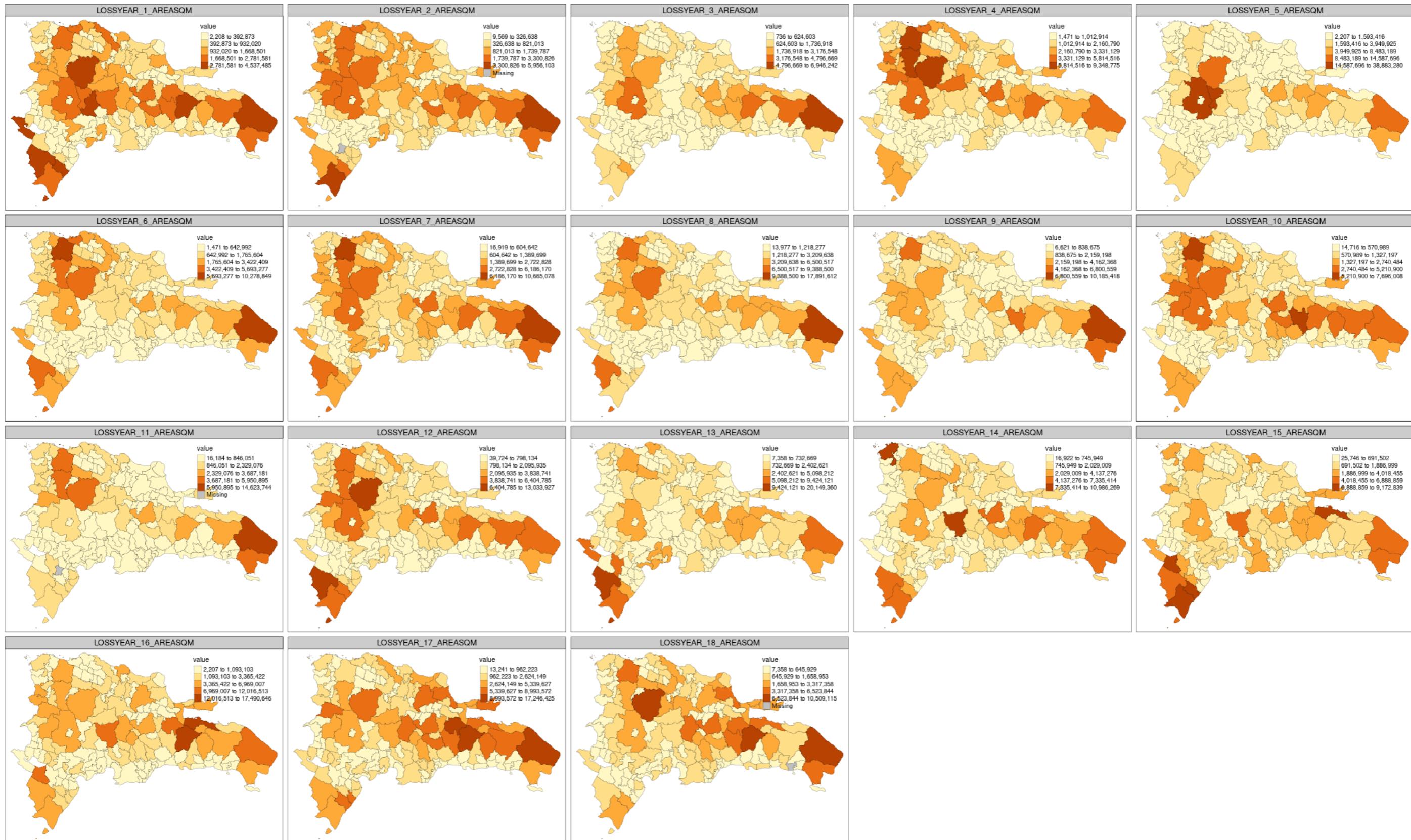
```
# Loss year
# * PCT
munzonal %>% select(matches('^LOSSYEAR_[1-9].*_PCT$')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 5, nrow = 4, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 0.75)
```



```
# Top twenty sorted descending by column 2
stripped_table(munzonal %>% select(TOPONIMIA, matches('^LOSSYEAR_[1-9].*_PCT$')))
```

| TOPONIMIA | LOSSYEAR_1_PCT | LOSSYEAR_2_PCT | LOSSYEAR_3_PCT | LOSSYEAR_4_PCT | LOSSYEAR_5_PCT | LOSSYEAR_6_PCT | LOSSYEAR_7_PCT | LOSSYEAR_8_PCT | LOSSYEAR_9_PCT | LOSSYEAR_10_PCT | LOSSYEAR_11_PCT | LOSSYEAR_12_PCT | LOSSYEAR_13_PCT | LOSSYEAR_14_PCT | LOSSYEAR_15_PCT | LOSSYEAR_16_PCT | LOSSYEAR_17_PCT | LOSSYEAR_18_PCT |
|--------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1 VILLA ISABELA | 0.9994303 | 1.5587222 | 0.3272379 | 2.7457410 | 0.9591335 | 1.7873023 | 0.9785871 | 1.7650696 | 0.7962093 | 0.6961621 | 1.0209682 | 1.4430425 | 0.2285802 | 0.2813829 | 0.4140844 | 0.2567185 | 0.5169108 | 0.2938888 |
| 2 ENRIQUELLO | 0.9741060 | 0.6360274 | 0.6564287 | 0.6322161 | 0.5140679 | 0.9698464 | 0.8297276 | 0.9187311 | 0.8747898 | 0.8351082 | 0.6281807 | 1.3886336 | 0.10225311 | 0.8126892 | 2.5122744 | 0.8505773 | 2.2737361 | 0.8274857 |
| 3 PADRE LAS CASAS | 0.7909467 | 0.2051742 | 0.1373385 | 0.2603148 | 0.6518129 | 0.0943801 | 0.1906838 | 0.2786523 | 0.1831180 | 0.3991921 | 0.1084859 | 0.1606771 | 0.0784791 | 0.1559324 | 0.0732216 | 0.2397974 | 0.2336422 | 0.1301574 |
| 4 JIMANI | 0.7506408 | 0.2061926 | 0.2002747 | 0.3275099 | 0.2027665 | 0.5861851 | 0.5534808 | 0.6794701 | 0.6883470 | 0.1169567 | 0.1164895 | 0.2161596 | 1.8974706 | 0.1579149 | 0.6850766 | 0.1737998 | 0.3672222 | 0.2677078 |
| 5 EL PINO | 0.7186764 | 0.7379641 | 0.4729679 | 2.3866429 | 0.6272694 | 0.8780095 | 0.6046274 | 1.2905985 | 0.7295781 | 0.6130133 | 0.5744379 | 0.7144834 | 0.0654105 | 0.0687648 | 0.1601717 | 0.5702450 | 0.4025258 | 0.1635261 |
| 6 VALLEJUELO | 0.7154490 | 0.2195768 | 0.1807694 | 0.7167757 | 0.4719907 | 0.4437973 | 0.5608828 | 0.8033461 | 0.8577427 | 0.3247216 | 0.2033242 | 0.4889067 | 0.4305298 | 0.3253850 | 0.3356673 | 0.8640448 | 0.3466130 | 0.4341784 |
| 7 SABANA IGLESIA | 0.6179326 | 0.0800560 | 0.0037526 | 0.2864505 | 1.0469829 | 0.5691484 | 0.1826278 | 0.5178625 | 0.2289102 | 0.1350946 | 0.6967377 | 0.3877714 | 0.2126489 | 0.1751226 | 0.0738017 | 0.2326629 | 0.1601121 | 0.5829080 |
| 8 VILLA LOS ALMÁCIGOS | 0.6153966 | 0.5817006 | 0.4160578 | 1.3347190 | 0.5469404 | 0.5448122 | 0.6122044 | 1.0218776 | 0.7423776 | 0.6707291 | 0.4564931 | 0.9328491 | 0.2933331 | 0.2564448 | 0.6827888 | 1.2985401 | 0.9651263 | 0.5178554 |
| 9 IMBERT | 0.5791735 | 0.2706162 | 0.3579265 | 0.5074054 | 0.5869446 | 0.3085573 | 0.2962150 | 0.2825014 | 0.5810020 | 0.1220516 | 0.2980435 | 0.4356372 | 0.4552935 | 0.1572500 | 0.2751874 | 0.1993052 | 1.1652039 | 0.5668312 |
| 10 YAMASÁ | 0.5714324 | 0.4617893 | 0.5136452 | 0.6785337 | 0.7605542 | 0.2899528 | 0.3712955 | 0.5080529 | 0.3624834 | 0.8571487 | 0.3902755 | 0.3824801 | 0.2641943 | 0.6415905 | 0.2760568 | 0.6668406 | 1.4157019 | 0.7641130 |
| 11 PEDRO BRAND | 0.5579235 | 0.4431545 | 0.6362053 | 0.9287669 | 0.6282445 | 0.6192885 | 0.8305830 | 0.6113276 | 0.5592504 | 0.7741935 | 0.3509412 | 0.4769881 | 0.6073472 | 0.7798325 | 0.4560909 | 0.6279128 | 0.0936044 | 0.6892777 |
| 12 LOMA DE CABRERA | 0.5183806 | 0.8317367 | 0.4897309 | 1.8267170 | 0.7105723 | 0.6750586 | 0.9466340 | 1.2996819 | 0.6046281 | 0.4828669 | 0.5512084 | 0.7445939 | 0.2581458 | 0.2572505 | 0.3491683 | 1.5339529 | 0.8627739 | 0.3351418 |
| 13 PIEDRA BLANCA | 0.4968462 | 0.1663576 | 0.3253993 | 0.4141445 | 0.3352599 | 0.2710070 | 0.5391513 | 0.6794261 | 0.2121616 | 0.2407891 | 0.1669938 | 0.4895303 | 0.1526800 | 0.3918787 | 0.4768070 | 1.5652882 | 1.7755413 | 1.0477666 |
| 14 SOSÚA | 0.4791335 | 0.6287596 | 0.1823568 | 0.7544565 | 0.6568144 | 0.6034552 | 0.4791335 | 0.7038476 | 0.5322177 | 0.1911583 | 0.4466778 | 0.6026300 | 0.2956765 | 0.7585822 | 0.8994067 | 1.4065951 | 0.7841616 | 0.5985043 |
| 15 VILLA MONTELLANO | 0.4434884 | 0.4363518 | 0.2609955 | 0.6249618 | 0.1559856 | 0.2927431 | 0.3965907 | 0.4434884 | 0.3863956 | 0.2518198 | 0.1651612 | 0.8145913 | 0.1631222 | 0.5250494 | 0.4098444 | 0.8512938 | 0.4343127 | 0.2293905 |
| 16 PARTIDO | 0.4430429 | 0.4793902 | 0.4710401 | 1.5712798 | 0.7804825 | 0.8649652 | 0.7524854 | 1.4288381 | 0.3182836 | 0.4422518 | 0.7023852 | 0.5761523 | 0.2401863 | 0.2667099 | 0.1458800 | 0.8227239 | 0.3870486 | 0.1552124 |
| 17 BOHECHÍO | 0.4351024 | 0.1731715 | 0.2097621 | 0.4023157 | 7.9629891 | 0.11181044 | 0.2718937 | 0.5387154 | 0.2539607 | 0.1228141 | 0.1693675 | 0.6142515 | 0.0547048 | 0.0599579 | 0.0157593 | 0.1889308 | 0.2244346 | 0.1488985 |
| 18 SABANA GRANDE DE BOYÁ | 0.4211248 | 0.4202882 | 0.6021249 | 0.6259700 | 1.0677328 | 0.3778968 | 0.4159654 | 0.6471657 | 0.2468182 | 0.4095509 | 0.4414839 | 0.5523429 | 0.5682397 | 0.6958321 | 0.5785586 | 2.2361451 | 3.0361428 | 0.9766750 |
| 19 ESPERANZA | 0.4145645 | 0.1649628 | 0.0564259 | 0.4112454 | 0.1052177 | 0.3066914 | 0.2346654 | 0.3773898 | 0.1301115 | 0.1530138 | 0.1387414 | 0.4089219 | 0.1390733 | 0.1925119 | 0.2127589 | 0.3053638 | 0.3013808 | 0.3123340 |
| 20 BAYAGUANA | 0.4138005 | 0.3508456 | 0.5494867 | 0.6481751 | 0.9717992 | 0.3920571 | 0.4871216 | 0.7446724 | 0.3075271 | 0.5049884 | 0.4105137 | 0.5175456 | 0.5072638 | 0.6392418 | 0.3631500 | 1.9532903 | 1.8679176 | 1.0832978 |

```
# * AREASQM
munzonal %>% select(matches('`^LOSSYEAR_[1-9]_*_AREASQM$`)) %>%
  gather(variable, value, -geom) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 5, nrow = 4, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 0.75)
```

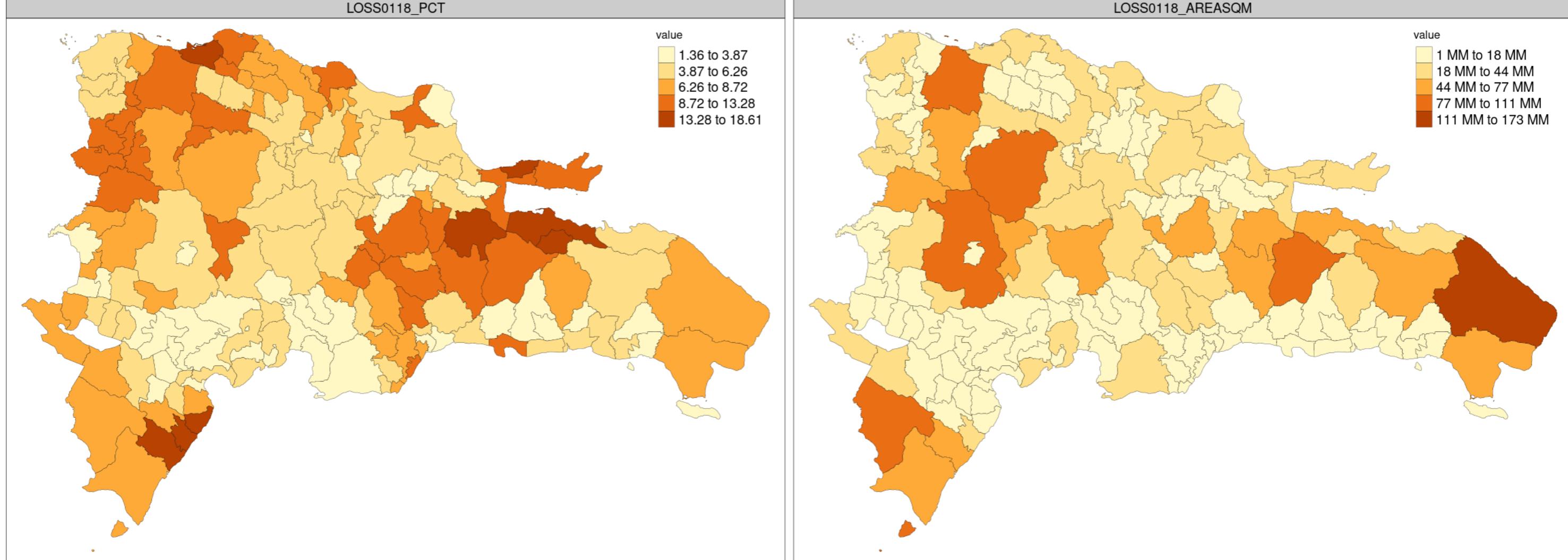


```
# Top twenty sorted descending by column 2
stripped_table(munzonal %>% select(TOPONIMIA, matches(`^LOSSYEAR_[1-9].*_AREASQM$`)))
```

| TOPONIMIA | LOSSYEAR_1_AREASQM | LOSSYEAR_2_AREASQM | LOSSYEAR_3_AREASQM | LOSSYEAR_4_AREASQM | LOSSYEAR_5_AREASQM | LOSSYEAR_6_AREASQM | LOSSYEAR_7_AREASQM | LOSSYEAR_8_AREASQM | LOSSYEAR_9_AREASQM | LOSSYEAR_10_AREASQM | LOSSYEAR_11_AREASQM | LOSSYEAR_12_AREASQM | LOSSYEAR_13_AREASQM | LOSSYEAR_14_AREASQM | LOSSYEAR_15_AREASQM | LOSSYEAR_16_AREASQM | LOSSYEAR_17_AREASQM | LOSSYEAR_18_AREASQM |
|--------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1 PADRE LAS CASAS | 4537485 | 1177039.0 | 787880.5 | 1493368 | 3739305.7 | 541437.9 | 1093911 | 1598566 | 1050507 | 2290076.5 | 622359.4 | 921768.7 | 450217.4 | 894549.6 | 42005579 | 1375664.3 | 1340353.1 | 746684.1 |
| 2 HIGUÉY | 4275742 | 551768.2 | 6946241.7 | 4942263 | 1458769.1 | 10665078 | 17891612 | 10185418 | 4795864.2 | 14623744.2 | 6404785 | 7417809.3 | 7335413.7 | 688859.08 | 12016512.6 | 17246425.0 | 10509114.9 | |
| 3 BAYAGUANA | 3612216 | 3062658.6 | 4796669.3 | 5658157 | 8483189.3 | 3422408.8 | 4252262 | 6500517 | 2684516 | 4408227.4 | 3583524.0 | 4517845.0 | 442890.9 | 5580174.4 | 3170068.73 | 1630573.0 | 9456501.1 | |
| 4 JIMANI | 3545830 | 973999.8 | 946045.2 | 1547071 | 957815.6 | 2768984.4 | 2614498 | 3209638 | 3251570 | 552472.7 | 550265.8 | 1021081.4 | 8963152.6 | 745948.5 | 3236121.83 | 820984.8 | 1734661.4 | 1264581.4 |
| 5 PEDERNALES | 3208272 | 987845.1 | 1530200.8 | 3331129 | 3038331.4 | 3838008.4 | 5890537 | 874243 | 3671011 | 1628045.4 | 2171708.0 | 13033926.6 | 20149360.3 | 6873397.1 | 5499159.08 | 5266686.3 | 4925333.8 | 1380123.4 |
| 6 ENRIQUILLO | 3196619 | 2087182.4 | 2154131.1 | 2074675 | 1686961.3 | 3182640.5 | 2722828 | 3014901 | 2870703 | 2740484.4 | 2061432.9 | 4556929.0 | 3355530.1 | 2666914.4 | 8244260.07 | 2791247.8 | 7461474.7 | 2715470.6 |
| 7 SAN JOSÉ DE LAS MATAS | 3020622 | 2031894.5 | 2254064.0 | 9348775 | 14481478.5 | 5692277.2 | 6186170 | 9388800 | 4162368 | 3361968.9 | 10003512.6 | 1780298.6 | 2462256.0 | 1241795.06 | 6503239.5 | 6350222.1 | 7822279.0 | |
| 8 SAN JUAN | 2781581 | 2398295.2 | 3915253.7 | 4937840 | 38883280.1 | 2736704.9 | 3531968 | 3927024 | 3764441 | 1984111.1 | 4561910.5 | 3832858.2 | 284484.9 | 20620924.4 | 3567280.1 | 3485204.2 | 2943429.1 | |
| 9 YAMASÁ | 2480846 | 2229965.3 | 2945820 | 3301908.3 | 1258815.8 | 1611961 | 2205687 | 1573704 | 3721268.3 | 1694361.6 | 1660518.5 | 1146986.4 | 2785433.4 | 1198486.78 | 2895055.5 | 6146199.2 | 3317358.4 | |
| 10 COTÚI | 2315862 | 1338167.8 | 2551273.2 | 4146922 | 5035601.2 | 2590263.2 | 4050551 | 4575077 | 3281785 | 4983369.3 | 3682270.2 | 5154778.3 | 3257508.0 | 6693781.7 | 3185413.19 | 5150364.4 | 8362261.4 | 6525843.9 |
| 11 SAN RAFAEL DEL YUMA | 2298897 | 2665342.5 | 1678805.3 | 2037812.3 | 657407.6 | 3200912.3 | 4402266 | 4931215 | 6800559 | 1992201.9 | 5167365.6 | 3838740.6 | 5098212.4 | 535426.5 | 6334878.30 | 3954976.9 | 4960641.6 | 5467520.1 |
| 12 GUAYUBÍN | 2229838 | 2415964.8 | 1992214.6 | 7265551 | 3673973.2 | 7808480.6 | 7467126 | 8599334 | 4604605 | 6685836.8 | 5950895.0 | 4369188.4 | 4340497.0 | 3244773.8 | 2710971.44 | 5528616.1 | 1859792.6 | 4998928.3 |
| 13 SABANA GRANDE DE BOYÁ | 2221671 | 2217256.7 | 3176547.6 | 3302344 | 5632891.4 | 1999618.3 | 2194451 | 3414163 | 1302105 | 2160611.5 | 2329075.9 | 2913919.6 | 2997784.0 | 3670906.1 | 3052223.1 | 11769923.8 | 1601736.23 | 5152510.3 |
| 14 OVIEDO | 2214411 | 5956103.1 | 1207258.5 | 2733804 | 2053295.9 | 2253402.1 | 1999513 | 2374054 | 3365022 | 1732537.4 | 5608859.9 | 9424120.6 | 7030202.7 | 8209505.20 | 4069071.9 | 3278210.9 | 2720561.9 | |
| 15 VILLA ISABELA | 2116442 | 3300826.3 | 692974.9 | 2031108.0 | 3784878.9 | 2072304 | 3737998 | 1686092 | 1474226.9 | 2162052.3 | 3058857.5 | 484052.5 | 5958670.1 | 876885.45 | 543639.6 | 1094635.5 | 2622533.3 | |
| 16 EL SEIBO | 2045221 | 1878955.0 | 3848400.1 | 3299975 | 3949925.4 | 2794154.7 | 3629900 | 5375695 | 3382708 | 5210900.0 | 3212027.3 | 4325127.9 | 2363039.8 | 283382.1 | 1713424.54 | 5285204.8 | 6569721.4 | 1305116.0 |
| 17 COHONZANA | 2031879 | 3882839.7 | 500013.3 | 1980100 | 2680000 | 3811056 | 1814193 | 2418000 | 80909 | 2161353.9 | 472290.4 | 1865598.8 | 109838.5 | 5884400.83 | 1111050.0 | 3883028.0 | 947500.4 | |
| 18 PUERTO PLATA | 1987093 | 1553939.8 | 1536116.2 | 2948237 | 1227127.3 | 2203231.1 | 2072433 | 21890143 | 1805378 | 1110152.9 | 1401746.6 | 2415793.8 | 857948.4 | 1277889.8 | 1836276.5 | 344675.6 | 2777221.6 | |
| 19 BOHECHÍO | 1981586 | 7023318.8 | 851942.8 | 1633994 | 3254456.6 | 478297.7 | 2104289 | 1031454 | 498860 | 687881.3 | 249468.2 | 2222182.0 | 243817.3 | 6466.07 | 913534.7 | 834747.0 | | |
| 20 MONTE PLATA | 1753875 | 1341155.1 | 2901544.5 | 2867566 | 3080316.2 | 1644257.6 | 2608006 | 2842690 | 4920266 | 7696084 | 191525.6 | 3699027.9 | 5016641.0 | 3252603.1 | 2705852.12 | 2149673.7 | 587592.19 | 4255942.0 |

Total loss 2001-2018

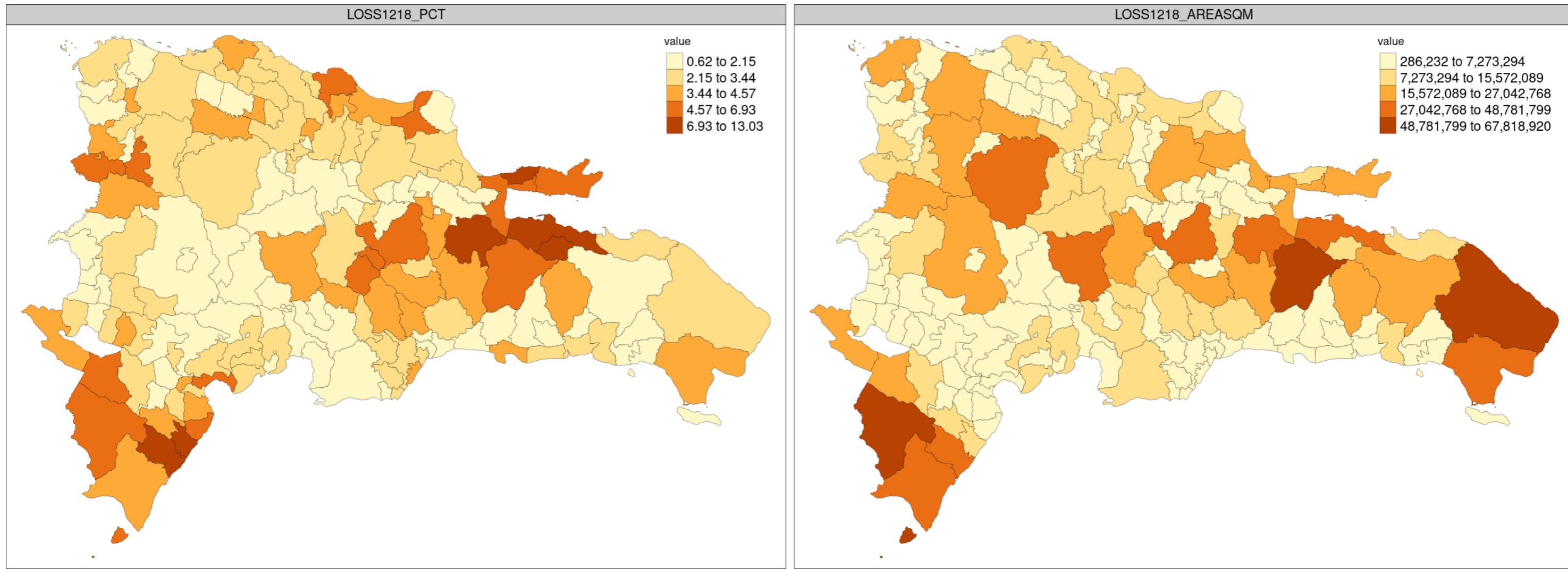
```
munzonal %>% select(matches('`LOSS0118`')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



```
# Top twenty sorted descending by column 2
stripped_table(munzonal %>% select(TOPONIMIA, matches('^LOSS0118')) %>% select(-matches('<NA>')))
```

| | TOPONIMIA | LOSS0118_PCT | LOSS0118_AREASQM |
|----|-------------------------|--------------|------------------|
| 1 | LAS TERRENAS | 18.60592 | 20803822 |
| 2 | ENRIQUILLO | 18.15716 | 59584385 |
| 3 | VILLA ISABELA | 17.06917 | 36146513 |
| 4 | EL VALLE | 16.79842 | 27327732 |
| 5 | LA CIÉNAGA | 15.10272 | 17650896 |
| 6 | PARAÍSO | 15.00678 | 20434419 |
| 7 | SABANA GRANDE DE BOYÁ | 14.32006 | 75546364 |
| 8 | SABANA DE LA MAR | 13.85536 | 70839509 |
| 9 | LOMA DE CABRERA | 13.27824 | 32730761 |
| 10 | BAYAGUANA | 12.71269 | 110973740 |
| 11 | VILLA LOS ALMÁCIGOS | 12.49025 | 25906886 |
| 12 | BOHECHÍO | 11.96513 | 48596055 |
| 13 | RESTAURACIÓN | 11.95832 | 33003809 |
| 14 | EL PINO | 11.77891 | 10334479 |
| 15 | LAS MATAS DE SANTA CRUZ | 11.74594 | 8424526 |
| 16 | COTUÍ | 11.62869 | 76879543 |
| 17 | PEDRO BRAND | 11.51339 | 25532014 |
| 18 | SOSÚA | 11.00357 | 29431673 |
| 19 | PEDRO SANTANA | 10.95457 | 60055728 |
| 20 | PARTIDO | 10.84866 | 16249652 |

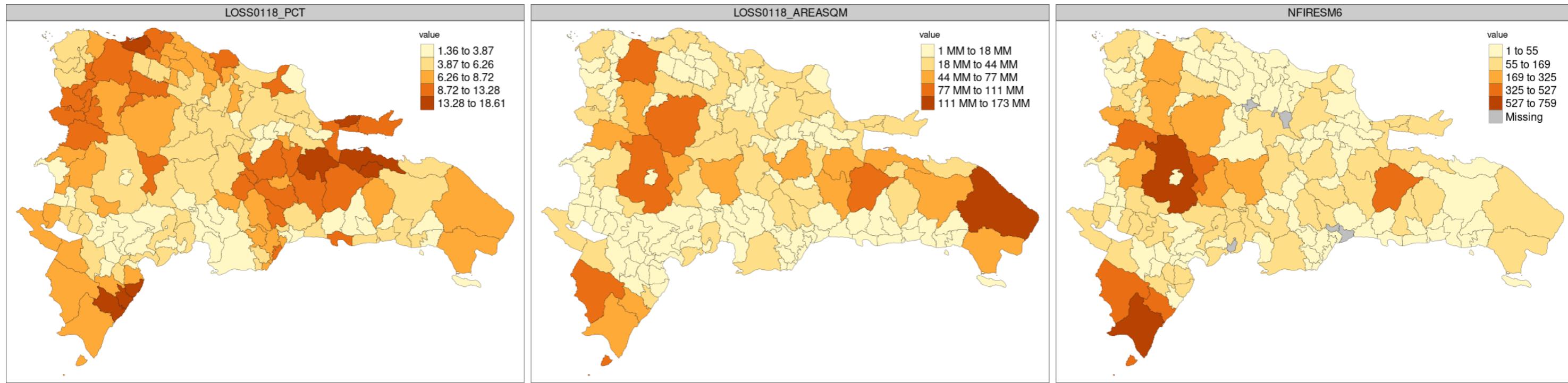
```
# Total loss 2012-2018
munzonal %>% select(matches('^LOSS1218')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



```
# Top twenty sorted descending by column 2
stripped_table(munzonal %>% select(TOPONIMIA, matches(`^LOSS1218`)) %>% select(-matches(`<NA>`)))
```

| | TOPONIMIA | LOSS1218_PCT | LOSS1218_AREASQM |
|----|-----------------------|--------------|------------------|
| 1 | LAS TERRENAS | 13.025658 | 14564368 |
| 2 | ENRIQUILLO | 9.687927 | 31791827 |
| 3 | SABANA DE LA MAR | 9.541138 | 48781799 |
| 4 | SABANA GRANDE DE BOYÁ | 8.643936 | 45601628 |
| 5 | PARAÍSO | 8.500673 | 11575189 |
| 6 | EL VALLE | 7.944483 | 12924115 |
| 7 | BAYAGUANA | 6.931707 | 60509395 |
| 8 | SÁNCHEZ | 6.359689 | 21658175 |
| 9 | MAIMÓN | 6.338366 | 5242823 |
| 10 | SAMANÁ | 6.082577 | 24977993 |
| 11 | PIEDRA BLANCA | 5.899492 | 13644958 |
| 12 | COTUÍ | 5.797430 | 38327951 |
| 13 | LA CIÉNAGA | 5.664938 | 6620741 |
| 14 | RESTAURACIÓN | 5.468702 | 15093089 |
| 15 | RÍO SAN JUAN | 5.459185 | 13348448 |
| 16 | SOSÚA | 5.345556 | 14297969 |
| 17 | PEDERNALES | 5.098481 | 57127986 |
| 18 | DUVERGÉ | 4.993313 | 22026878 |
| 19 | VILLA LOS ALMÁCIGOS | 4.946938 | 10260787 |
| 20 | JAQUIMEYES | 4.932285 | 5672865 |

```
# Fires M6
munzonal %>% select(matches('`^LOSS0118|NFIRESM6`')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 3, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



```
# Top twenty sorted descending by column 2
stripped_table(munzonal %>% select(TOPONIMIA, matches(`^LOSS0118|NFIRESM6`)) %>% select(-matches('<NA>')))
```

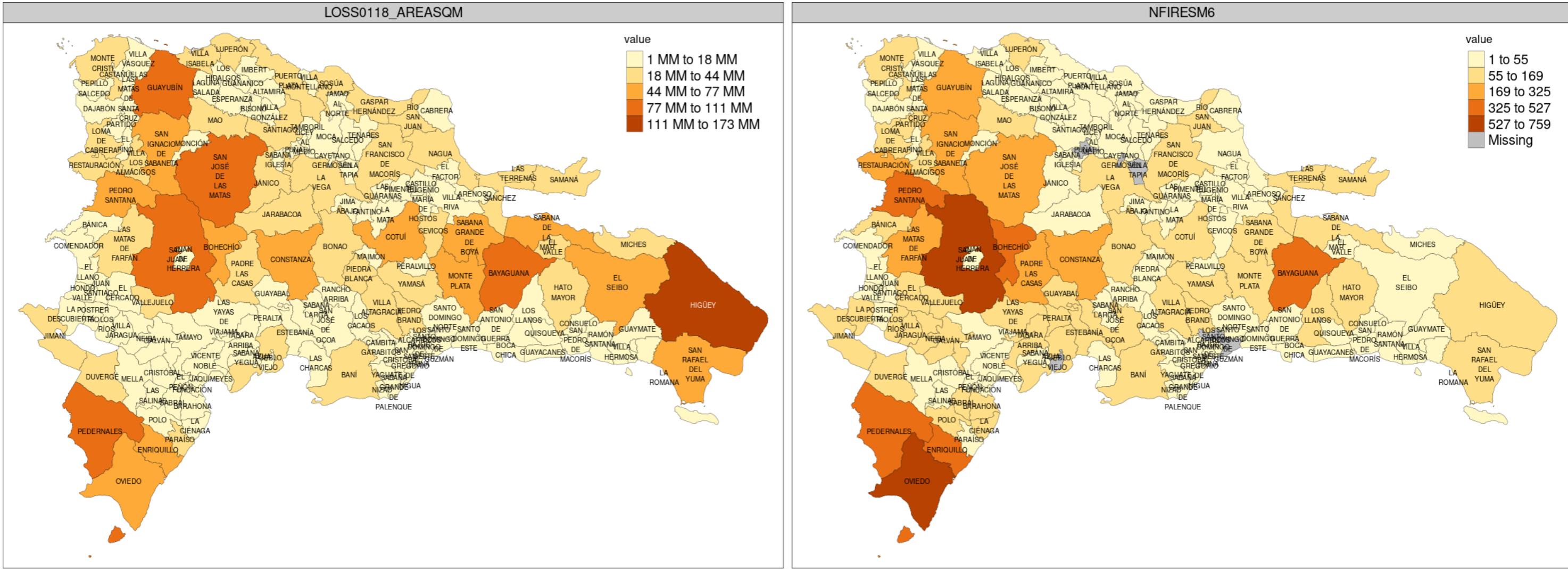
| | TOPONIMIA | LOSS0118_PCT | LOSS0118_AREASQM | NFIRESM6 |
|----|-------------------------|--------------|------------------|----------|
| 1 | LAS TERRENAS | 18.60592 | 20803822 | 68 |
| 2 | ENRIQUILLO | 18.15716 | 59584385 | 463 |
| 3 | VILLA ISABELA | 17.06917 | 36146513 | 49 |
| 4 | EL VALLE | 16.79842 | 27327732 | 26 |
| 5 | LA CIÉNAGA | 15.10272 | 17650896 | 71 |
| 6 | PARAÍSO | 15.00678 | 20434419 | 28 |
| 7 | SABANA GRANDE DE BOYÁ | 14.32006 | 75546364 | 155 |
| 8 | SABANA DE LA MAR | 13.85536 | 70839509 | 102 |
| 9 | LOMA DE CABRERA | 13.27824 | 32730761 | 89 |
| 10 | BAYAGUANA | 12.71269 | 110973740 | 422 |
| 11 | VILLA LOS ALMÁCIGOS | 12.49025 | 25906886 | 109 |
| 12 | BOHECHÍO | 11.96513 | 48596055 | 527 |
| 13 | RESTAURACIÓN | 11.95832 | 33003809 | 203 |
| 14 | EL PINO | 11.77891 | 10334479 | 28 |
| 15 | LAS MATAS DE SANTA CRUZ | 11.74594 | 8424526 | 27 |
| 16 | COTUÍ | 11.62869 | 76879543 | 136 |
| 17 | PEDRO BRAND | 11.51339 | 25532014 | 132 |
| 18 | SOSÚA | 11.00357 | 29431673 | 54 |
| 19 | PEDRO SANTANA | 10.95457 | 60055728 | 430 |
| 20 | PARTIDO | 10.84866 | 16249652 | 81 |

```
# Fires M6. Only AREASQM and FIRESM6
munzonal %>% select(matches(`^LOSS0118_AREASQM|NFIRESM6|TOPONIMIA`)) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom, -TOPONIMIA) %>%
mutate(TOPONIMIA=gsub(' ', '\n', TOPONIMIA)) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
```

```

tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1) +
tm_text(text = 'TOPONIMIA', size = 0.5)

```



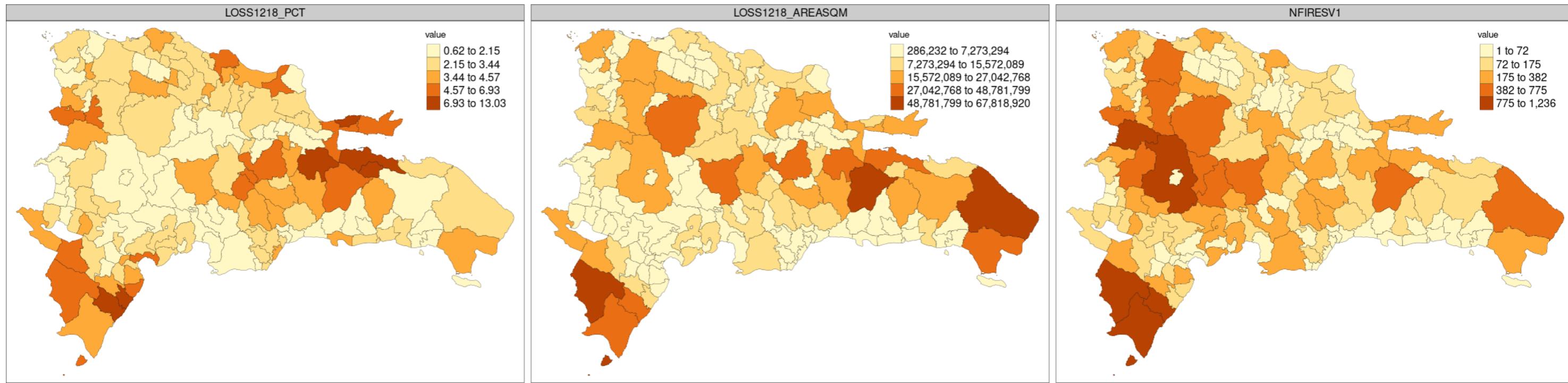
```

# Top twenty sorted descending by column 2
stripped_table(munzonal %>% select(TOPONIMIA, matches(`^LOSS0118_AREASQM|NFIRESM6|TOPONIMIA`)) %>% select(-matches('`<NA>`')))

```

| | TOPONIMIA | LOSS0118_AREASQM | NFIRESM6 |
|----|-------------------------|------------------|----------|
| 1 | HIGÜEY | 172531196 | 121 |
| 2 | BAYAGUANA | 110973740 | 422 |
| 3 | SAN JOSÉ DE LAS MATAS | 100892170 | 299 |
| 4 | SAN JUAN | 95509530 | 759 |
| 5 | PEDERNALES | 95166718 | 413 |
| 6 | GUAYUBÍN | 85736587 | 325 |
| 7 | COTUÍ | 76879543 | 136 |
| 8 | SAN RAFAEL DEL YUMA | 76759362 | 109 |
| 9 | SABANA GRANDE DE BOYÁ | 75546364 | 155 |
| 10 | SABANA DE LA MAR | 70839509 | 102 |
| 11 | OVIEDO | 67603535 | 599 |
| 12 | EL SEIBO | 63022977 | 55 |
| 13 | SAN IGNACIO DE SABANETA | 61756747 | 202 |
| 14 | MONTE PLATA | 60527072 | 82 |
| 15 | PEDRO SANTANA | 60055728 | 430 |
| 16 | ENRIQUILLO | 59584385 | 463 |
| 17 | CONSTANZA | 48663568 | 299 |
| 18 | BOHECHÍO | 48596055 | 527 |
| 19 | YAMASÁ | 44179210 | 117 |
| 20 | SAMANÁ | 42187655 | 73 |

```
# Fires V1
munzonal %>% select(matches('`^LOSS1218|NFIRESV1`')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 3, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1)
```



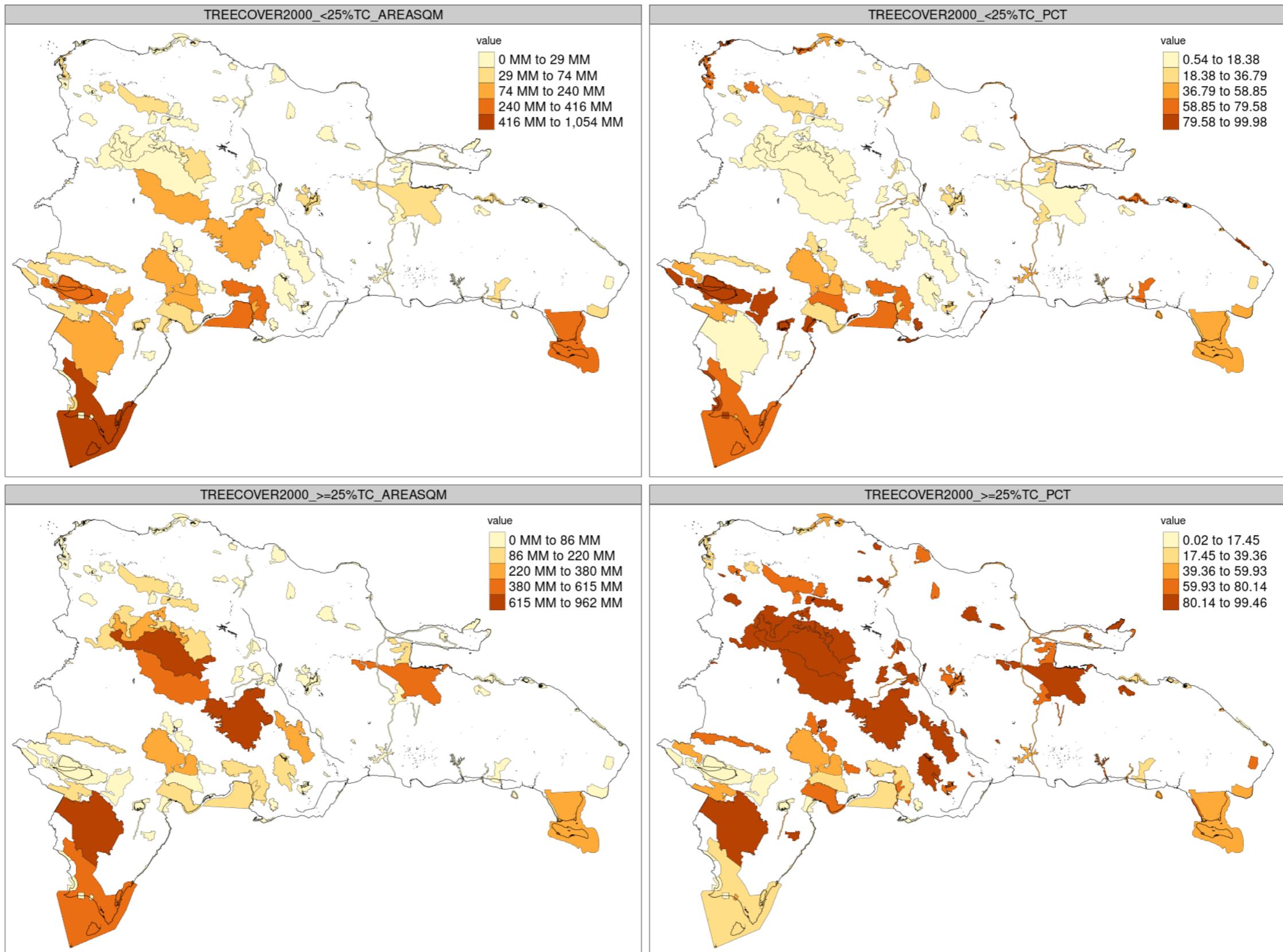
```
# Top twenty sorted descending by column 2
stripped_table(munzonal %>% select(TOPONIMIA, matches('`^LOSS1218|NFIRESV1`')) %>% select(-matches('<NA>')))
```

| | TOPONIMIA | LOSS1218_PCT | LOSS1218_AREASQM | NFIRESV1 |
|----|-----------------------|--------------|------------------|----------|
| 1 | LAS TERRENAS | 13.025658 | 14564368 | 261 |
| 2 | ENRIQUILLO | 9.687927 | 31791827 | 981 |
| 3 | SABANA DE LA MAR | 9.541138 | 48781799 | 355 |
| 4 | SABANA GRANDE DE BOYÁ | 8.643936 | 45601628 | 382 |
| 5 | PARAÍSO | 8.500673 | 11575189 | 100 |
| 6 | EL VALLE | 7.944483 | 12924115 | 67 |
| 7 | BAYAGUANA | 6.931707 | 60509395 | 775 |
| 8 | SÁNCHEZ | 6.359689 | 21658175 | 284 |
| 9 | MAIMÓN | 6.338366 | 5242823 | 28 |
| 10 | SAMANÁ | 6.082577 | 24977993 | 290 |
| 11 | PIEDRA BLANCA | 5.899492 | 13644958 | 126 |
| 12 | COTUÍ | 5.797430 | 38327951 | 256 |
| 13 | LA CIÉNAGA | 5.664938 | 6620741 | 160 |
| 14 | RESTAURACIÓN | 5.468702 | 15093089 | 484 |
| 15 | RÍO SAN JUAN | 5.459185 | 13348448 | 120 |
| 16 | SOSÚA | 5.345556 | 14297969 | 211 |
| 17 | PEDERNALES | 5.098481 | 57127986 | 892 |
| 18 | DUVERGÉ | 4.993313 | 22026878 | 340 |
| 19 | VILLA LOS ALMÁCIGOS | 4.946938 | 10260787 | 276 |
| 20 | JAQUIMEYES | 4.932285 | 5672865 | 58 |

11.4 Zonal, by protected areas

```
#Zonal statistics object
pazonal <- readRDS('out/pa_zonal_statistics.RDS')
pazonal <- pazonal %>% mutate(CATEGORY_NAME = paste(DESIG, NAME))
pazonal <- pazonal %>% filter(!grepl('Cartagena Convention', DESIG))

# Tree cover for pctc threshold
pazonal %>% select(matches('^TREECOVER2000')) %>%
  gather(variable, value, -geom) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 2, nrow = 2, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(shp = cline) + tm_borders(col = 'black', lwd = 0.5)
```



```
# Top twenty sorted descending by column 2
stripped_table(pazonal %>% select(CATEGORY_NAME, matches('^TREECOVER2000')))
```

| CATEGORY_NAME | TREECOVER2000_>=25%TC_PCT | TREECOVER2000_<25%TC_PCT | TREECOVER2000_>=25%TC_AREASQM | TREECOVER2000_<25%TC_AREASQM |
|---|---------------------------|--------------------------|-------------------------------|------------------------------|
| 1 Reserva Cientifica Ébano Verde | 99.45886 | 0.5411389 | 29737413 | 161796.2 |
| 2 Parque Nacional Armando Bermúdez | 99.44928 | 0.5507213 | 798130271 | 4419814.0 |
| 3 Reserva Biológica Sierra Prieta | 96.83358 | 3.1664212 | 3873387 | 126658.3 |
| 4 Monumento Natural Salto de Jimenoa | 96.73826 | 3.2617410 | 16862472 | 568555.0 |
| 5 Monumento Natural Salto de La Damajagua | 96.29039 | 3.7096131 | 5320742 | 204983.0 |
| 6 Reserva Cientifica Loma Barbacoa | 95.98497 | 4.0150295 | 13157487 | 550374.7 |
| 7 Reserva Cientifica Loma Guaconejo | 95.74294 | 4.2570610 | 22376360 | 994930.1 |
| 8 Area Nacional De Recreco Guagui | 95.15097 | 4.8490329 | 39462770 | 2011080.6 |
| 9 Monumento Natural Loma Isabel de Torres | 94.52917 | 5.4708282 | 15696490 | 908426.4 |
| 10 Parque Nacional Los Haitises | 94.36072 | 5.6392834 | 596059009 | 35622299.1 |
| 11 Parque Nacional Montaña La Humeadora | 94.02525 | 5.9747549 | 287161000 | 18247403.6 |
| 12 Reserva Cientifica Las Neblinas | 93.37844 | 6.6215607 | 38076127 | 2700017.1 |
| 13 Reserva Forestal Loma Novillero | 93.31888 | 6.6811206 | 12028318 | 861161.7 |
| 14 Parque Nacional Manolo Tavarez Justo | 93.04410 | 6.9558961 | 327260774 | 24465730.1 |
| 15 Monumento Natural Diego de Ocampo | 92.85590 | 7.1441013 | 23532983 | 1810569.0 |
| 16 Reserva Cientifica Loma Quita Espuela | 92.70482 | 7.2951783 | 70211435 | 5525116.5 |
| 17 Parque Nacional Picky Lora | 92.31943 | 7.6805670 | 103652897 | 8623460.9 |
| 18 Monumento Natural Cerro de San Francisco | 90.71807 | 9.2819295 | 3651148 | 373571.7 |
| 19 Reserva Forestal Alto Mao | 89.03664 | 10.9633598 | 187078973 | 23035618.6 |
| 20 Parque Nacional Saltos de la Jalda | 88.18683 | 11.8131702 | 32129714 | 4303973.5 |

```
# ALL sorted descending by column 2
stripped_table(
  pazonal %>% select(CATEGORY_NAME, matches('^TREECOVER2000')) %>% select(-matches('<NA>')),
  order_col = 1, n = nrow(pazonal),
  long_table = T
)
```

| CATEGORY_NAME | TREECOVER2000_>=25%TC_PCT | TREECOVER2000_<25%TC_PCT | TREECOVER2000_>=25%TC_AREASQM | TREECOVER2000_<25%TC_AREASQM |
|--|---------------------------|--------------------------|-------------------------------|------------------------------|
| 1 Via Panoramica Vía Panorámica Costa Azul | 16.3307853 | 83.6692147 | 3.112644e+06 | 15947334.9 |
| 2 Via Panoramica Mirador del Paraíso | 39.3640466 | 60.6359534 | 8.275303e+06 | 12747187.0 |
| 3 Via Panoramica Mirador del Atlántico | 51.3662861 | 48.6337139 | 6.223541e+06 | 5892462.7 |
| 4 Via Panoramica Entrada de Mao | 71.5352663 | 28.4647337 | 3.889122e+07 | 15475281.1 |
| 5 Via Panoramica Carretera Santiago - La Cumbre - Puerto Plata | 59.2508235 | 40.7491765 | 1.243086e+07 | 8549200.8 |
| 6 Via Panoramica Carretera Nagua - Sánchez | 58.0140667 | 41.9859333 | 9.773630e+06 | 7073370.0 |
| 7 Via Panoramica Carretera El Abanico - Constanza | 57.6227891 | 42.3772109 | 1.310670e+07 | 9638986.5 |
| 8 Via Panoramica Carretera Cabral - Polo | 59.9304146 | 40.0695854 | 6.089977e+06 | 4071769.9 |
| 9 Via Panoramica Carretera Bayacanes-Jarabacoa | 73.7080689 | 26.2919311 | 1.196090e+07 | 4266496.6 |
| 10 Via Panoramica Autovia Santo Domingo - Samana - Boulevard del Atlantico | 57.7894782 | 42.2105218 | 5.969193e+07 | 43600110.1 |
| 11 Santuario De Mamiferos Marinos Estero Hondo | 31.2148392 | 68.7851608 | 1.015811e+07 | 22384455.7 |
| 12 Reserva Forestal Villarpando | 79.6642464 | 20.3357536 | 6.337343e+07 | 16177225.7 |
| 13 Reserva Forestal Río Cana | 80.1427532 | 19.8572468 | 2.083290e+08 | 51618405.8 |
| 14 Reserva Forestal Loma Novillero | 93.3188794 | 6.6811206 | 1.202832e+07 | 861161.7 |
| 15 Reserva Forestal Loma El 20 | 69.5133433 | 30.4866567 | 3.476835e+07 | 15248448.2 |
| 16 Reserva Forestal Las Matas | 20.9660036 | 79.0339964 | 1.001703e+07 | 37760440.8 |
| 17 Reserva Forestal Hatillo | 63.6135031 | 36.3864969 | 2.030413e+08 | 116138281.8 |
| 18 Reserva Forestal Guanito | 70.9588252 | 29.0411748 | 4.892286e+07 | 20022561.6 |
| 19 Reserva Forestal Cerro de Bocanigua | 8.6179107 | 91.3820893 | 2.517152e+06 | 26691226.5 |
| 20 Reserva Forestal Cerro Chacuey | 84.8994811 | 15.1005189 | 4.405685e+07 | 7836105.6 |
| 21 Reserva Forestal Cayuco | 88.0875912 | 11.9124088 | 4.438683e+06 | 600259.4 |
| 22 Reserva Forestal Cabeza de Toro | 70.1046838 | 29.8953162 | 2.633262e+08 | 112292355.2 |
| 23 Reserva Forestal Barrero | 26.1405649 | 73.8594351 | 8.120355e+07 | 229438349.3 |

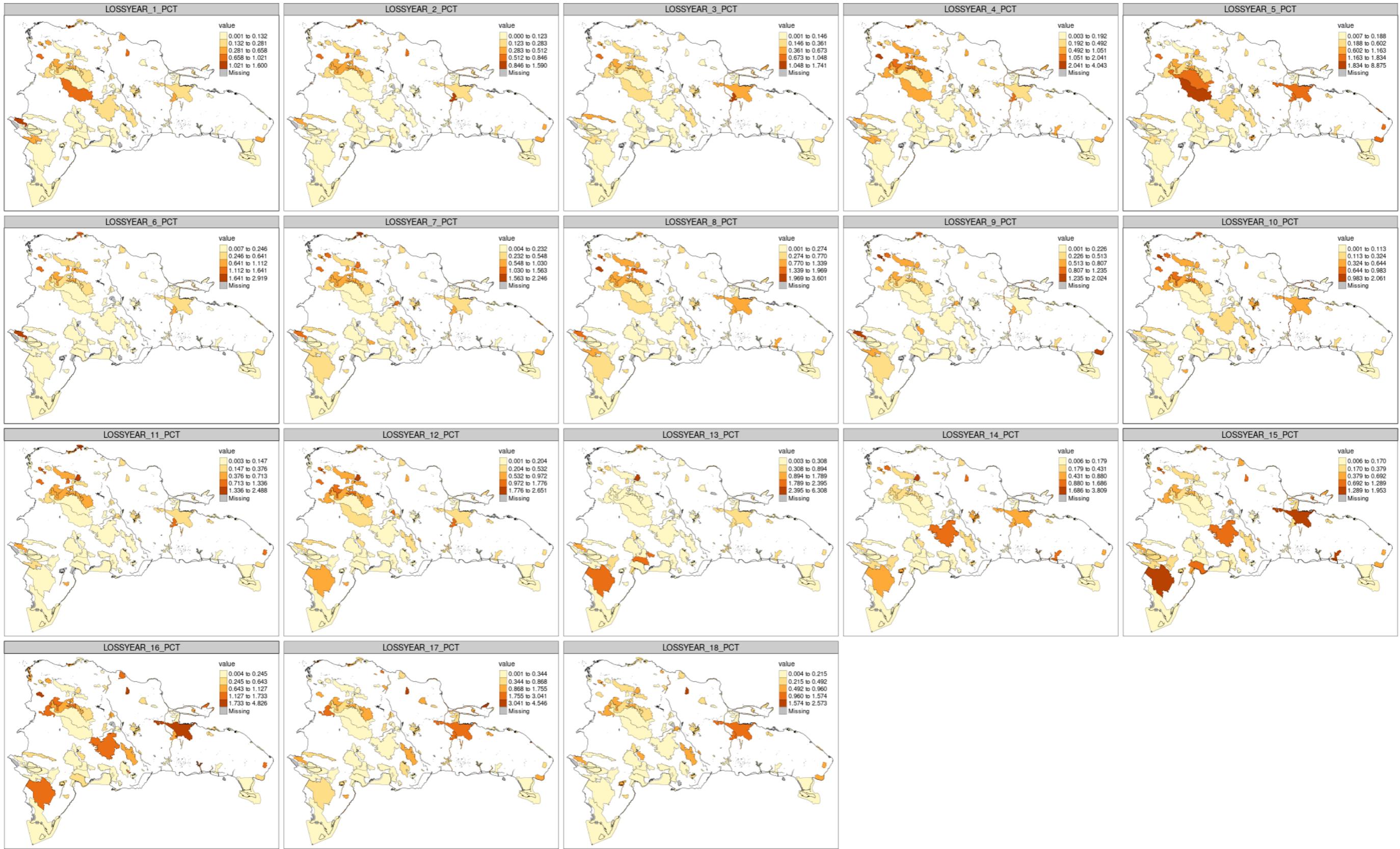
(continued)

| | CATEGORY_NAME | TREECOVER2000_>=25%TC_PCT | TREECOVER2000_<25%TC_PCT | TREECOVER2000_>=25%TC_AREASQM | TREECOVER2000_<25%TC_AREASQM |
|----|---|---------------------------|--------------------------|-------------------------------|------------------------------|
| 24 | Reserva Forestal Arroyo Cano | 84.4863667 | 15.5136333 | 2.019122e+07 | 3707571.4 |
| 25 | Reserva Forestal Alto Mao | 89.0366402 | 10.9633598 | 1.870790e+08 | 23035618.6 |
| 26 | Reserva Forestal Alto bao | 83.9546228 | 16.0453772 | 2.204493e+08 | 42132192.7 |
| 27 | Reserva Cientifica Loma Quita Espuela | 92.7048217 | 7.2951783 | 7.021144e+07 | 5525116.5 |
| 28 | Reserva Cientifica Loma Guaconejo | 95.7429390 | 4.2570610 | 2.237636e+07 | 994930.1 |
| 29 | Reserva Cientifica Loma Barbacoa | 95.9849705 | 4.0150295 | 1.315749e+07 | 550374.7 |
| 30 | Reserva Cientifica Las Neblinas | 93.3784393 | 6.6215607 | 3.807613e+07 | 2700017.1 |
| 31 | Reserva Cientifica La Salcedoa | 77.5760173 | 22.4239827 | 3.197405e+07 | 9242360.9 |
| 32 | Reserva Cientifica Ébano Verde | 99.4588611 | 0.5411389 | 2.973741e+07 | 161796.2 |
| 33 | Reserva Biológica Sierra Prieta | 96.8335788 | 3.1664212 | 3.873387e+06 | 126658.3 |
| 34 | Reserva Biológica Loma Charco Azul | 57.3430148 | 42.6569852 | 9.988543e+07 | 74303929.7 |
| 35 | Refugio de Vida Silvestre Río Soco | 45.1802336 | 54.8197664 | 5.315016e+06 | 6449013.7 |
| 36 | Refugio de Vida Silvestre Río Higuamo | 65.8064260 | 34.1935740 | 1.216933e+07 | 6323287.4 |
| 37 | Refugio de Vida Silvestre Río Chacuey | 77.3000664 | 22.6999336 | 2.997265e+07 | 8801768.0 |
| 38 | Refugio de Vida Silvestre Ría Maimón | 49.8247218 | 50.1752782 | 2.405438e+06 | 2422362.4 |
| 39 | Refugio de Vida Silvestre Monumento Natural Miguel Domingo Fuerte | 84.0686221 | 15.9313779 | 2.818711e+07 | 5341582.1 |
| 40 | Refugio de Vida Silvestre Manglares de Puerto Viejo | 7.8763050 | 92.1236950 | 8.769266e+05 | 10256804.7 |
| 41 | Refugio de Vida Silvestre Manglar de la Jina | 24.9558113 | 75.0441887 | 1.319275e+07 | 39671701.7 |
| 42 | Refugio de Vida Silvestre Lagunas Redonda y Limón | 36.1311239 | 63.8688761 | 9.594479e+06 | 16960131.6 |
| 43 | Refugio de Vida Silvestre Lagunas de Bávaro y El Caletón | 20.4231831 | 79.5768169 | 1.307073e+06 | 5092873.7 |
| 44 | Refugio de Vida Silvestre Laguna Saladilla | 30.4988180 | 69.5011820 | 9.489458e+06 | 21624725.7 |
| 45 | Refugio de Vida Silvestre Laguna Cabral o Rincón | 4.0765686 | 95.9234314 | 2.284298e+06 | 53750526.7 |
| 46 | Refugio de Vida Silvestre La Gran Laguna o Peruco | 33.8233813 | 66.1766187 | 2.475744e+06 | 4843880.0 |
| 47 | Refugio de Vida Silvestre Humedales del Bajo Yaque del Sur | 3.8745155 | 96.1254845 | 2.265132e+06 | 56197194.2 |
| 48 | Refugio de Vida Silvestre Cañón Río Gurabo | 74.8286878 | 25.1713122 | 2.256819e+07 | 7591620.2 |
| 49 | Refugio de Vida Silvestre Bahía de Luperón | 43.6916900 | 56.3083100 | 8.163662e+06 | 10521039.6 |
| 50 | Parque Nacional Valle Nuevo | 84.5282712 | 15.4717288 | 7.659372e+08 | 140194190.1 |
| 51 | Parque Nacional Sierra Martín García | 72.8168067 | 27.1831933 | 1.904179e+08 | 71084794.4 |
| 52 | Parque Nacional Sierra de Neiba | 69.6271339 | 30.3728661 | 1.274175e+08 | 55582293.7 |
| 53 | Parque Nacional Sierra de Bahoruco | 88.1011026 | 11.8988974 | 9.623023e+08 | 129968135.2 |
| 54 | Parque Nacional Saltos de la Jalda | 88.1868298 | 11.8131702 | 3.212971e+07 | 4303973.5 |
| 55 | Parque Nacional Punta Espada | 49.9096730 | 50.0903270 | 4.104462e+07 | 41193188.6 |
| 56 | Parque Nacional Picky Lora | 92.3194330 | 7.6805670 | 1.036529e+08 | 8623460.9 |
| 57 | Parque Nacional Nalga de Maco | 82.6462447 | 17.3537553 | 1.370679e+08 | 28781005.0 |
| 58 | Parque Nacional Montaña La Humeadora | 94.0252451 | 5.9747549 | 2.871610e+08 | 18247403.6 |
| 59 | Parque Nacional Máximo Gómez | 76.1949505 | 23.8050495 | 3.222647e+07 | 10068289.4 |
| 60 | Parque Nacional Manolo Tavarez Justo | 93.0441039 | 6.9558961 | 3.272608e+08 | 24465730.1 |
| 61 | Parque Nacional Manglares del Bajo Yuna | 78.3065153 | 21.6934847 | 9.487214e+07 | 26282708.9 |
| 62 | Parque Nacional Manglares de Estero Balsa | 33.3944954 | 66.6055046 | 1.888339e+07 | 37663017.7 |
| 63 | Parque Nacional Luis Quin | 86.8040330 | 13.1959670 | 1.712595e+08 | 26034908.2 |
| 64 | Parque Nacional Los Haitises | 94.3607166 | 5.6392834 | 5.960590e+08 | 35622299.1 |
| 65 | Parque Nacional Lago Enriquillo e Isla Cabritos | 1.6547394 | 98.3452606 | 6.700602e+06 | 398233395.5 |
| 66 | Parque Nacional La Hispaniola | 50.0098947 | 49.9901053 | 2.741823e+07 | 27407377.2 |
| 67 | Parque Nacional La Gran Sabana | 6.7321418 | 93.2678582 | 1.478217e+07 | 204793812.2 |
| 68 | Parque Nacional José del Carmen Ramírez | 82.0178580 | 17.9821420 | 6.149357e+08 | 134822601.0 |
| 69 | Parque Nacional Jaragua | 31.3660689 | 68.6339311 | 4.814738e+08 | 1053541025.4 |
| 70 | Parque Nacional Humedales del Ozama | 43.4198647 | 56.5801353 | 2.015476e+07 | 26263538.8 |
| 71 | Parque Nacional Francisco Alberto Caamaño Deñó | 33.6662104 | 66.3337896 | 1.977924e+08 | 389717643.3 |
| 72 | Parque Nacional El Morro | 17.4540788 | 82.5459212 | 3.205114e+06 | 15158008.2 |
| 73 | Parque Nacional Cotubanamá (Del Este) | 47.7556133 | 52.2443867 | 3.803282e+08 | 416077050.5 |
| 74 | Parque Nacional Cabo Cabrón | 87.4517255 | 12.5482745 | 3.115334e+07 | 4470131.5 |

(continued)

| | CATEGORY_NAME | TREECOVER2000_>=25%TC_PCT | TREECOVER2000_<25%TC_PCT | TREECOVER2000_>=25%TC_AREASQM | TREECOVER2000_<25%TC_AREASQM |
|-----|---|---------------------------|--------------------------|-------------------------------|------------------------------|
| 75 | Parque Nacional Baiguate | 86.6759322 | 13.3240678 | 4.544164e+07 | 6985416.1 |
| 76 | Parque Nacional Armando Bermúdez | 99.4492787 | 0.5507213 | 7.981303e+08 | 4419814.0 |
| 77 | Parque Nacional Aniana Vargas | 66.2654500 | 33.7345500 | 8.589790e+07 | 43729077.2 |
| 78 | Parque Nacional Anacaona | 55.3803711 | 44.6196289 | 2.984618e+08 | 240468883.3 |
| 79 | Monumento Natural Saltos de Jima | 64.1597654 | 35.8402346 | 1.191080e+07 | 6653483.8 |
| 80 | Monumento Natural Salto Grande | 72.4481659 | 27.5518341 | 1.069278e+07 | 4066434.4 |
| 81 | Monumento Natural Salto El Limón | 88.1772739 | 11.8227261 | 1.452719e+07 | 1947792.3 |
| 82 | Monumento Natural Salto de Socoá | 77.9952416 | 22.0047584 | 5.327307e+07 | 15029904.4 |
| 83 | Monumento Natural Salto de La Damajagua | 96.2903869 | 3.7096131 | 5.320742e+06 | 204983.0 |
| 84 | Monumento Natural Salto de Jimenoa | 96.7382590 | 3.2617410 | 1.686247e+07 | 568555.0 |
| 85 | Monumento Natural Río Cumayasa y Cueva de las Maravillas | 36.6842668 | 63.3157332 | 3.256086e+07 | 56198878.1 |
| 86 | Monumento Natural Reserva Antropológica Cuevas de Borbón o del Pomier | 63.2103105 | 36.7896895 | 3.174434e+06 | 1847585.3 |
| 87 | Monumento Natural Los Cacheos | 0.8271550 | 99.1728450 | 4.613026e+05 | 55308489.8 |
| 88 | Monumento Natural Loma Isabel de Torres | 94.5291718 | 5.4708282 | 1.569649e+07 | 908426.4 |
| 89 | Monumento Natural Las Marías | 27.0243743 | 72.9756257 | 1.217374e+06 | 3287352.9 |
| 90 | Monumento Natural Las Dunas de las Calderas | 16.9268970 | 83.0731030 | 2.958687e+06 | 14520516.3 |
| 91 | Monumento Natural Las Caobas | 53.9809062 | 46.0190938 | 5.693486e+07 | 48537361.9 |
| 92 | Monumento Natural Lagunas Cabarete y Goleta | 74.2833726 | 25.7166274 | 5.333655e+07 | 18464916.9 |
| 93 | Monumento Natural La Tinaja | 81.6231436 | 18.3768564 | 2.409466e+07 | 5424736.3 |
| 94 | Monumento Natural Isla Catalina | 48.2635273 | 51.7364727 | 7.837690e+06 | 8401674.6 |
| 95 | Monumento Natural Hoyo Claro | 67.0247609 | 32.9752391 | 2.633797e+07 | 12957912.7 |
| 96 | Monumento Natural Diego de Ocampo | 92.8558987 | 7.1441013 | 2.353298e+07 | 1810569.0 |
| 97 | Monumento Natural Cerro de San Francisco | 90.7180705 | 9.2819295 | 3.651148e+06 | 373571.7 |
| 98 | Monumento Natural Cabo Samaná | 79.2496232 | 20.7503768 | 7.346906e+06 | 1923682.0 |
| 99 | Corredor Ecologico Autopista Juan Bosch | 22.1218962 | 77.8781038 | 1.227294e+06 | 4320574.7 |
| 100 | Corredor Ecologico Autopista Duarte | 41.1485625 | 58.8514375 | 4.265560e+06 | 6100682.9 |
| 101 | Corredor Ecologico Autopista 6 de Noviembre | 20.5983424 | 79.4016576 | 7.483224e+05 | 2884602.8 |
| 102 | Area Nacional De Recreio Playa Larga | 0.0197443 | 99.9802557 | 2.961669e+03 | 14997150.5 |
| 103 | Area Nacional De Recreio Playa de Cabo Rojo - Pedernales | 6.7464316 | 93.2535684 | 1.181795e+06 | 16335533.9 |
| 104 | Area Nacional De Recreio Playa Blanca | 51.8436741 | 48.1563259 | 3.454111e+06 | 3208439.2 |
| 105 | Area Nacional De Recreio Guaraguao - Punta Catuano | 67.2725113 | 32.7274887 | 1.250931e+07 | 6085669.8 |
| 106 | Area Nacional De Recreio Guagui | 95.1509671 | 4.8490329 | 3.946277e+07 | 2011080.6 |
| 107 | Area Nacional De Recreio Boca de Nigua | 15.0601647 | 84.9398353 | 8.757018e+05 | 4938987.4 |
| 108 | Area Nacional De Recreio Bahía de las Águilas | 1.1695259 | 98.8304741 | 4.665196e+05 | 39423115.7 |

```
# Loss year
# * PCT
pazonal %>% select(matches('LOSSYEAR_[1-9].*_PCT$')) %>%
  gather(variable, value, -geom) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 5, nrow = 4, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 0.75) +
  tm_shape(shp = cline) + tm_borders(col = 'black', lwd = 0.5)
```



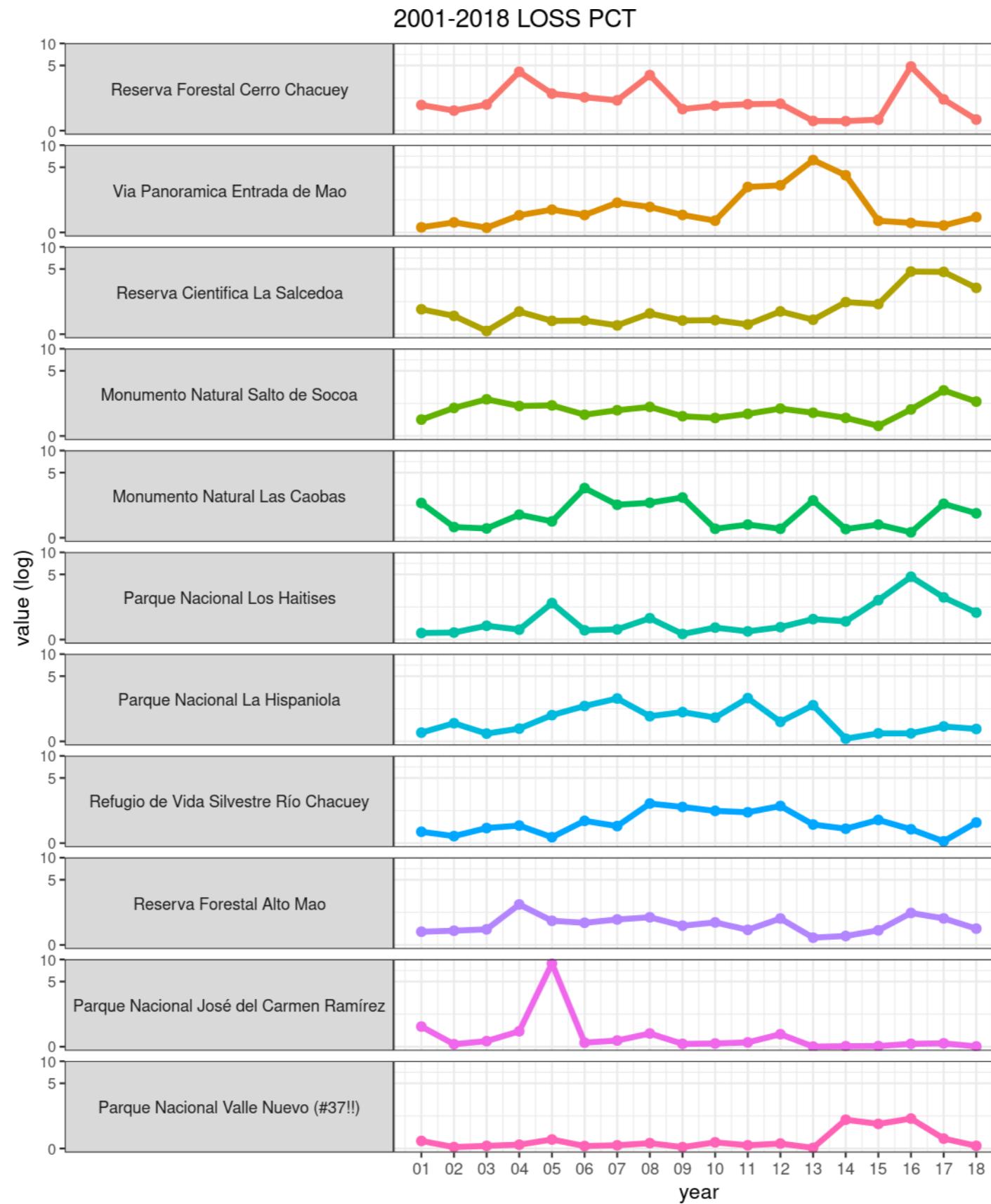
```
# Top twenty sorted descending by column 2
stripped_table(pazonal %>% select(CATEGORY_NAME, matches('`LOSSYEAR_[1-9].*_PCT$')))
```

| CATEGORY_NAME | LOSSYEAR_1_PCT | LOSSYEAR_2_PCT | LOSSYEAR_3_PCT | LOSSYEAR_4_PCT | LOSSYEAR_5_PCT | LOSSYEAR_6_PCT | LOSSYEAR_7_PCT | LOSSYEAR_8_PCT | LOSSYEAR_9_PCT | LOSSYEAR_10_PCT | LOSSYEAR_11_PCT | LOSSYEAR_12_PCT | LOSSYEAR_13_PCT | LOSSYEAR_14_PCT | LOSSYEAR_15_PCT | LOSSYEAR_16_PCT | LOSSYEAR_17_PCT | LOSSYEAR_18_PCT |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1 Monumento Natural Las Caobas | 1.6004519 | 0.3431034 | 0.2921958 | 0.8863505 | 0.5690496 | 2.9191685 | 1.4777157 | 1.6157939 | 2.0244496 | 0.2810380 | 0.4358529 | 0.2803406 | 1.7894377 | 0.2705775 | 0.4372476 | 0.1617886 | 1.5453601 | 0.9595738 |
| 2 Reserva Forestal Cerro Chacuey | 1.0207843 | 0.7388154 | 1.047217 | 4.0434400 | 1.7636884 | 1.5014036 | 1.3015000 | 3.6011002 | 0.8067032 | 0.9825049 | 1.0689880 | 1.0973431 | 0.3048175 | 0.2977288 | 0.3516035 | 4.8260413 | 1.3996280 | 0.3558567 |
| 3 Reserva Cientifica La Salcedoa | 0.9838056 | 0.6652752 | 0.0928455 | 0.8641777 | 0.4428018 | 0.4553002 | 0.2749656 | 0.7695467 | 0.4570857 | 0.4713697 | 0.3071045 | 0.8695342 | 0.4874391 | 1.4158944 | 1.2891246 | 4.5922831 | 4.5458603 | 2.5728927 |
| 4 Santuario De Mamiferos Marinos Estero Hondo | 0.8517657 | 0.4021599 | NA | 1.6786787 | 0.1061883 | 0.3298615 | 0.0406679 | 0.6100178 | 0.1852647 | 0.0542238 | 0.4654210 | 0.0180746 | 0.0474458 | 0.0361492 | 0.1355595 | 1.1274034 | 1.6131583 | 0.1174849 |
| 5 Parque Nacional José del Carmen Ramírez | 0.7393416 | 0.0711377 | 0.1653339 | 0.527965 | 8.8746504 | 0.1188245 | 0.1854487 | 0.4381102 | 0.0808517 | 0.0924300 | 0.1257911 | 0.4098513 | 0.0030418 | 0.0140313 | 0.0169749 | 0.0827160 | 0.0977285 | 0.0075553 |
| 6 Refugio de Vida Silvestre Cañón Río Gurabo | 0.6584242 | 0.8461970 | 0.3560368 | 1.8728510 | 1.1632160 | 1.0900578 | 0.7657229 | 1.1168825 | 0.3731070 | 0.3243349 | 1.2022338 | 0.7218280 | 0.3755456 | 0.3316507 | 0.2511766 | 0.1804570 | 0.1316848 | 0.0560880 |
| 7 Parque Nacional Punta Espada | 0.5804178 | 0.04480575 | 0.3398440 | 0.5249696 | 1.4461258 | 0.4730987 | 0.7825356 | 0.4471632 | 1.7537741 | 0.1529298 | 0.3434213 | 0.2808185 | 0.5687916 | 0.2468341 | 0.6743221 | 0.6179795 | 1.0544108 | 0.8353009 |
| 8 Monumento Natural Salto de Socoa | 0.5684204 | 1.1616015 | 1.7407874 | 1.2789458 | 1.3187783 | 0.7955732 | 1.0302619 | 1.2218885 | 0.7212910 | 0.6416260 | 0.8354057 | 1.1239221 | 0.8935396 | 0.6448557 | 0.3197365 | 1.0744006 | 2.5019109 | 1.5739216 |
| 9 Monumento Natural Lagunas Cabarete y Goleta | 0.4733122 | 0.2424623 | 0.2099215 | 0.4313083 | 0.4087696 | 0.5409282 | 0.4640918 | 0.4886794 | 0.4200389 | 0.0737629 | 0.2366561 | 0.3319332 | 0.0440529 | 0.2755865 | 0.6915275 | 1.3205614 | 0.5883444 | 0.2971007 |
| 10 Reserva Forestal Las Matas | 0.4634477 | 0.1678266 | 0.0508099 | 0.3033196 | 0.1431915 | 0.2463509 | 1.5627887 | 0.6328139 | 1.0439121 | 0.7590688 | 0.1801441 | 0.4819240 | 0.7482909 | 1.1378333 | 0.0631274 | 0.8406725 | 0.0215557 | 0.1216358 |
| 11 Reserva Forestal Alto Mao | 0.4369518 | 0.4775660 | 0.2405091 | 0.9407769 | 0.8367908 | 1.0125519 | 1.1382455 | 0.6956918 | 0.8553472 | 0.5139786 | 1.0657704 | 0.2205767 | 0.2779966 | 0.4929713 | 1.4057385 | 1.0724227 | 0.5647462 | |
| 12 Vía Panorámica Carretera Santiago - La Cumbre - Puerto Plata | 0.4204920 | 0.3574182 | 0.1051230 | 0.3013526 | 0.1156353 | 0.5396314 | 0.2242624 | 0.3013526 | 0.1927255 | 0.4239961 | 0.3434018 | 0.3784428 | 0.0560656 | 0.1051230 | 0.0770902 | 0.2873362 | 0.7358610 | 0.6307380 |
| 13 Reserva Biológica Loma Charco Azul | 0.3784711 | 0.0996866 | 0.2124676 | 0.5968523 | 0.2716037 | 0.1305218 | 0.2433028 | 1.3183128 | 0.6948492 | 0.1279874 | 0.1879683 | 0.1579779 | 0.3083526 | 0.1972612 | 0.3370758 | 0.0604033 | 0.0274560 | 0.0084480 |
| 14 Refugio de Vida Silvestre Río Chacuey | 0.3661892 | 0.2125036 | 0.5141827 | 0.6204345 | 0.1764538 | 0.8443222 | 0.5976663 | 1.9694526 | 1.7000285 | 1.4268096 | 1.3357366 | 1.7759226 | 0.6678683 | 0.4857224 | 0.8917560 | 0.4629542 | 0.0512285 | 0.7627360 |
| 15 Refugio de Vida Silvestre Monumento Natural Miguel Domingo Fuerte | 0.2808064 | 0.2654498 | 0.0658140 | 0.1755040 | 0.3663647 | 0.1996358 | 0.2873878 | 0.5023803 | 0.1908606 | 0.4365663 | 0.4694733 | 0.6274269 | 0.0351008 | 0.0548450 | 0.2895816 | 0.6427835 | 1.4237764 | 0.2500932 |
| 16 Parque Nacional Aniana Vargas | 0.2746660 | 0.0680990 | 0.1810299 | 0.2990682 | 0.3705721 | 0.2304017 | 0.4102966 | 0.3246053 | 0.1038510 | 0.4647758 | 0.2434540 | 0.1588977 | 0.1310906 | 0.5237949 | 0.1265507 | 0.2712611 | 0.7615740 | 0.3889467 |
| 17 Monumento Natural La Tinaja | 0.2740955 | 0.2142928 | 0.2392106 | 0.1918668 | 0.2342271 | 0.1719326 | 0.2417024 | 0.2242599 | 0.1669491 | 0.1046546 | 0.0647862 | 0.0697698 | 0.0348849 | 0.4310774 | 0.1146217 | 0.5456992 | 1.2508721 | 0.4136350 |
| 18 Parque Nacional La Hispaniola | 0.2711153 | 0.6451358 | 0.2374733 | 0.4195361 | 1.0547727 | 1.6405446 | 2.2461015 | 0.9954088 | 1.2348611 | 0.9202090 | 2.2797435 | 0.7104409 | 1.6979340 | 0.0771788 | 0.2453891 | 0.2453891 | 0.5066097 | 0.4056835 |
| 19 Parque Nacional Manolo Távarez Justo | 0.2691917 | 0.3497191 | 0.2781856 | 1.0102531 | 0.6017595 | 0.4469795 | 0.7199361 | 0.9791139 | 0.3898782 | 0.4996883 | 0.5084732 | 0.8611205 | 0.1746504 | 0.2610343 | 0.2729566 | 1.1104418 | 0.7075955 | 0.4419596 |
| 20 Monumento Natural Salto de La Damajagua | 0.2659221 | 0.1861455 | 0.4653636 | 0.6913974 | 0.5717325 | 0.2393299 | 0.2925143 | 0.4121792 | 0.7179896 | 0.1462571 | 0.4653636 | 0.3324026 | 0.1196649 | 0.0398883 | 0.0664805 | 0.0664805 | 1.7550858 | 0.0132961 |

```

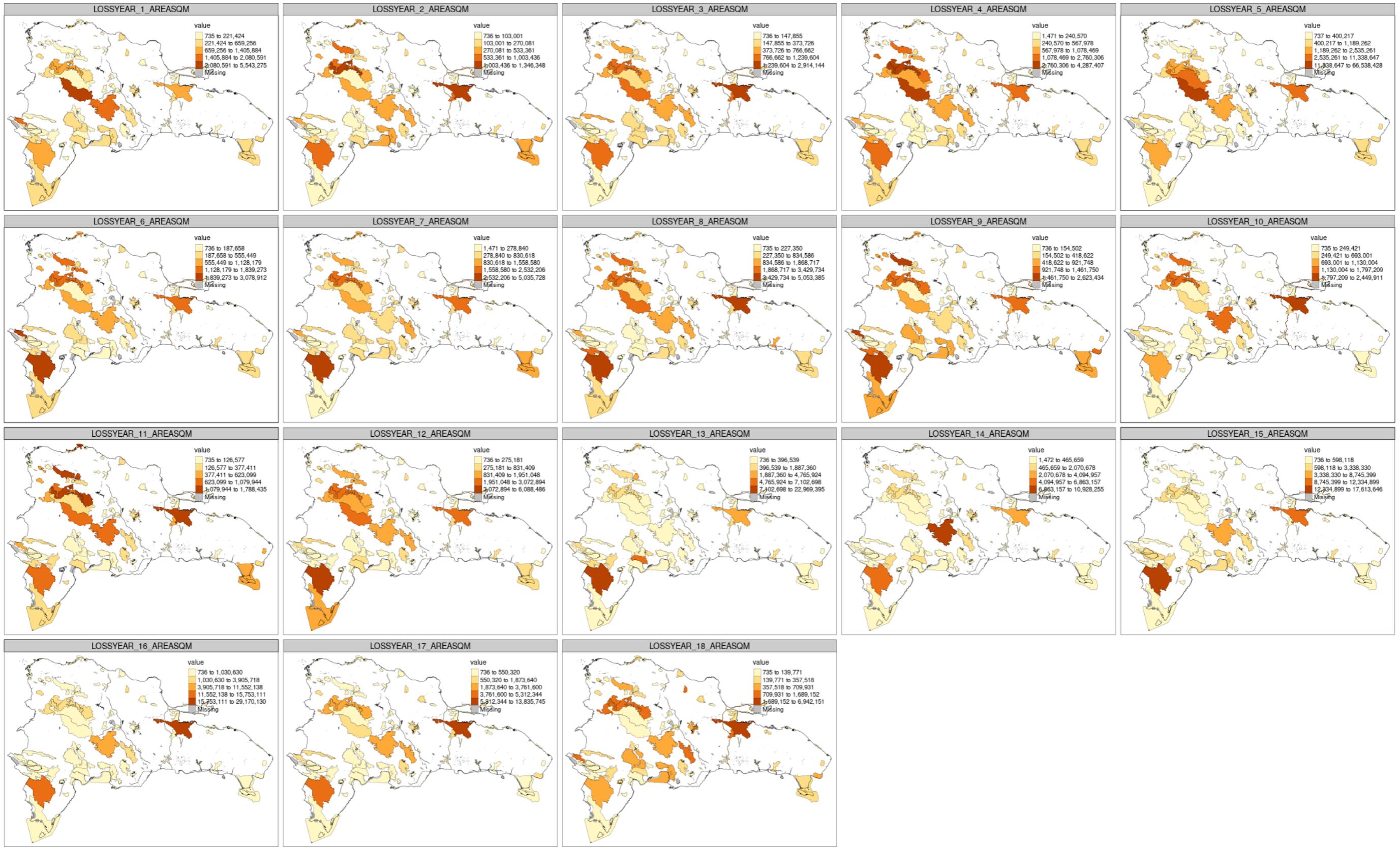
## ggplot
pazonal %>% select(CATEGORY_NAME, matches('`^LOSSYEAR_[1-9].*_PCT$|`^LOSS0118_PCT$`')) %>%
  st_drop_geometry() %>%
  replace(is.na(.), 0) %>%
  arrange(desc(LOSS0118_PCT)) %>%
  slice(c(1:10,37)) %>%
  mutate(CATEGORY_NAME = gsub('Valle Nuevo', 'Valle Nuevo (#37!!)', CATEGORY_NAME)) %>%
  mutate(CATEGORY_NAME = fct_reorder(CATEGORY_NAME, desc(LOSS0118_PCT))) %>%
  gather(variable, value, -CATEGORY_NAME, -LOSS0118_PCT) %>%
  mutate(year = lubridate::as_date(
    paste0(2000 + as.numeric(gsub(`(LOSSYEAR_)([0-9]{,2})(.*)`, '\\\\2', variable)), '-01-01')))) %>%
  ggplot + aes(x=year, y=value, group = CATEGORY_NAME, colour = CATEGORY_NAME) +
  geom_path(lwd = 1.5) +
  geom_point(size = 2) +
  scale_x_date(breaks=date_breaks("1 year"), date_labels = "%y") +
  scale_y_continuous(n.breaks = 3, trans = 'log1p') +
  facet_grid(CATEGORY_NAME ~ ., switch = 'y') +
  ggtitle('2001-2018 LOSS PCT') +
  ylab('value (log!)') +
  theme_bw() +
  theme(strip.text.y.left = element_text(angle = 0), legend.position="none",
        axis.text.y = element_text(size = 8), aspect.ratio=0.15)

```



```
# * AREASQM
pazonal %>% select(matches('^LOSSYEAR_[1-9].*_AREASQM$')) %>%
  gather(variable, value, -geom) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
```

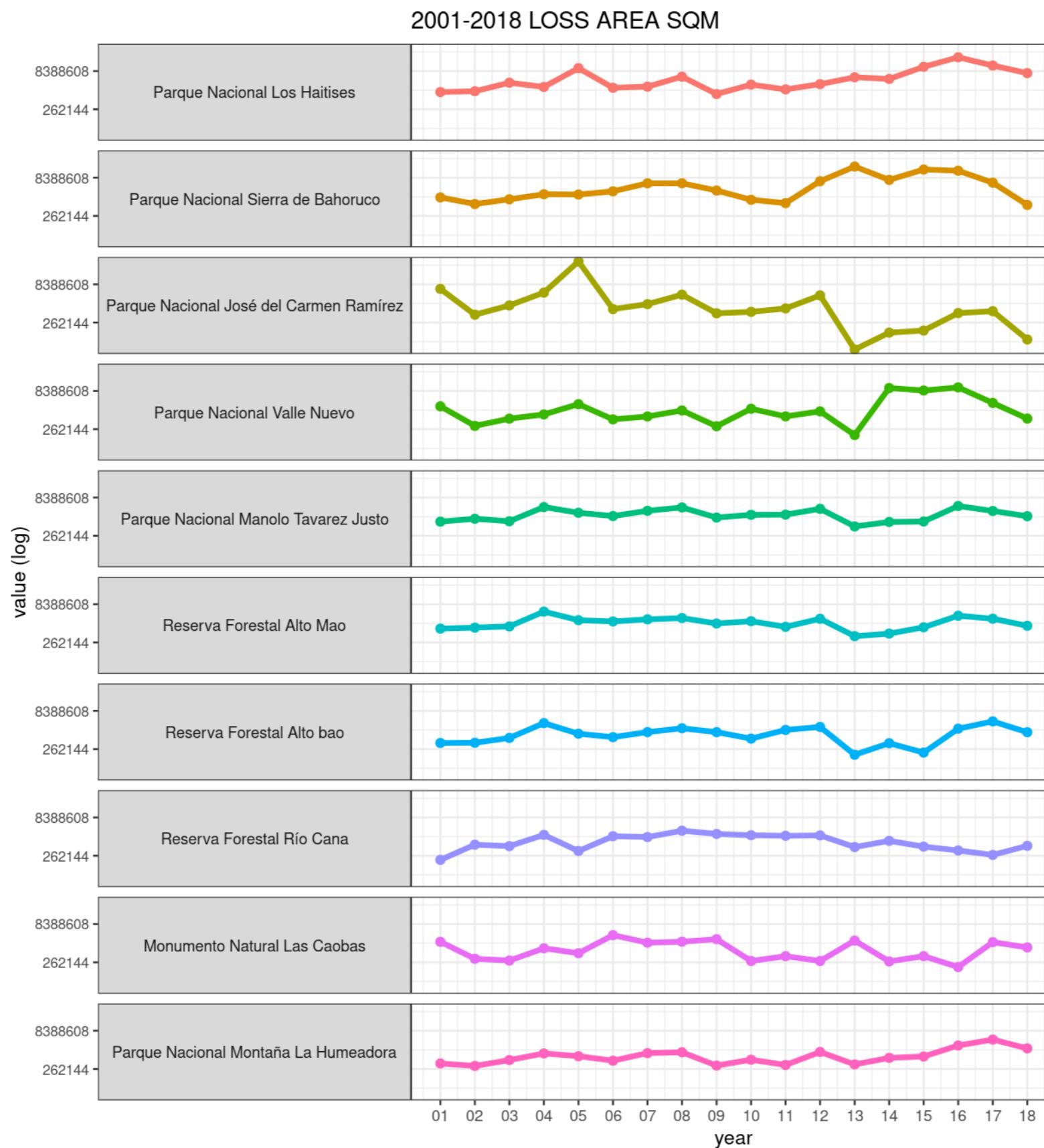
```
tm_shape() +  
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +  
  tm_borders(col = 'grey15', lwd = 0.3) +  
  tm_facets(by = "variable", ncol = 5, nrow = 4, free.coords = FALSE, free.scales = TRUE) +  
  tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 0.75) +  
  tm_shape(shp = cline) + tm_borders(col = 'black', lwd = 0.5)
```



```
# Top twenty sorted descending by column 2
stripped_table(pazonal %>% select(CATEGORY_NAME, matches('^LOSSYEAR_[1-9].*_AREASQM$')))
```

| CATEGORY_NAME | LOSSYEAR_1_AREASQM | LOSSYEAR_2_AREASQM | LOSSYEAR_3_AREASQM | LOSSYEAR_4_AREASQM | LOSSYEAR_5_AREASQM | LOSSYEAR_6_AREASQM | LOSSYEAR_7_AREASQM | LOSSYEAR_8_AREASQM | LOSSYEAR_9_AREASQM | LOSSYEAR_10_AREASQM | LOSSYEAR_11_AREASQM | LOSSYEAR_12_AREASQM | LOSSYEAR_13_AREASQM | LOSSYEAR_14_AREASQM | LOSSYEAR_15_AREASQM | LOSSYEAR_16_AREASQM | LOSSYEAR_17_AREASQM | LOSSYEAR_18_AREASQM |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| 1 Parque Nacional José del Carmen Ramírez | 5543275.0 | 533360.902 | 1239604.3 | 3955698.72 | 66538427.81 | 890896.6 | 1390416.7 | 3284767.49 | 606192.3 | 693001.34 | 943129.21 | 3072894.47 | 22805.78 | 10520.8 | 127270.9 | 620170.0 | 732727.53 | 56464.61 |
| 2 Parque Nacional Valle Nuevo | 2080591.4 | 353877.104 | 682004.3 | 996153.01 | 2535260.92 | 637861.6 | 1428751.22 | 342105.7 | 1667857.37 | 835032.25 | 1316187.40 | 154499.36 | 1092824.7 | 8745399.4 | 11552137.8 | 2833223.97 | 686418.58 | |
| 3 Monumento Natural Caobas | 1688032.2 | 361878.800 | 308185.4 | 934853.57 | 600189.23 | 3078911.9 | 1558579.6 | 1704213.78 | 2135232.0 | 296416.98 | 4597037.36 | 295681.46 | 1887397.76 | 285384.1 | 461174.8 | 170642.0 | 1629925.65 | 1012083.80 |
| 4 Parque Nacional Sierra de Bahoruco | 1405884.1 | 770992.424 | 1182237.4 | 1873040.76 | 1824485.89 | 2444664.0 | 5035782.1 | 2623434.1 | 1130004.16 | 836467.93 | 6088485.98 | 22966394.53 | 6863156.8 | 17613645.6 | 15753111.4 | 5312343.79 | 709931.00 | |
| 5 Parque Nacional Los Haitises | 12477626.6 | 1346347.660 | 2914143.8 | 1986414.38 | 10892908.99 | 1899272.8 | 2040857.1 | 5036664.52 | 1044706.9 | 2449911.32 | 1993545.92 | 2581739.10 | 4766923.57 | 409464.59 | 12334898.8 | 29470130.3 | 13833745.41 | 6942151.10 |
| 6 Parque Nacional Monte Verde Justo | 948332.7 | 123003.749 | 97945.6 | 1002455.01 | 2116547.55 | 1572145.3 | 2535260.9 | 3078911.9 | 137139.1 | 1788436.26 | 3072894.47 | 916127.0 | 96295.07 | 308121.1 | 248801.97 | 155415.07 | 248801.97 | |
| 7 Reserva Forestal Alto Maro | 9180996.4 | 1003485.754 | 1110012.1 | 4297607.21 | 1995898.58 | 1786309.5 | 2237519.2 | 2291639.97 | 1449489.1 | 1292948.25 | 1039944.05 | 2229659.03 | 888111.4 | 10038604.6 | 2985601.73 | 23331631 | 1186914.28 | |
| 8 Reserva Biológica Loma Charco Azul | 659256.4 | 173643.414 | 370095.9 | 1039653.15 | 473104.72 | 227355.1 | 423807.7 | 2294360.57 | 1210353.5 | 222940.48 | 275180.66 | 537117.34 | 343607.9 | 587150.2 | 105216.1 | 47825.52 | 14715.54 | |
| 9 Parque Nacional Cotubanama (Océano) | 5406904.4 | 438437.356 | 237609.5 | 103742.74 | 432552.9 | 995311.6 | 712828.52 | 921748.3 | 224368.11 | 559816.82 | 521563.9 | 235402.61 | 183908.3 | 213333.6 | 177287.6 | 387678.67 | 357317.71 | |
| 10 Reserva Forestal Cerro Chacuey | 529715.1 | 381836.335 | 543693.7 | 2086260.55 | 915230.06 | 779122.7 | 675386.8 | 1868717.32 | 418622.1 | 509850.83 | 554729.47 | 569443.78 | 158178.83 | 154500.3 | 182457.5 | 250437.55 | 705551.15 | 184664.59 |
| 11 Parque Nacional Pintad Espada | 477322.9 | 368472.701 | 279480.3 | 431723.50 | 1189962.19 | 388006.0 | 643540.1 | 367737.23 | 1442765.4 | 125766.13 | 284242.19 | 230938.98 | 467761.75 | 202990.9 | 554547.7 | 508212.8 | 867124.38 | 686933.14 |
| 12 Reserva Forestal Alto bao | 456127.4 | 464219.973 | 719504.2 | 2760306.40 | 1054978.51 | 773209.5 | 1219772.9 | 1730341.32 | 1215358.8 | 676834.19 | 1488299.53 | 1951048.13 | 156701.83 | 447299.1 | 190543.5 | 1662657.9 | 3226733.44 | 1207266.20 |
| 13 Parque Nacional Montaña La Humeadora | 432587.7 | 345775.901 | 587819.0 | 1072640.99 | 837954.79 | 555448.5 | 1104275.8 | 1192559.01 | 357547.0 | 607682.75 | 377410.72 | 1224193.83 | 396538.75 | 715829.7 | 812941.2 | 2205608.8 | 376160.39 | 1689152.06 |
| 14 Parque Nacional Nalga de Maco | 422265.6 | 361941.939 | 598822.6 | 1078469.27 | 782000.57 | 642961.9 | 733447.4 | 1092446.70 | 663560.2 | 1030651.74 | 623099.23 | 1371259.70 | 136831.71 | 150073.5 | 923246.2 | 2805785.7 | 3523784.32 | 1018145.62 |
| 15 Parque Nacional Francisco Alcaíno Díaz | 409038.8 | 481871.299 | 186127.4 | 309721.86 | 331792.30 | 108880.8 | 434052.0 | 359748.39 | 658434.8 | 173620.80 | 126537.20 | 169942.40 | 204519.42 | 240567.8 | 764372.9 | 251603.0 | 356069.78 | 468629.03 |
| 16 Reserva Científica La Selvadilla | 405489.4 | 270080.935 | 38267.6 | 356183.03 | 182507.01 | 187658.4 | 113331.0 | 317179.52 | 188394.3 | 194281.65 | 126577.44 | 358390.78 | 20904.89 | 583380.9 | 531330.9 | 1892774.3 | 1873640.49 | 1060454.02 |
| 17 Reserva Forestal de Torno | 3890915.5 | 220630.900 | 123991.4 | 617957.50 | 831299.93 | 112556.8 | 443604.98 | 306993.08 | 564899.3 | 112556.88 | 66588.8 | 846582.61 | 985380.9 | 103380.93 | 226584.2 | 11034.95 | 1942150.0 | |
| 18 Monumento Natural Salto de Socoa | 3885239.5 | 79393.359 | 11166.6 | 877234.04 | 90452.52 | 543410.2 | 703095.2 | 833558.18 | 497264.52 | 438249.66 | 570648.84 | 444455.6 | 713895.5 | 733847.6 | 170870.34 | 107300.24 | 107300.24 | |
| 19 Parque Nacional Atacorao | 3737256.6 | 2207.041 | 379258.6 | 625328.83 | 193488.92 | 251602.7 | 646663.0 | 47083.54 | 696268.8 | 112589.09 | 104466.61 | 153275.19 | 264844.92 | 320203.9 | 278800.1 | 297634.7 | 80189.15 | 512033.50 |
| 20 Reserva Forestal Hatillo | 365633.5 | 520126.470 | 27958.8 | 303175.62 | 113294.9 | 430373.4 | 359748.01 | 388439.6 | 202312.28 | 112559.19 | 225118.39 | 267787.89 | 404624.6 | 868839.3 | 282501.5 | 347241.43 | 497320.36 | |

```
## ggplot
pazonal %>% select(CATEGORY_NAME, matches('^LOSSYEAR_[1-9]_*_AREASQM|^LOSS0118_AREASQM')) %>%
  st_drop_geometry() %>%
  replace(is.na(.), 0) %>%
  arrange(desc(LOSS0118_AREASQM)) %>%
  slice(c(1:10)) %>%
  mutate(CATEGORY_NAME = fct_reorder(CATEGORY_NAME, desc(LOSS0118_AREASQM))) %>%
  gather(variable, value, -CATEGORY_NAME, -LOSS0118_AREASQM) %>%
  mutate(year = lubridate::as_date(
    paste0(2000 + as.numeric(gsub('LOSSYEAR_([0-9]{2})', '\1\2', variable)), '-01-01'))) %>%
  ggplot + aes(x=year, y=value, group = CATEGORY_NAME, colour = CATEGORY_NAME) +
  geom_path(lwd = 1.5) +
  geom_point(size = 2) +
  scale_x_date(breaks=date_breaks("1 year"), date_labels = "%y") +
  scale_y_continuous(n.breaks = 3, trans = 'log2') +
  facet_grid(CATEGORY_NAME ~ ., switch = 'y') +
  ggtitle('2001-2018 LOSS AREA SQM') +
  ylab('value (log)') +
  theme_bw() +
  theme(strip.text.y.left = element_text(angle = 0), legend.position="none",
        axis.text.y = element_text(size = 8), aspect.ratio=0.15)
```

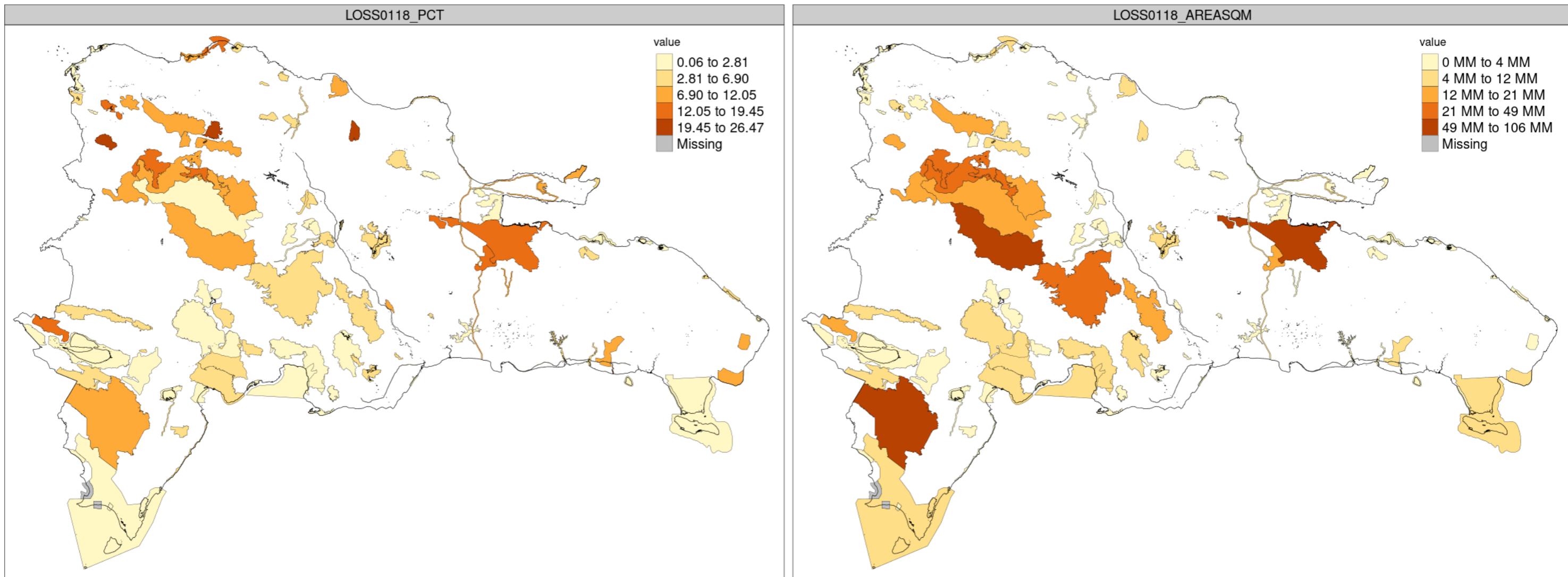


```
# Total loss 2001-2018
pazonal %>% select(matches('^LOSS0118')) %>% select(-matches('<NA>')) %>%
  gather(variable, value, -geom) %>%
```

```

mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1) +
tm_shape(shp = cline) + tm_borders(col = 'black', lwd = 0.5)

```



```

# ALL sorted descending by column 2
stripped_table(
  pazonal %>% select(CATEGORY_NAME, matches('^LOSS0118')) %>% select(-matches('<NA>')),
  n = nrow(pazonal),
  long_table = T
)

```

| | CATEGORY_NAME | LOSS0118_PCT | LOSS0118_AREASQM |
|---|----------------------------------|--------------|------------------|
| 1 | Reserva Forestal Cerro Chacuey | 26.4666686 | 1.373434e+07 |
| 2 | Via Panoramica Entrada de Mao | 22.6278261 | 1.230196e+07 |
| 3 | Reserva Cientifica La Salcedoa | 21.5473066 | 8.881026e+06 |
| 4 | Monumento Natural Salto de Socoa | 19.4468667 | 1.328279e+07 |

(continued)

| | CATEGORY_NAME | LOSS0118_PCT | LOSS0118_AREASQM |
|----|---|--------------|------------------|
| 5 | Monumento Natural Las Caobas | 17.8894956 | 1.886845e+07 |
| 6 | Parque Nacional Los Haitises | 16.7961407 | 1.060981e+08 |
| 7 | Parque Nacional La Hispaniola | 15.8335312 | 8.680829e+06 |
| 8 | Refugio de Vida Silvestre Río Chacuey | 14.8619676 | 5.762642e+06 |
| 9 | Reserva Forestal Alto Mao | 14.5829176 | 3.064084e+07 |
| 10 | Parque Nacional José del Carmen Ramírez | 12.0514154 | 9.035649e+07 |
| 11 | Refugio de Vida Silvestre Cañón Río Gurabo | 11.8174946 | 3.564134e+06 |
| 12 | Parque Nacional Punta Espada | 11.5707949 | 9.515568e+06 |
| 13 | Via Panoramica Autovia Santo Domingo - Samana - Boulevard del Atlantico | 11.5427912 | 1.192278e+07 |
| 14 | Parque Nacional Nalga de Maco | 10.8284097 | 1.795879e+07 |
| 15 | Parque Nacional Cabo Cabrón | 10.8114248 | 3.851405e+06 |
| 16 | Monumento Natural Hoyo Claro | 10.4508619 | 4.106759e+06 |
| 17 | Parque Nacional Manolo Tavarez Justo | 9.8789370 | 3.474684e+07 |
| 18 | Parque Nacional Sierra de Bahoruco | 9.1085863 | 9.949039e+07 |
| 19 | Reserva Forestal Las Matas | 8.9687134 | 4.285024e+06 |
| 20 | Monumento Natural Río Cumayasa y Cueva de las Maravillas | 8.4629858 | 7.511724e+06 |
| 21 | Monumento Natural Salto El Limón | 8.3638311 | 1.377940e+06 |
| 22 | Reserva Forestal Alto bao | 8.1503086 | 2.140120e+07 |
| 23 | Monumento Natural Salto Grande | 7.9794657 | 1.177706e+06 |
| 24 | Parque Nacional Picky Lora | 7.8947713 | 8.863962e+06 |
| 25 | Santuario De Mamiferos Marinos Estero Hondo | 7.8195251 | 2.544674e+06 |
| 26 | Reserva Forestal Loma Novillero | 7.7993952 | 1.005301e+06 |
| 27 | Reserva Forestal Río Cana | 7.4888845 | 1.946716e+07 |
| 28 | Monumento Natural Lagunas Cabarete y Goleta | 7.4869378 | 5.375732e+06 |
| 29 | Monumento Natural Salto de La Damajagua | 6.9006781 | 3.813125e+05 |
| 30 | Refugio de Vida Silvestre Monumento Natural Miguel Domingo Fuerte | 6.5638506 | 2.200773e+06 |
| 31 | Via Panoramica Carretera Nagua - Sánchez | 6.5527937 | 1.103949e+06 |
| 32 | Via Panoramica Mirador del Paraíso | 6.4120055 | 1.347963e+06 |
| 33 | Parque Nacional Saltos de la Jalda | 6.3589184 | 2.316788e+06 |
| 34 | Parque Nacional Montaña La Humeadora | 5.9846313 | 1.827757e+07 |
| 35 | Monumento Natural Loma Isabel de Torres | 5.8831353 | 9.768897e+05 |
| 36 | Via Panoramica Carretera Santiago - La Cumbre - Puerto Plata | 5.5960474 | 1.174054e+06 |
| 37 | Parque Nacional Valle Nuevo | 5.3641486 | 4.860623e+07 |
| 38 | Monumento Natural Cabo Samaná | 5.3621004 | 4.970983e+05 |
| 39 | Reserva Biológica Loma Charco Azul | 5.3589984 | 9.334805e+06 |
| 40 | Parque Nacional Aniana Vargas | 5.3429353 | 6.925885e+06 |
| 41 | Via Panoramica Carretera Bayacanes-Jarabacoa | 5.1178604 | 8.304956e+05 |
| 42 | Monumento Natural La Tinaja | 4.9885378 | 1.472586e+06 |
| 43 | Via Panoramica Mirador del Atlántico | 4.8032548 | 5.819625e+05 |
| 44 | Reserva Cientifica Las Neblinas | 4.7686062 | 1.944454e+06 |
| 45 | Refugio de Vida Silvestre Río Soco | 4.4230649 | 5.203307e+05 |
| 46 | Via Panoramica Vía Panorámica Costa Azul | 4.3664582 | 8.322460e+05 |
| 47 | Reserva Forestal Loma El 20 | 4.2928178 | 2.147130e+06 |
| 48 | Via Panoramica Carretera Cabral - Polo | 4.2766019 | 4.345775e+05 |
| 49 | Refugio de Vida Silvestre Ría Maimón | 4.2676421 | 2.060333e+05 |
| 50 | Corredor Ecológico Autopista 6 de Noviembre | 4.2652112 | 1.549519e+05 |
| 51 | Reserva Forestal Villarpando | 4.2454794 | 3.377307e+06 |
| 52 | Area Nacional De Recreo Guagui | 4.2107689 | 1.746368e+06 |
| 53 | Parque Nacional Máximo Gómez | 4.2038593 | 1.778012e+06 |
| 54 | Parque Nacional Sierra de Neiba | 3.8649577 | 7.072866e+06 |
| 55 | Refugio de Vida Silvestre Río Higuamo | 3.8293304 | 7.081435e+05 |

(continued)

| | CATEGORY_NAME | LOSS0118_PCT | LOSS0118_AREASQM |
|-----|---|--------------|------------------|
| 56 | Monumento Natural Las Marías | 3.8115492 | 1.716999e+05 |
| 57 | Reserva Científica Loma Quita Espuela | 3.4800012 | 2.635633e+06 |
| 58 | Refugio de Vida Silvestre Bahía de Luperón | 3.2791403 | 6.126976e+05 |
| 59 | Reserva Forestal Barrero | 3.2605838 | 1.012874e+07 |
| 60 | Parque Nacional Sierra Martín García | 3.2280569 | 8.441457e+06 |
| 61 | Monumento Natural Reserva Antropológica Cuevas de Borbón o del Pomier | 3.1927358 | 1.603398e+05 |
| 62 | Monumento Natural Diego de Ocampo | 3.1409661 | 7.960324e+05 |
| 63 | Corredor Ecológico Autopista Juan Bosch | 3.1337140 | 1.738543e+05 |
| 64 | Reserva Biológica Sierra Prieta | 3.0743741 | 1.229764e+05 |
| 65 | Refugio de Vida Silvestre Laguna Saladilla | 3.0472813 | 9.481367e+05 |
| 66 | Reserva Científica Loma Barbacoa | 2.9683306 | 4.068947e+05 |
| 67 | Monumento Natural Saltos de Jima | 2.9440900 | 5.465493e+05 |
| 68 | Parque Nacional Luis Quin | 2.8069861 | 5.538027e+06 |
| 69 | Via Panoramica Carretera El Abanico - Constanza | 2.7128399 | 6.170540e+05 |
| 70 | Monumento Natural Cerro de San Francisco | 2.6310981 | 1.058943e+05 |
| 71 | Parque Nacional Baiguate | 2.5817049 | 1.353512e+06 |
| 72 | Refugio de Vida Silvestre Laguna Cabral o Rincón | 2.5207767 | 1.412513e+06 |
| 73 | Reserva Forestal Guanito | 2.2209652 | 1.531254e+06 |
| 74 | Parque Nacional Armando Bermúdez | 2.1521028 | 1.727170e+07 |
| 75 | Corredor Ecológico Autopista Duarte | 2.0818581 | 2.158105e+05 |
| 76 | Reserva Forestal Hatillo | 1.9647072 | 6.270945e+06 |
| 77 | Parque Nacional La Gran Sabana | 1.9438134 | 4.268147e+06 |
| 78 | Parque Nacional Humedales del Ozama | 1.9053804 | 8.844452e+05 |
| 79 | Reserva Científica Loma Guaconejo | 1.8671873 | 4.363857e+05 |
| 80 | Parque Nacional Manglares del Bajo Yuna | 1.7645273 | 2.137810e+06 |
| 81 | Reserva Forestal Arroyo Cano | 1.4002585 | 3.346449e+05 |
| 82 | Reserva Científica Ébano Verde | 1.3922027 | 4.162576e+05 |
| 83 | Reserva Forestal Cayuco | 1.3722628 | 6.914752e+04 |
| 84 | Parque Nacional El Morro | 1.1670811 | 2.143125e+05 |
| 85 | Refugio de Vida Silvestre Lagunas Redonda y Limón | 1.1499667 | 3.053692e+05 |
| 86 | Refugio de Vida Silvestre Humedales del Bajo Yaque del Sur | 1.1086223 | 6.481264e+05 |
| 87 | Parque Nacional Cotubanamá (Del Este) | 1.0818280 | 8.615735e+06 |
| 88 | Parque Nacional Francisco Alberto Caamaño Deñó | 1.0273068 | 6.035530e+06 |
| 89 | Parque Nacional Anacaona | 0.8662760 | 4.668627e+06 |
| 90 | Parque Nacional Manglares de Estero Balsa | 0.8484612 | 4.797743e+05 |
| 91 | Monumento Natural Salto de Jimenoa | 0.8439175 | 1.471035e+05 |
| 92 | Reserva Forestal Cabeza de Toro | 0.7569748 | 2.843338e+06 |
| 93 | Parque Nacional Lago Enriquillo e Isla Cabritos | 0.6845694 | 2.772054e+06 |
| 94 | Área Nacional De Recreación Boca de Nigua | 0.6713110 | 3.903465e+04 |
| 95 | Refugio de Vida Silvestre La Gran Laguna o Perúcho | 0.6343772 | 4.643403e+04 |
| 96 | Refugio de Vida Silvestre Manglar de la Jina | 0.4690262 | 2.479481e+05 |
| 97 | Monumento Natural Las Dunas de las Calderas | 0.4461092 | 7.797633e+04 |
| 98 | Refugio de Vida Silvestre Manglares de Puerto Viejo | 0.4427118 | 4.929034e+04 |
| 99 | Reserva Forestal Cerro de Bocanigua | 0.3878312 | 1.132792e+05 |
| 100 | Parque Nacional Jaragua | 0.3557469 | 5.460767e+06 |
| 101 | Monumento Natural Los Cacheos | 0.2519722 | 1.405244e+05 |
| 102 | Monumento Natural Isla Catalina | 0.2263980 | 3.676560e+04 |
| 103 | Área Nacional De Recreación Playa de Cabo Rojo - Pedernales | 0.1847187 | 3.235779e+04 |
| 104 | Refugio de Vida Silvestre Lagunas de Bávaro y El Caletón | 0.1494940 | 9.567537e+03 |
| 105 | Área Nacional De Recreación Guaraguao - Punta Catuano | 0.1465114 | 2.724377e+04 |
| 106 | Área Nacional De Recreación Playa Blanca | 0.0551998 | 3.677716e+03 |

(continued)

| | CATEGORY_NAME | LOSS0118_PCT | LOSS0118_AREASQM |
|-----|--|--------------|------------------|
| 107 | Area Nacional De Recreo Bahía de las Águilas | NA | NA |
| 108 | Area Nacional De Recreo Playa Larga | NA | NA |

```
# ALL sorted descending by column 3
stripped_table(
  pazonal %>% select(CATEGORY_NAME, matches('^LOSS0118')) %>% select(-matches('<NA>')),
  n = nrow(pazonal),
  order_col = 3,
  long_table = T
)
```

| | CATEGORY_NAME | LOSS0118_PCT | LOSS0118_AREASQM |
|----|---|--------------|------------------|
| 1 | Parque Nacional Los Haitises | 16.7961407 | 1.060981e+08 |
| 2 | Parque Nacional Sierra de Bahoruco | 9.1085863 | 9.949039e+07 |
| 3 | Parque Nacional José del Carmen Ramírez | 12.0514154 | 9.035649e+07 |
| 4 | Parque Nacional Valle Nuevo | 5.3641486 | 4.860623e+07 |
| 5 | Parque Nacional Manolo Tavarez Justo | 9.8789370 | 3.474684e+07 |
| 6 | Reserva Forestal Alto Mao | 14.5829176 | 3.064084e+07 |
| 7 | Reserva Forestal Alto bao | 8.1503086 | 2.140120e+07 |
| 8 | Reserva Forestal Río Cana | 7.4888845 | 1.946716e+07 |
| 9 | Monumento Natural Las Caobas | 17.8894956 | 1.886845e+07 |
| 10 | Parque Nacional Montaña La Humeadora | 5.9846313 | 1.827757e+07 |
| 11 | Parque Nacional Nalga de Maco | 10.8284097 | 1.795879e+07 |
| 12 | Parque Nacional Armando Bermúdez | 2.1521028 | 1.727170e+07 |
| 13 | Reserva Forestal Cerro Chacuey | 26.4666686 | 1.373434e+07 |
| 14 | Monumento Natural Salto de Socoá | 19.4468667 | 1.328279e+07 |
| 15 | Via Panoramica Entrada de Mao | 22.6278261 | 1.230196e+07 |
| 16 | Via Panoramica Autovía Santo Domingo - Samana - Boulevard del Atlantico | 11.5427912 | 1.192278e+07 |
| 17 | Reserva Forestal Barrero | 3.2605838 | 1.012874e+07 |
| 18 | Parque Nacional Punta Espada | 11.5707949 | 9.515568e+06 |
| 19 | Reserva Biológica Loma Charco Azul | 5.3589984 | 9.334805e+06 |
| 20 | Reserva Científica La Salcedoa | 21.5473066 | 8.881026e+06 |
| 21 | Parque Nacional Picky Lora | 7.8947713 | 8.863962e+06 |
| 22 | Parque Nacional La Hispaniola | 15.8335312 | 8.680829e+06 |
| 23 | Parque Nacional Cotubanamá (Del Este) | 1.0818280 | 8.615735e+06 |
| 24 | Parque Nacional Sierra Martín García | 3.2280569 | 8.441457e+06 |
| 25 | Monumento Natural Río Cumayasa y Cueva de las Maravillas | 8.4629858 | 7.511724e+06 |
| 26 | Parque Nacional Sierra de Neiba | 3.8649577 | 7.072866e+06 |
| 27 | Parque Nacional Aniana Vargas | 5.3429353 | 6.925885e+06 |
| 28 | Reserva Forestal Hatillo | 1.9647072 | 6.270945e+06 |
| 29 | Parque Nacional Francisco Alberto Caamaño Deñó | 1.0273068 | 6.035530e+06 |
| 30 | Refugio de Vida Silvestre Río Chacuey | 14.8619676 | 5.762642e+06 |
| 31 | Parque Nacional Luis Quin | 2.8069861 | 5.538027e+06 |
| 32 | Parque Nacional Jaragua | 0.3557469 | 5.460767e+06 |
| 33 | Monumento Natural Lagunas Cabarete y Goleta | 7.4869378 | 5.375732e+06 |
| 34 | Parque Nacional Anacaona | 0.8662760 | 4.668627e+06 |
| 35 | Reserva Forestal Las Matas | 8.9687134 | 4.285024e+06 |
| 36 | Parque Nacional La Gran Sabana | 1.9438134 | 4.268147e+06 |
| 37 | Monumento Natural Hoyo Claro | 10.4508619 | 4.106759e+06 |
| 38 | Parque Nacional Cabo Cabrón | 10.8114248 | 3.851405e+06 |
| 39 | Refugio de Vida Silvestre Cañón Río Gurabo | 11.8174946 | 3.564134e+06 |

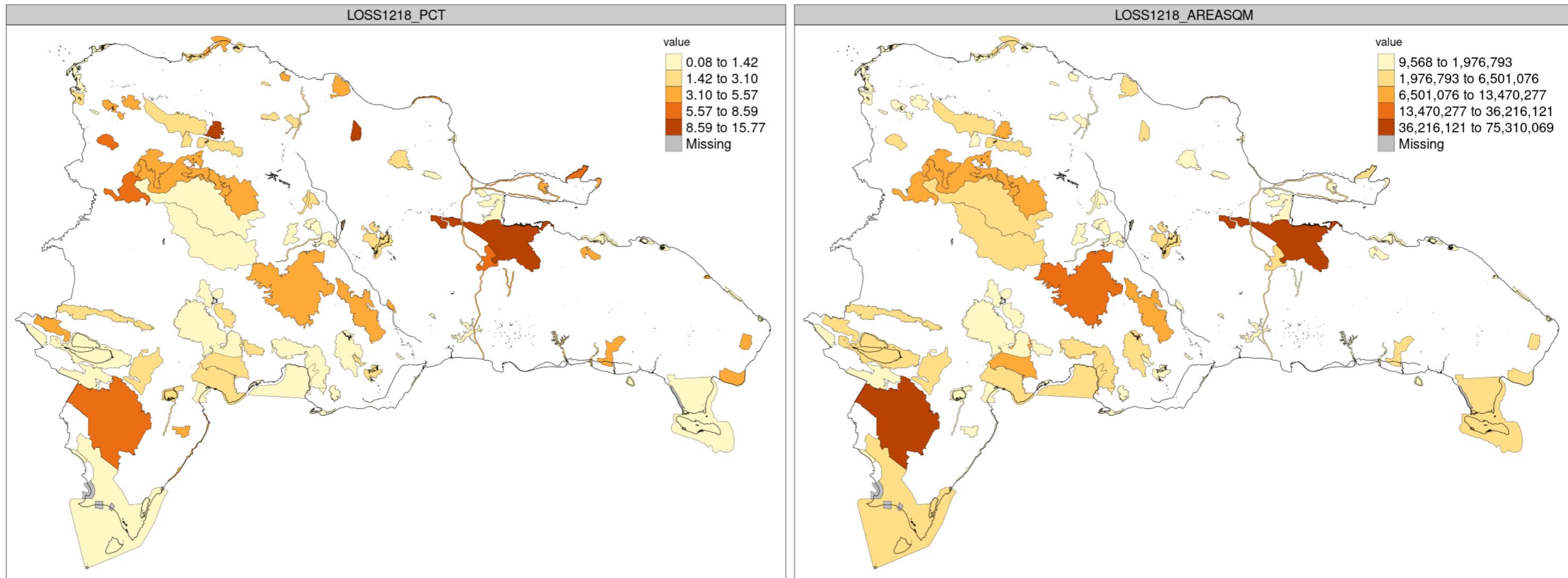
(continued)

| | CATEGORY_NAME | LOSS0118_PCT | LOSS0118_AREASQM |
|----|---|--------------|------------------|
| 40 | Reserva Forestal Villarpando | 4.2454794 | 3.377307e+06 |
| 41 | Reserva Forestal Cabeza de Toro | 0.7569748 | 2.843338e+06 |
| 42 | Parque Nacional Lago Enriquillo e Isla Cabritos | 0.6845694 | 2.772054e+06 |
| 43 | Reserva Cientifica Loma Quita Espuela | 3.4800012 | 2.635633e+06 |
| 44 | Santuario De Mamiferos Marinos Estero Hondo | 7.8195251 | 2.544674e+06 |
| 45 | Parque Nacional Saltos de la Jalda | 6.3589184 | 2.316788e+06 |
| 46 | Refugio de Vida Silvestre Monumento Natural Miguel Domingo Fuerte | 6.5638506 | 2.200773e+06 |
| 47 | Reserva Forestal Loma El 20 | 4.2928178 | 2.147130e+06 |
| 48 | Parque Nacional Manglares del Bajo Yuna | 1.7645273 | 2.137810e+06 |
| 49 | Reserva Cientifica Las Neblinas | 4.7686062 | 1.944454e+06 |
| 50 | Parque Nacional Máximo Gómez | 4.2038593 | 1.778012e+06 |
| 51 | Area Nacional De Recreo Guagui | 4.2107689 | 1.746368e+06 |
| 52 | Reserva Forestal Guanito | 2.2209652 | 1.531254e+06 |
| 53 | Monumento Natural La Tinaja | 4.9885378 | 1.472586e+06 |
| 54 | Refugio de Vida Silvestre Laguna Cabral o Rincón | 2.5207767 | 1.412513e+06 |
| 55 | Monumento Natural Salto El Limón | 8.3638311 | 1.377940e+06 |
| 56 | Parque Nacional Baiguate | 2.5817049 | 1.353512e+06 |
| 57 | Via Panoramica Mirador del Paraíso | 6.4120055 | 1.347963e+06 |
| 58 | Monumento Natural Salto Grande | 7.9794657 | 1.177706e+06 |
| 59 | Via Panoramica Carretera Santiago - La Cumbre - Puerto Plata | 5.5960474 | 1.174054e+06 |
| 60 | Via Panoramica Carretera Nagua - Sánchez | 6.5527937 | 1.103949e+06 |
| 61 | Reserva Forestal Loma Novillero | 7.7993952 | 1.005301e+06 |
| 62 | Monumento Natural Loma Isabel de Torres | 5.8831353 | 9.768897e+05 |
| 63 | Refugio de Vida Silvestre Laguna Saladilla | 3.0472813 | 9.481367e+05 |
| 64 | Parque Nacional Humedales del Ozama | 1.9053804 | 8.844452e+05 |
| 65 | Via Panoramica Vía Panorámica Costa Azul | 4.3664582 | 8.322460e+05 |
| 66 | Via Panoramica Carretera Bayacanes-Jarabacoa | 5.1178604 | 8.304956e+05 |
| 67 | Monumento Natural Diego de Ocampo | 3.1409661 | 7.960324e+05 |
| 68 | Refugio de Vida Silvestre Río Higuamo | 3.8293304 | 7.081435e+05 |
| 69 | Refugio de Vida Silvestre Humedales del Bajo Yaque del Sur | 1.1086223 | 6.481264e+05 |
| 70 | Via Panoramica Carretera El Abanico - Constanza | 2.7128399 | 6.170540e+05 |
| 71 | Refugio de Vida Silvestre Bahía de Luperón | 3.2791403 | 6.126976e+05 |
| 72 | Via Panoramica Mirador del Atlántico | 4.8032548 | 5.819625e+05 |
| 73 | Monumento Natural Saltos de Jima | 2.9440900 | 5.465493e+05 |
| 74 | Refugio de Vida Silvestre Río Soco | 4.4230649 | 5.203307e+05 |
| 75 | Monumento Natural Cabo Samaná | 5.3621004 | 4.970983e+05 |
| 76 | Parque Nacional Manglares de Estero Balsa | 0.8484612 | 4.797743e+05 |
| 77 | Reserva Cientifica Loma Guaconejo | 1.8671873 | 4.363857e+05 |
| 78 | Via Panoramica Carretera Cabral - Polo | 4.2766019 | 4.345775e+05 |
| 79 | Reserva Cientifica Ébano Verde | 1.3922027 | 4.162576e+05 |
| 80 | Reserva Cientifica Loma Barbacoa | 2.9683306 | 4.068947e+05 |
| 81 | Monumento Natural Salto de La Damajagua | 6.9006781 | 3.813125e+05 |
| 82 | Reserva Forestal Arroyo Cano | 1.4002585 | 3.346449e+05 |
| 83 | Refugio de Vida Silvestre Lagunas Redonda y Limón | 1.1499667 | 3.053692e+05 |
| 84 | Refugio de Vida Silvestre Manglar de la Jina | 0.4690262 | 2.479481e+05 |
| 85 | Corredor Ecologico Autopista Duarte | 2.0818581 | 2.158105e+05 |
| 86 | Parque Nacional El Morro | 1.1670811 | 2.143125e+05 |
| 87 | Refugio de Vida Silvestre Ría Maimón | 4.2676421 | 2.060333e+05 |
| 88 | Corredor Ecologico Autopista Juan Bosch | 3.1337140 | 1.738543e+05 |
| 89 | Monumento Natural Las Marías | 3.8115492 | 1.716999e+05 |
| 90 | Monumento Natural Reserva Antropológica Cuevas de Borbón o del Pomier | 3.1927358 | 1.603398e+05 |

(continued)

| | CATEGORY_NAME | LOSS0118_PCT | LOSS0118_AREASQM |
|-----|--|--------------|------------------|
| 91 | Corredor Ecológico Autopista 6 de Noviembre | 4.2652112 | 1.549519e+05 |
| 92 | Monumento Natural Salto de Jimenoa | 0.8439175 | 1.471035e+05 |
| 93 | Monumento Natural Los Cacheos | 0.2519722 | 1.405244e+05 |
| 94 | Reserva Biológica Sierra Prieta | 3.0743741 | 1.229764e+05 |
| 95 | Reserva Forestal Cerro de Bocanigua | 0.3878312 | 1.132792e+05 |
| 96 | Monumento Natural Cerro de San Francisco | 2.6310981 | 1.058943e+05 |
| 97 | Monumento Natural Las Dunas de las Calderas | 0.4461092 | 7.797633e+04 |
| 98 | Reserva Forestal Cayuco | 1.3722628 | 6.914752e+04 |
| 99 | Refugio de Vida Silvestre Manglares de Puerto Viejo | 0.4427118 | 4.929034e+04 |
| 100 | Refugio de Vida Silvestre La Gran Laguna o Perucho | 0.6343772 | 4.643403e+04 |
| 101 | Area Nacional De Recreo Boca de Nigua | 0.6713110 | 3.903465e+04 |
| 102 | Monumento Natural Isla Catalina | 0.2263980 | 3.676560e+04 |
| 103 | Area Nacional De Recreo Playa de Cabo Rojo - Pedernales | 0.1847187 | 3.235779e+04 |
| 104 | Area Nacional De Recreo Guaraguao - Punta Catuano | 0.1465114 | 2.724377e+04 |
| 105 | Refugio de Vida Silvestre Lagunas de Bávaro y El Caletón | 0.1494940 | 9.567537e+03 |
| 106 | Area Nacional De Recreo Playa Blanca | 0.0551998 | 3.677716e+03 |
| 107 | Area Nacional De Recreo Bahía de las Águilas | NA | NA |
| 108 | Area Nacional De Recreo Playa Larga | NA | NA |

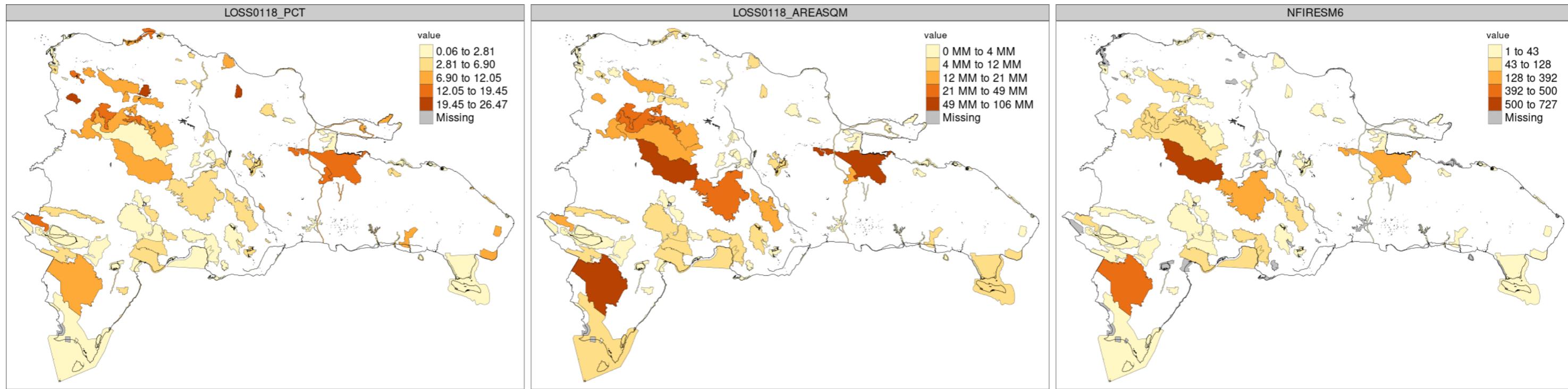
```
# Total loss 2012-2018
pazonal %>% select(matches('`LOSS1218`')) %>% select(-matches('`NA`')) %>%
  gather(variable, value, -geom) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(shp = cline) + tm_borders(col = 'black', lwd = 0.5)
```



```
# Top twenty sorted descending by column 2
stripped_table(pazonal %>% select(CATEGORY_NAME, matches('`LOSS1218`')) %>% select(-matches('<NA>')))
```

| | CATEGORY_NAME | LOSS1218_PCT | LOSS1218_AREASQM |
|----|--|--------------|------------------|
| 1 | Reserva Cientifica La Salcedoa | 15.773028 | 6501076.2 |
| 2 | Via Panoramica Entrada de Mao | 14.178246 | 7708217.1 |
| 3 | Parque Nacional Los Haitises | 11.668154 | 73705545.1 |
| 4 | Reserva Forestal Cerro Chacuey | 8.593019 | 4459171.5 |
| 5 | Monumento Natural Salto de Socoá | 8.132287 | 5554593.8 |
| 6 | Parque Nacional Cabo Cabrón | 7.604139 | 2708858.5 |
| 7 | Parque Nacional Sierra de Bahoruco | 6.894819 | 75310069.2 |
| 8 | Parque Nacional Nalga de Maco | 5.986853 | 9929126.7 |
| 9 | Monumento Natural Hoyo Claro | 5.567929 | 2187967.0 |
| 10 | Monumento Natural Las Caobas | 5.444326 | 5742251.6 |
| 11 | Monumento Natural Salto El Limón | 5.137017 | 846322.8 |
| 12 | Reserva Forestal Alto Mao | 5.100222 | 10716311.3 |
| 13 | Refugio de Vida Silvestre Río Chacuey | 5.098188 | 1976792.9 |
| 14 | Monumento Natural Río Cumayasa y Cueva de las Maravillas | 4.811717 | 4270867.5 |
| 15 | Monumento Natural Cabo Samaná | 4.624415 | 428710.5 |
| 16 | Parque Nacional Punta Espada | 4.278458 | 3518509.8 |
| 17 | Monumento Natural Loma Isabel de Torres | 4.185139 | 694938.9 |
| 18 | Via Panoramica Mirador del Atlántico | 4.129220 | 500296.5 |
| 19 | Parque Nacional Saltos de la Jalda | 4.004362 | 1458936.7 |
| 20 | Parque Nacional Valle Nuevo | 3.996785 | 36216121.2 |

```
# Fires M6
pazonal %>% select(matches('^LOSS0118|NFIRESM6')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom) %>%
mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 3, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1) +
tm_shape(shp = cline) + tm_borders(col = 'black', lwd = 0.5)
```



```
# Top twenty sorted descending by column 2
stripped_table(pazonal %>% select(CATEGORY_NAME, matches('^LOSS0118|NFIRESM6')) %>% select(-matches('<NA>')))
```

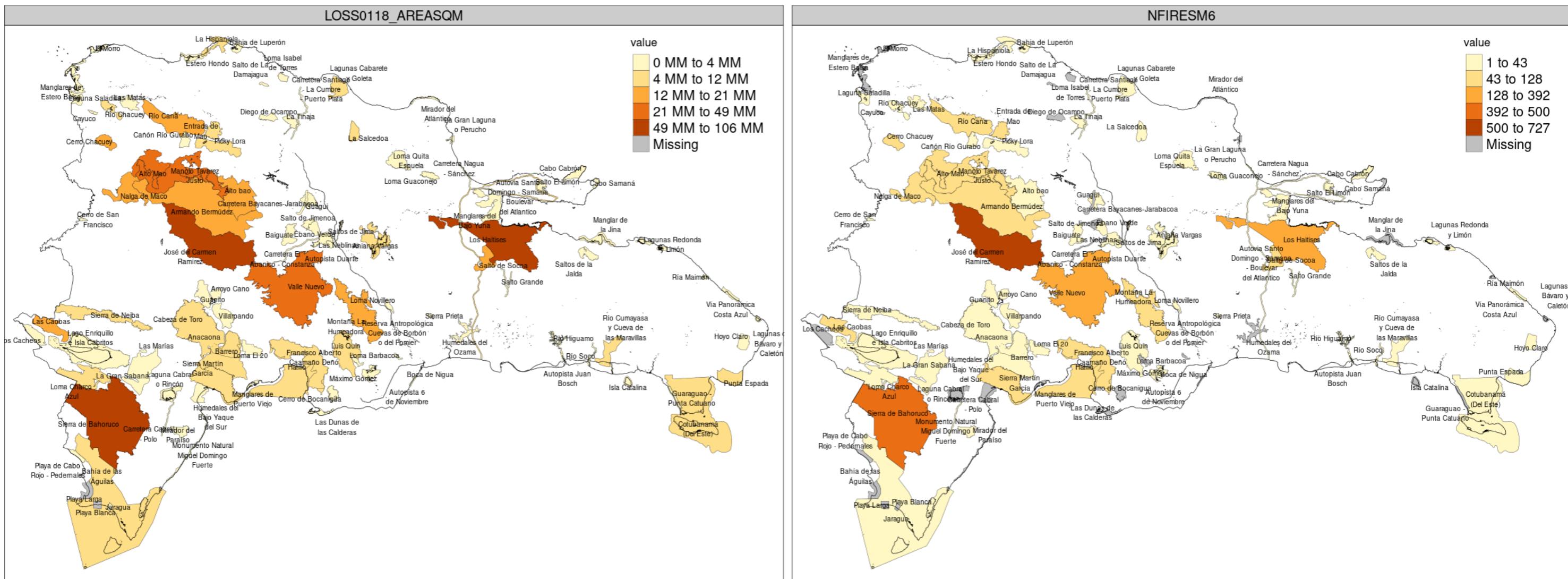
| CATEGORY_NAME | LOSS0118_PCT | LOSS0118_AREASQM | NFIRESM6 |
|--|--------------|------------------|----------|
| 1 Reserva Forestal Cerro Chacuey | 26.466669 | 13734337 | 82 |
| 2 Via Panoramica Entrada de Mao | 22.627826 | 12301958 | 69 |
| 3 Reserva Cientifica La Salcedoa | 21.547307 | 8881026 | 27 |
| 4 Monumento Natural Salto de Socoa | 19.446867 | 13282788 | 53 |
| 5 Monumento Natural Las Caobas | 17.889496 | 18868449 | 76 |
| 6 Parque Nacional Los Haitises | 16.796141 | 106098081 | 308 |
| 7 Parque Nacional La Hispaniola | 15.833531 | 8680829 | 14 |
| 8 Refugio de Vida Silvestre Río Chacuey | 14.861968 | 5762642 | 38 |
| 9 Reserva Forestal Alto Mao | 14.582918 | 30640838 | 104 |
| 10 Parque Nacional José del Carmen Ramírez | 12.051415 | 90356487 | 727 |
| 11 Refugio de Vida Silvestre Cañón Río Gurabo | 11.817495 | 3564134 | 8 |
| 12 Parque Nacional Punta Espada | 11.570795 | 9515568 | 16 |
| 13 Via Panoramica Autovia Santo Domingo - Samana - Boulevard del Atlantico | 11.542791 | 11922785 | 18 |
| 14 Parque Nacional Nalga de Maco | 10.828410 | 17958794 | 117 |
| 15 Parque Nacional Cabo Cabrón | 10.811425 | 3851405 | 8 |
| 16 Monumento Natural Hoyo Claro | 10.450862 | 4106759 | 8 |
| 17 Parque Nacional Manolo Tavarez Justo | 9.878937 | 34746840 | 128 |
| 18 Parque Nacional Sierra de Bahoruco | 9.108586 | 99490393 | 500 |
| 19 Reserva Forestal Las Matas | 8.968713 | 4285024 | 15 |
| 20 Monumento Natural Río Cumayasa y Cueva de las Maravillas | 8.462986 | 7511724 | 15 |

```
# Fires M6. Only AREASQM and FIRESM6
pazonal %>% select(matches('^LOSS0118_AREASQM|NFIRESM6|^NAME')) %>% select(-matches('<NA>')) %>%
gather(variable, value, -geom, -NAME) %>%
mutate(NAME = gsub(".{10,}?", "\\s", "\\\n", NAME)) %>%
# mutate(NAME=gsub(' ', '\n', NAME)) %>%
```

```

mutate(variable = factor(variable, levels = unique(variable))) %>%
tm_shape() +
tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1) +
tm_text(text = 'NAME', size = 0.5, auto.placement = T, col = 'black') +
tm_shape(shp = cline) + tm_borders(col = 'black', lwd = 0.5)

```



```

# Top twenty sorted descending by column 2
stripped_table(
  pazonal %>% select(CATEGORY_NAME, matches('^LOSS0118_AREASQM|NFIRESM6')) %>%
  select(-matches('<NA>'))
)

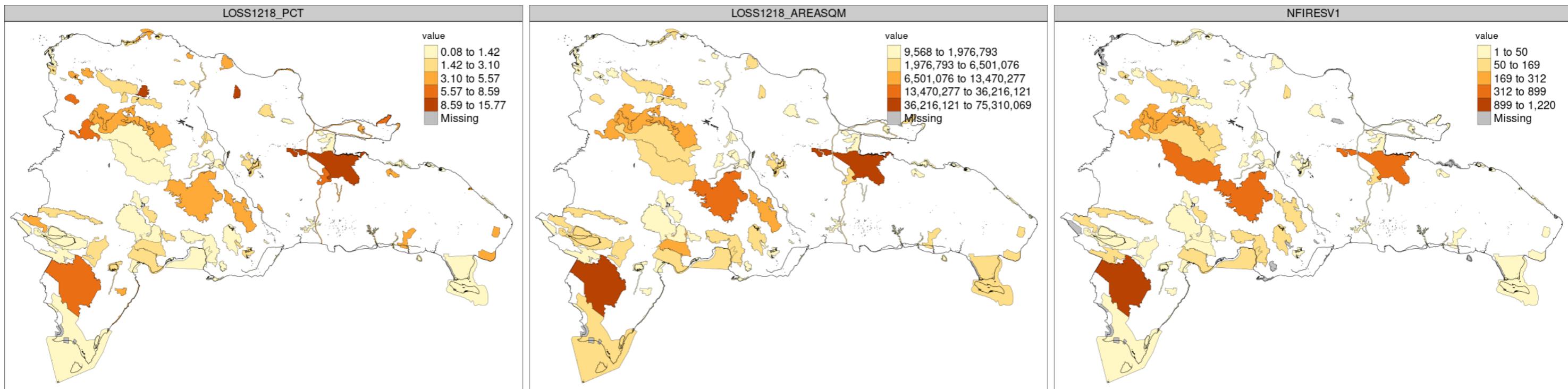
```

| CATEGORY_NAME | LOSS0118_AREASQM | NFIRESM6 |
|--|------------------|----------|
| 1 Parque Nacional Los Haitises | 106098081 | 308 |
| 2 Parque Nacional Sierra de Bahoruco | 99490393 | 500 |
| 3 Parque Nacional José del Carmen Ramírez | 90356487 | 727 |
| 4 Parque Nacional Valle Nuevo | 48606234 | 392 |
| 5 Parque Nacional Manolo Tavarez Justo | 34746840 | 128 |
| 6 Reserva Forestal Alto Mao | 30640838 | 104 |
| 7 Reserva Forestal Alto bao | 21401203 | 23 |
| 8 Reserva Forestal Río Cana | 19467164 | 53 |
| 9 Monumento Natural Las Caobas | 18868449 | 76 |
| 10 Parque Nacional Montaña La Humeadora | 18277567 | 82 |
| 11 Parque Nacional Nalga de Maco | 17958794 | 117 |
| 12 Parque Nacional Armando Bermúdez | 17271703 | 79 |
| 13 Reserva Forestal Cerro Chacuey | 13734337 | 82 |
| 14 Monumento Natural Salto de Socoá | 13282788 | 53 |
| 15 Vía Panoramica Entrada de Mao | 12301958 | 69 |
| 16 Vía Panoramica Autovía Santo Domingo - Samaná - Boulevard del Atlántico | 11922785 | 18 |
| 17 Reserva Forestal Barrero | 10128739 | 20 |
| 18 Parque Nacional Punta Espada | 9515568 | 16 |
| 19 Reserva Biológica Loma Charco Azul | 9334805 | 22 |
| 20 Reserva Científica La Salcedoa | 8881026 | 27 |

```
# Top twenty sorted descending by column 2
stripped_table(
  pazonal %>%
    select(CATEGORY_NAME, matches('`LOSS0118_AREASQM|NFIRESM6`')) %>%
    select(-matches('`<NA>`')),
  order_col = 3
)
```

| CATEGORY_NAME | LOSS0118_AREASQM | NFIRESM6 |
|---|------------------|----------|
| 1 Parque Nacional José del Carmen Ramírez | 90356487 | 727 |
| 2 Parque Nacional Sierra de Bahoruco | 99490393 | 500 |
| 3 Parque Nacional Valle Nuevo | 48606234 | 392 |
| 4 Parque Nacional Los Haitises | 106098081 | 308 |
| 5 Parque Nacional Manolo Tavarez Justo | 34746840 | 128 |
| 6 Parque Nacional Nalga de Maco | 17958794 | 117 |
| 7 Reserva Forestal Alto Mao | 30640838 | 104 |
| 8 Reserva Forestal Cerro Chacuey | 13734337 | 82 |
| 9 Parque Nacional Montaña La Humeadora | 18277567 | 82 |
| 10 Parque Nacional Francisco Alberto Caamaño Deñó | 6035530 | 81 |
| 11 Parque Nacional Armando Bermúdez | 17271703 | 79 |
| 12 Reserva Forestal Hatillo | 6270945 | 76 |
| 13 Monumento Natural Las Caobas | 18868449 | 76 |
| 14 Parque Nacional Sierra Martín García | 8441457 | 76 |
| 15 Vía Panoramica Entrada de Mao | 12301958 | 69 |
| 16 Reserva Forestal Río Cana | 19467164 | 53 |
| 17 Monumento Natural Salto de Socoá | 13282788 | 53 |
| 18 Parque Nacional Sierra de Neiba | 7072866 | 43 |
| 19 Refugio de Vida Silvestre Río Chacuey | 5762642 | 38 |
| 20 Reserva Forestal Villarpando | 3377307 | 34 |

```
# Fires V1
pazonal %>% select(matches('^LOSS1218|NFIRESV1')) %>% select(-matches('<NA>')) %>%
  gather(variable, value, -geom) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'jenks') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 3, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 1, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(shp = cline) + tm_borders(col = 'black', lwd = 0.5)
```



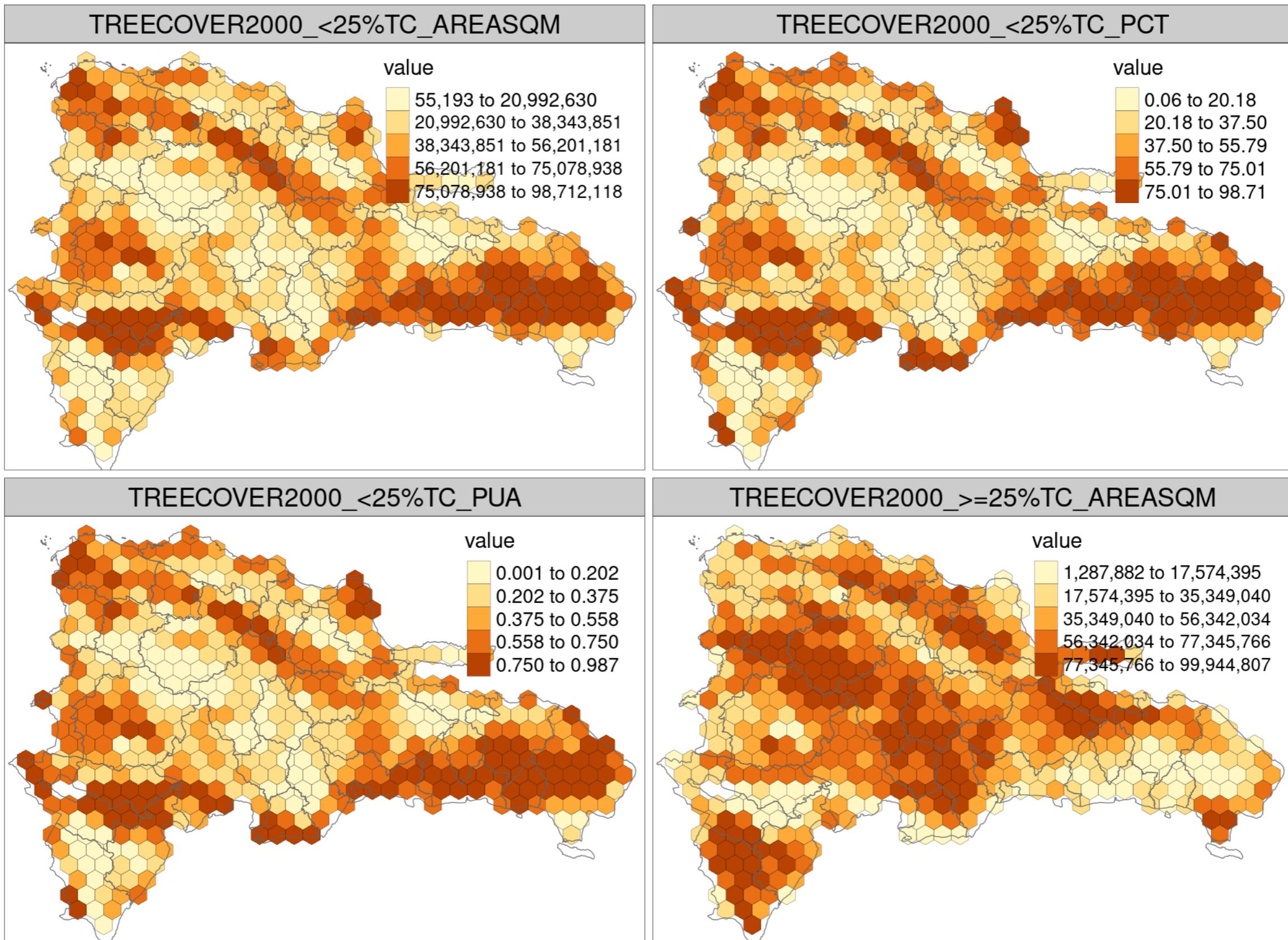
```
# Top twenty sorted descending by column 2
stripped_table(pazonal %>% select(CATEGORY_NAME, matches('^LOSS1218|NFIRESV1')) %>% select(-matches('<NA>')))
```

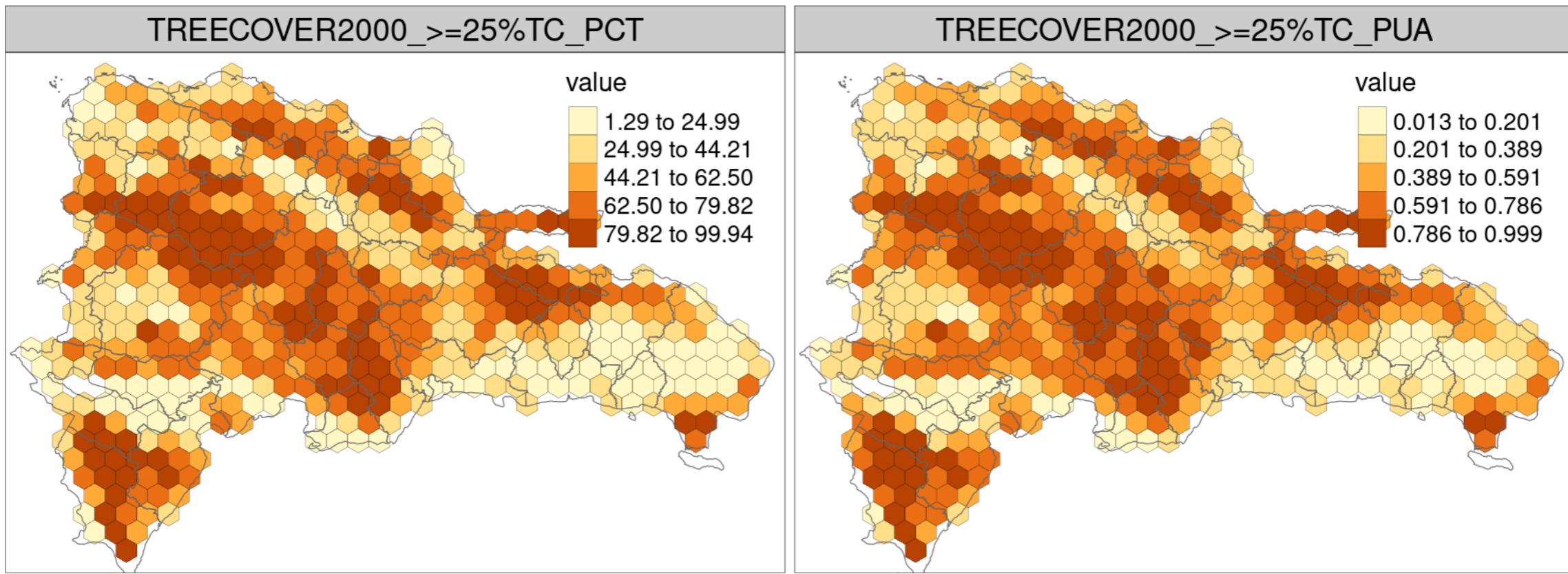
| CATEGORY_NAME | LOSS1218_PCT | LOSS1218_AREASQM | NFIRESV1 |
|---|--------------|------------------|----------|
| 1 Reserva Cientifica La Salcedoa | 15.773028 | 6501076.2 | 66 |
| 2 Via Panoramica Entrada de Mao | 14.178246 | 7708217.1 | 132 |
| 3 Parque Nacional Los Haitises | 11.668154 | 73705545.1 | 694 |
| 4 Reserva Forestal Cerro Chacuey | 8.593019 | 4459171.5 | 106 |
| 5 Monumento Natural Salto de Socoá | 8.132287 | 5554593.8 | 92 |
| 6 Parque Nacional Cabo Cabrón | 7.604139 | 2708858.5 | 16 |
| 7 Parque Nacional Sierra de Bahoruco | 6.894819 | 75310069.2 | 1220 |
| 8 Parque Nacional Nalga de Maco | 5.986853 | 9929126.7 | 259 |
| 9 Monumento Natural Hoyo Claro | 5.567929 | 2187967.0 | 27 |
| 10 Monumento Natural Las Caobas | 5.444326 | 5742251.6 | 85 |
| 11 Monumento Natural Salto El Limón | 5.137017 | 846322.8 | 16 |
| 12 Reserva Forestal Alto Mao | 5.100222 | 10716311.3 | 240 |
| 13 Refugio de Vida Silvestre Río Chacuey | 5.098188 | 1976792.9 | 67 |
| 14 Monumento Natural Río Cumayasa y Cueva de las Maravillas | 4.811717 | 4270867.5 | 41 |
| 15 Monumento Natural Cabo Samaná | 4.624415 | 428710.5 | 8 |
| 16 Parque Nacional Punta Espada | 4.278458 | 3518509.8 | 30 |
| 17 Monumento Natural Loma Isabel de Torres | 4.185139 | 694938.9 | 1 |
| 18 Via Panoramica Mirador del Atlántico | 4.129220 | 500296.5 | NA |
| 19 Parque Nacional Saltos de la Jalda | 4.004362 | 1458936.7 | 2 |
| 20 Parque Nacional Valle Nuevo | 3.996785 | 36216121.2 | 899 |

11.5 Zonal, by grid used in the long-term analytical approach

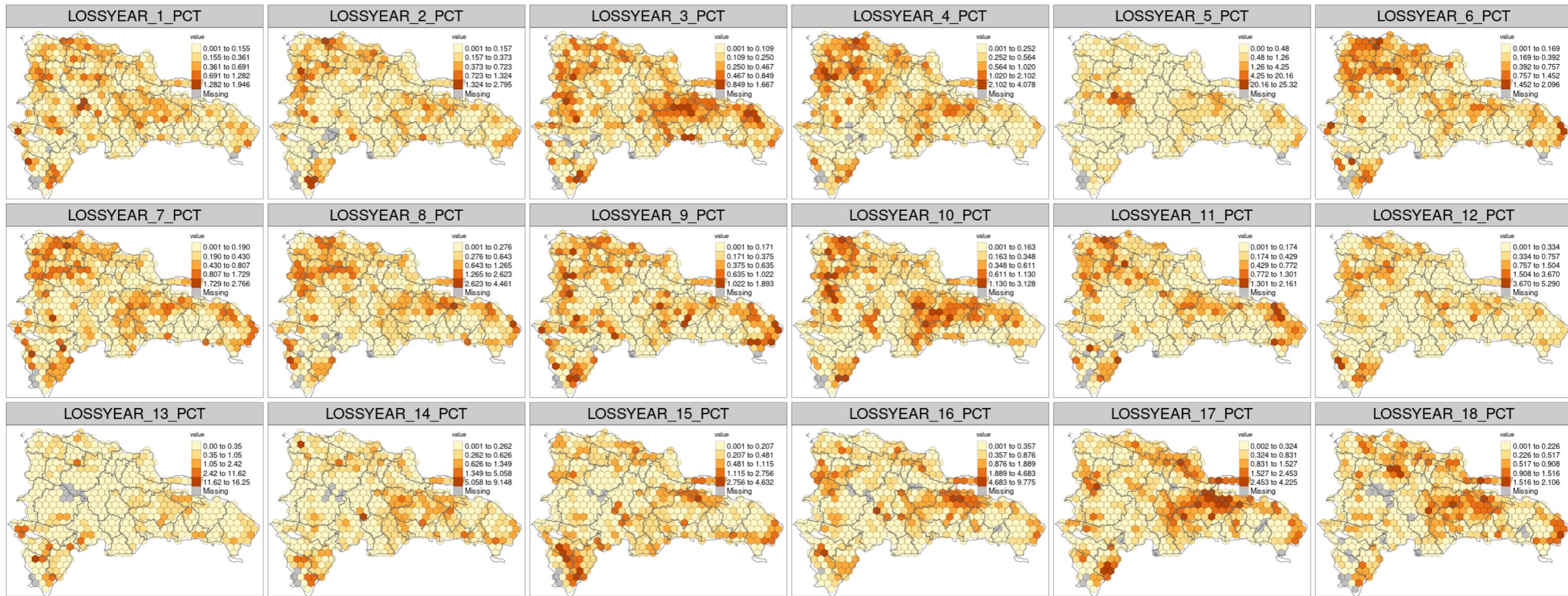
```
#Zonal statistics object
grdzonal <- readRDS('out/grd_zonal_statistics.RDS')

# Tree cover for pctc threshold
grdzonal %>% select(matches('^TREECOVER2000')) %>%
  gather(variable, value, -geometry) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'kmeans') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 2, nrow = 2, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 2, legend.title.size = 2, legend.text.size = 1.5) +
  tm_shape(prov) + tm_borders()
```

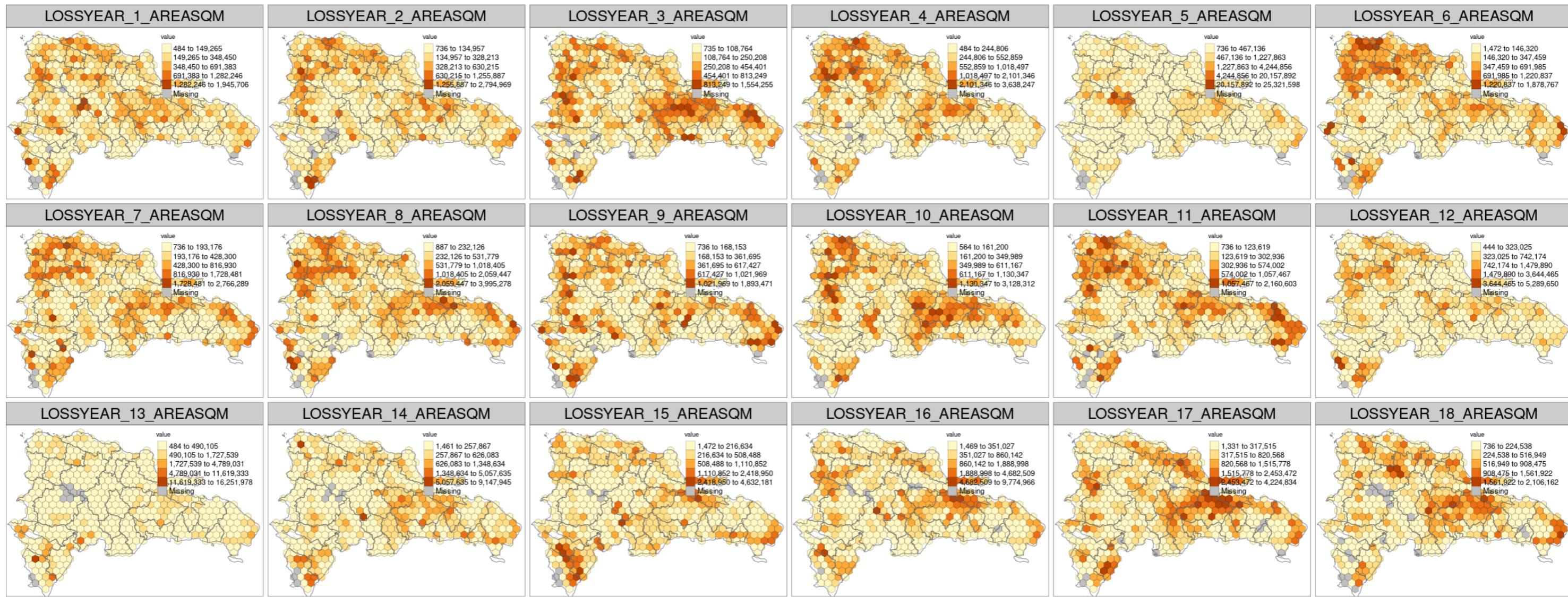




```
# Loss year
# * PCT
grdzonal %>% dplyr::select(matches('LOSSYEAR_[1-9].*_PCT$')) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'kmeans') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 6, nrow = 3, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 2, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(prov) + tm_borders()
```

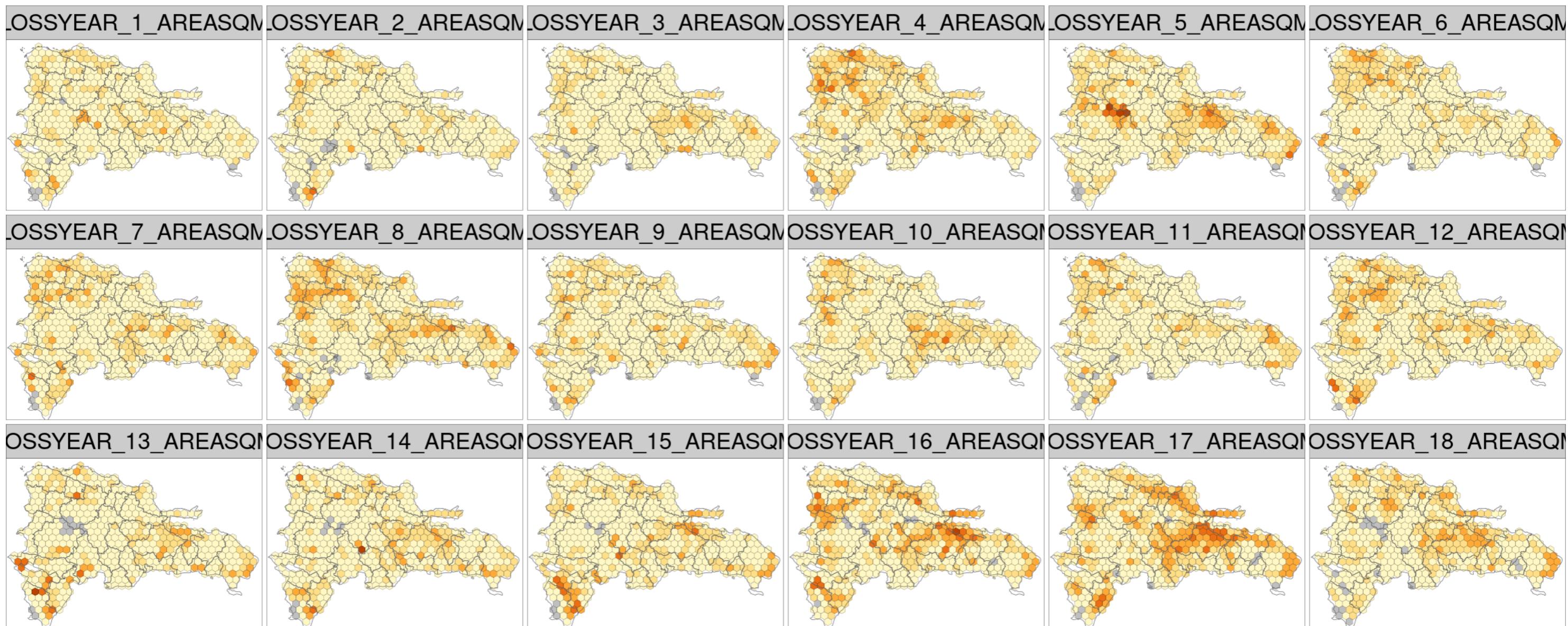


```
# * AREASQM
grdzonal %>% dplyr::select(matches('`LOSSYEAR_[1-9].*AREA.*')) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'kmeans') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 6, nrow = 3, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 2, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(prov) + tm_borders()
```



```
# * Provinces overlaid, single scale
grdzonal %>% dplyr::select(matches('`LOSSYEAR_[1-9].*AREA.*')) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1,
         style = 'kmeans', legend.is.portrait = F, title = 'Area (square meters)',
         textNA = "No tree cover loss") +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 6, nrow = 3, free.coords = FALSE, free.scales = FALSE) +
  tm_layout(panel.label.size = 3, legend.title.size = 2.5, legend.text.size = 1.5,
            legend.outside.position = "bottom", legend.outside.size = .1,
            main.title = 'Dominican Republic. Tree cover loss 2001-2018',
            main.title.size = 2.5, attr.outside=TRUE) +
  tm_credits('Author: José Martínez B.\nSource: Hansen et al. 2013', size = 2) +
  tm_shape(prov) + tm_borders()
```

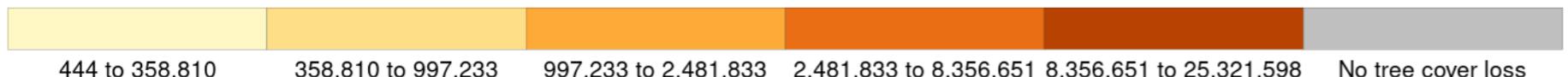
Dominican Republic. Tree cover loss 2001-2018



Author: Jose Martinez B.

Source: Hansen et al. 2013

Area (square meters)



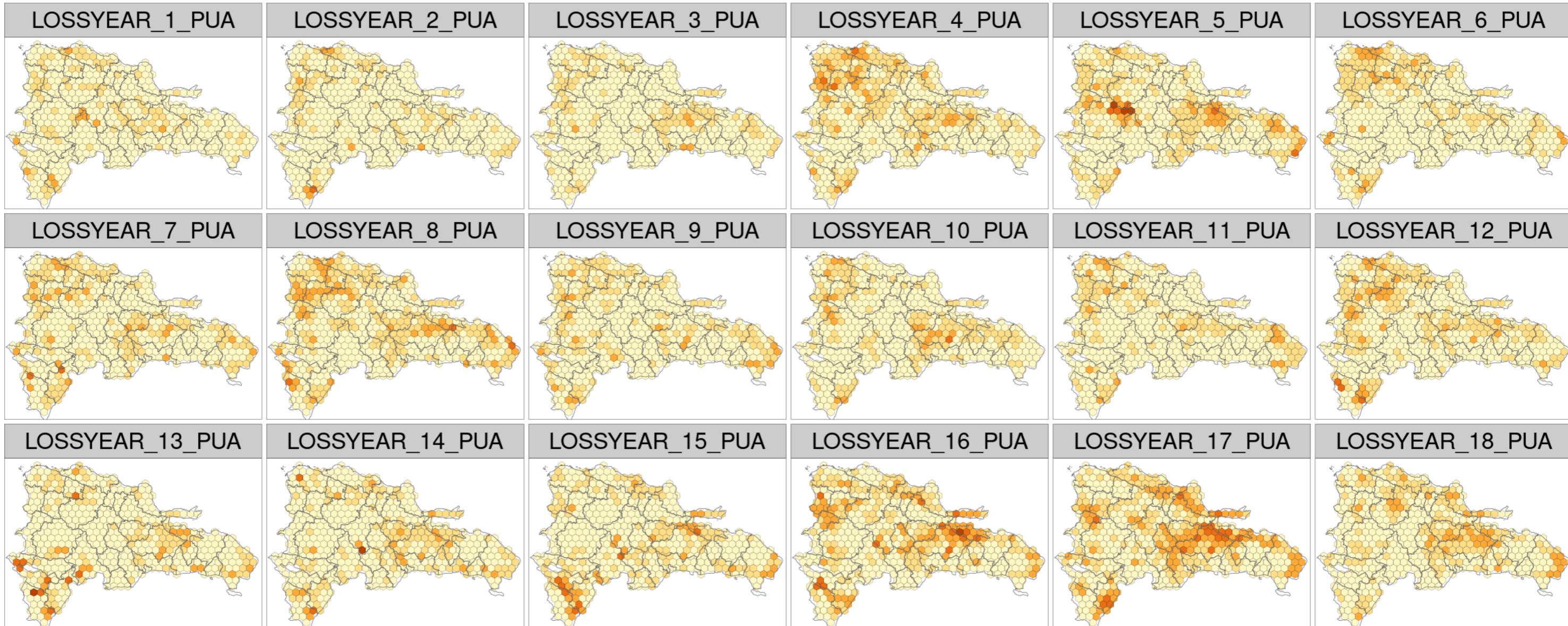
```
# * Loss per unit area (PUA). Provinces overlaid, single scale
grdzonal %>% dplyr::select(matches('`LOSSYEAR_[1-9].*PUA.*')) %>%
  replace(is.na(.), 0) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1,
         style = 'kmeans', legend.is.portrait = F, legend.format = list(digits = 3, text.separator = '-'),
         title = 'Per unit area loss', textNA = "No tree cover loss") +
  tm_borders(col = 'grey15', lwd = 0.3) +
```

```

tm_facets(by = "variable", ncol = 6, nrow = 3, free.coords = FALSE, free.scales = FALSE) +
  tm_layout(panel.label.size = 3, legend.title.size = 2, legend.text.size = 0.8,
            legend.outside.position = "bottom", legend.outside.size = .1,
            main.title = 'Dominican Republic. Tree cover loss 2001-2018',
            main.title.size = 2.5, attr.outside=TRUE) +
  tm_credits('\nAuthor: José Martínez B.\nSource: Hansen et al. 2013', size = 2) +
  tm_shape(prov) + tm_borders()

```

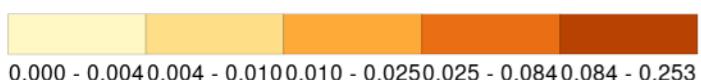
Dominican Republic. Tree cover loss 2001-2018



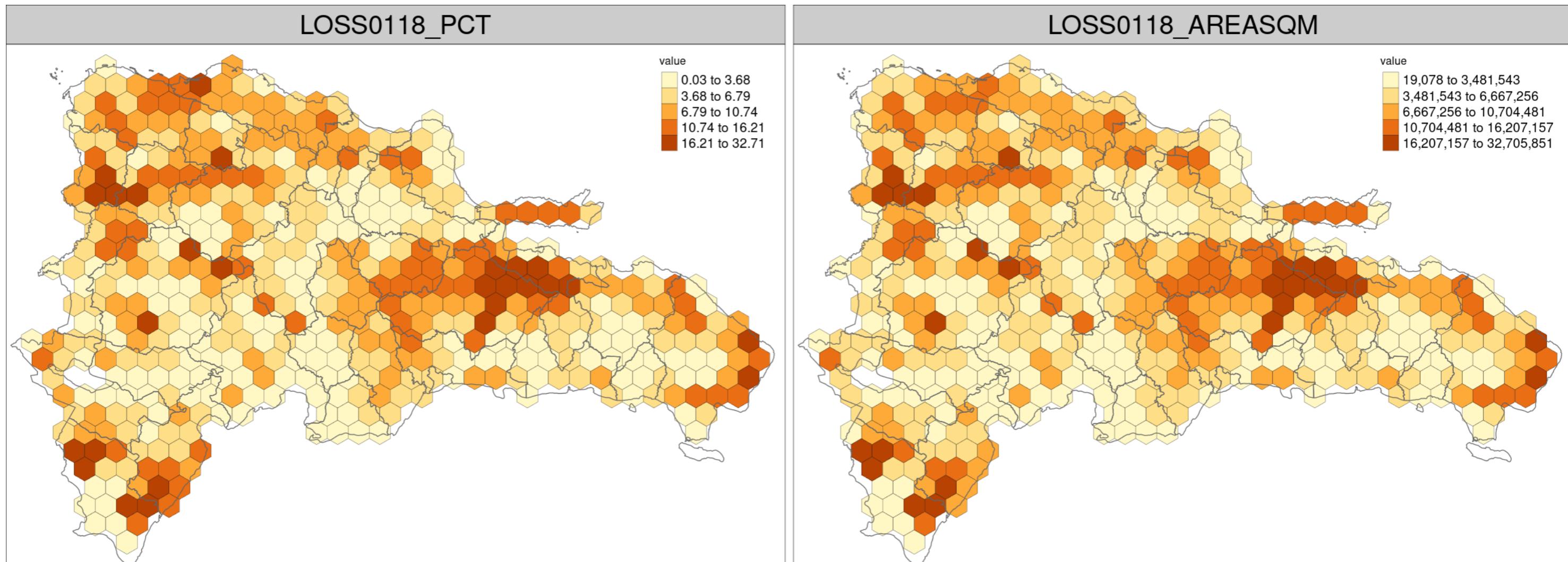
Author: José Martínez B.

Source: Hansen et al. 2013

Per unit area loss

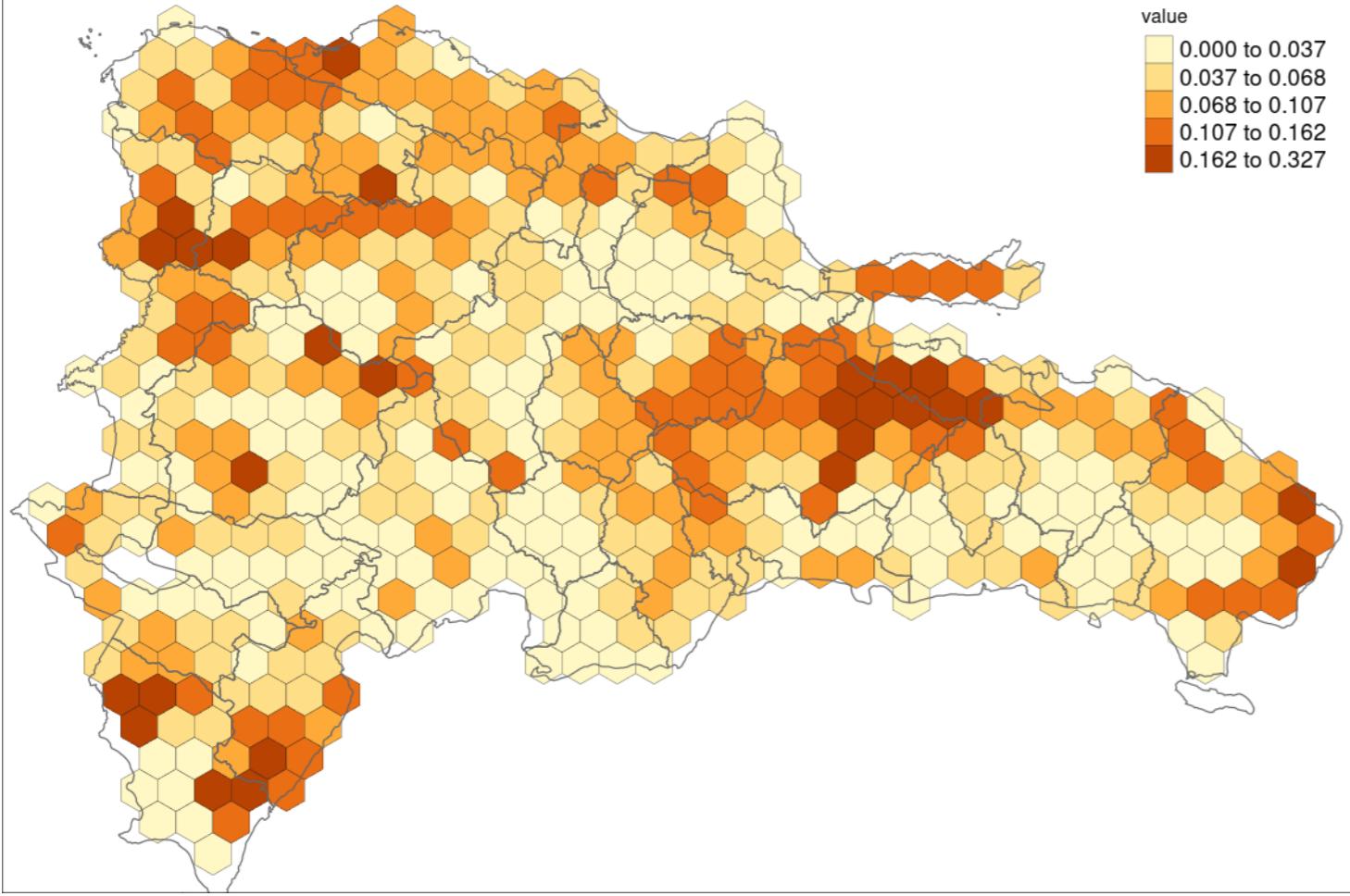


```
# Total loss 2001-2018
grdzonal %>% select(matches('`LOSS0118`')) %>% select(-matches('<NA>')) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'kmeans') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 2, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(prov) + tm_borders()
```

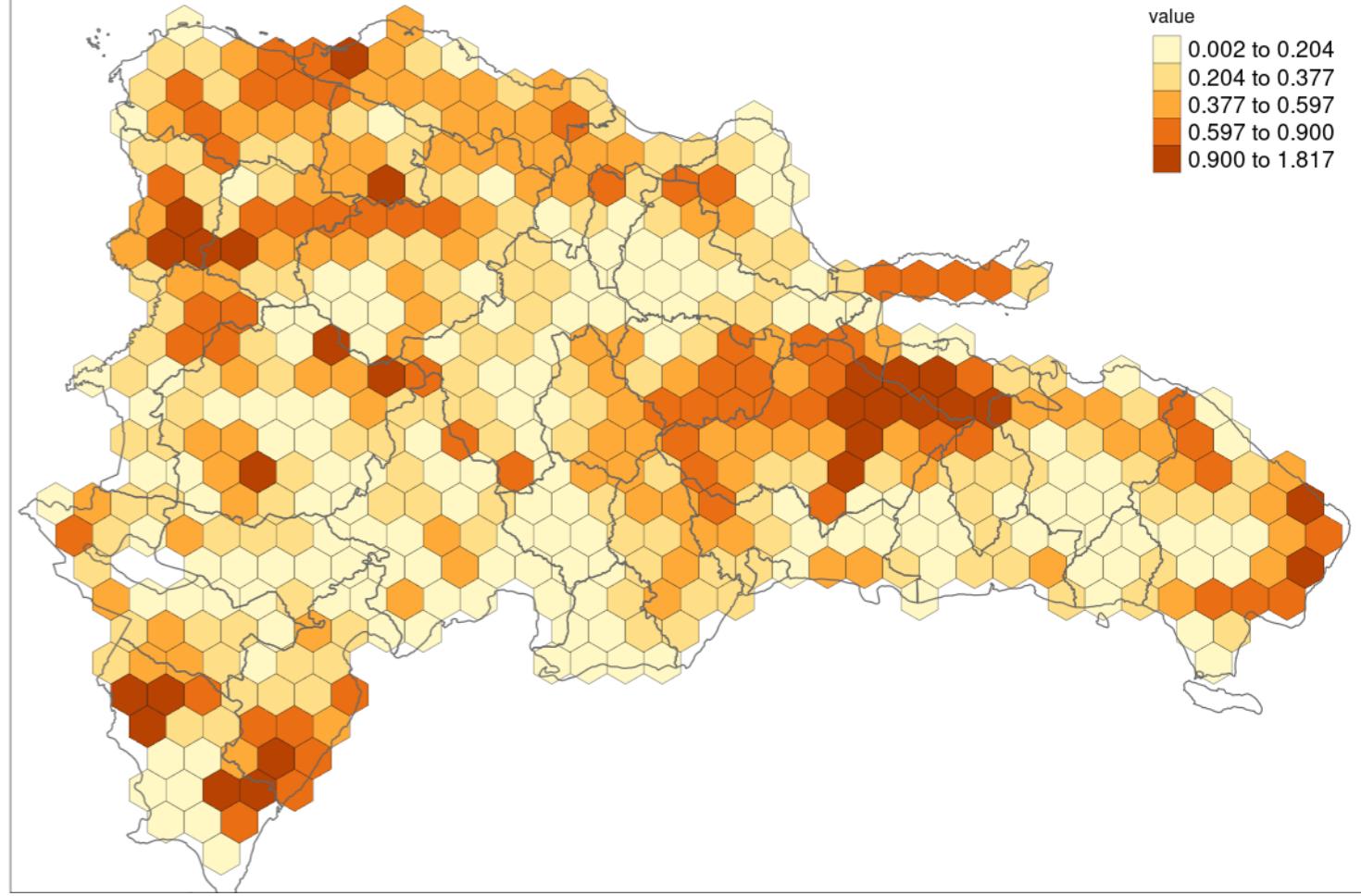


```
## =====
```

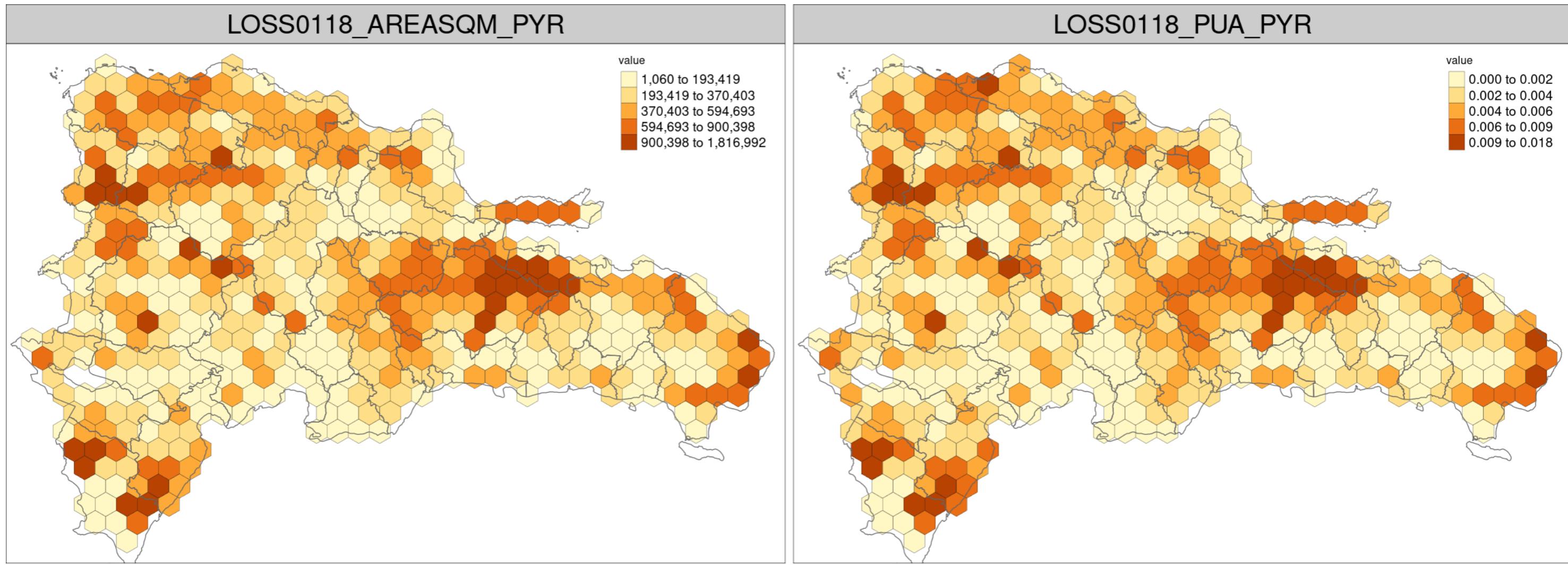
LOSS0118_PUA



LOSS0118_PCT_PYR

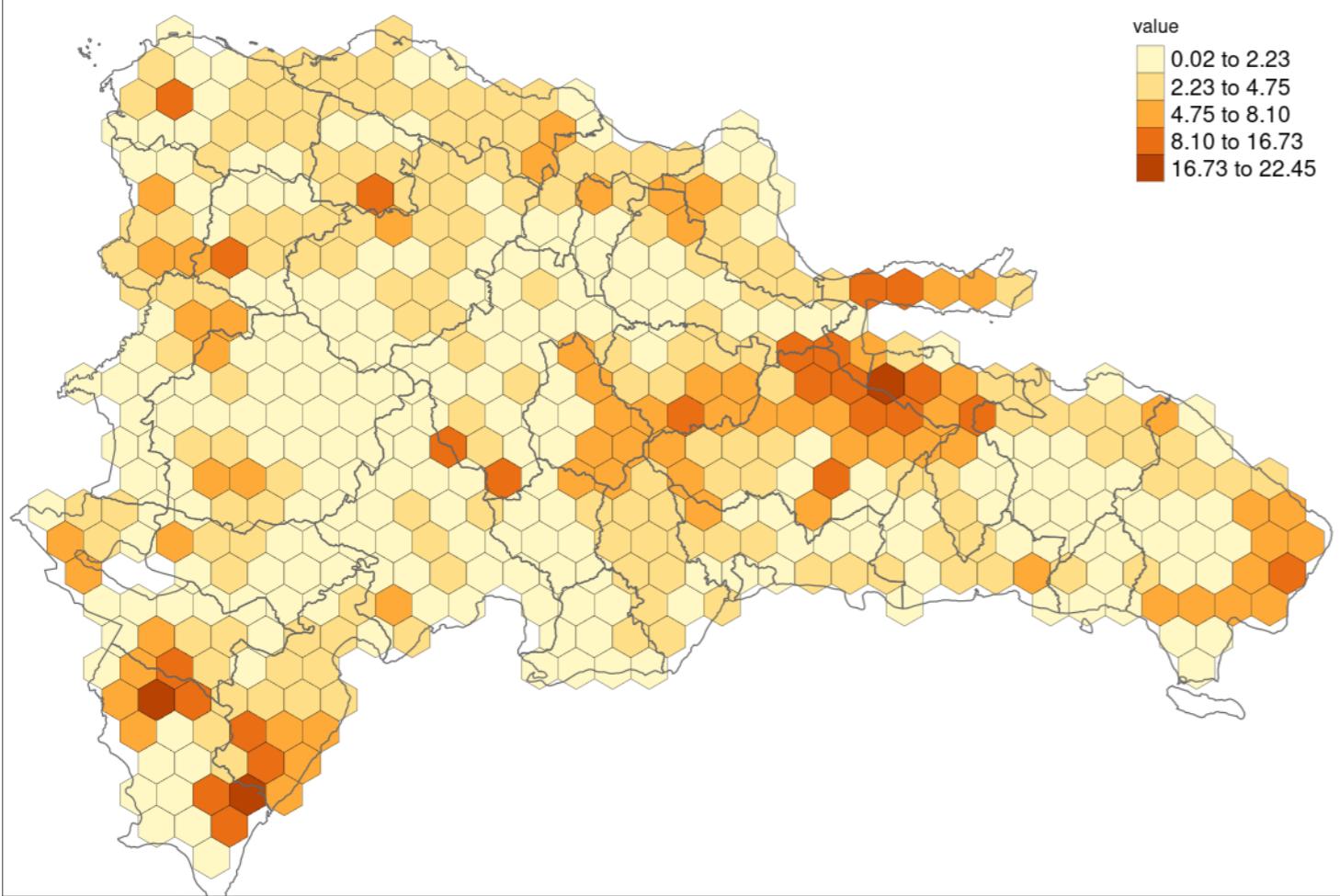


=====

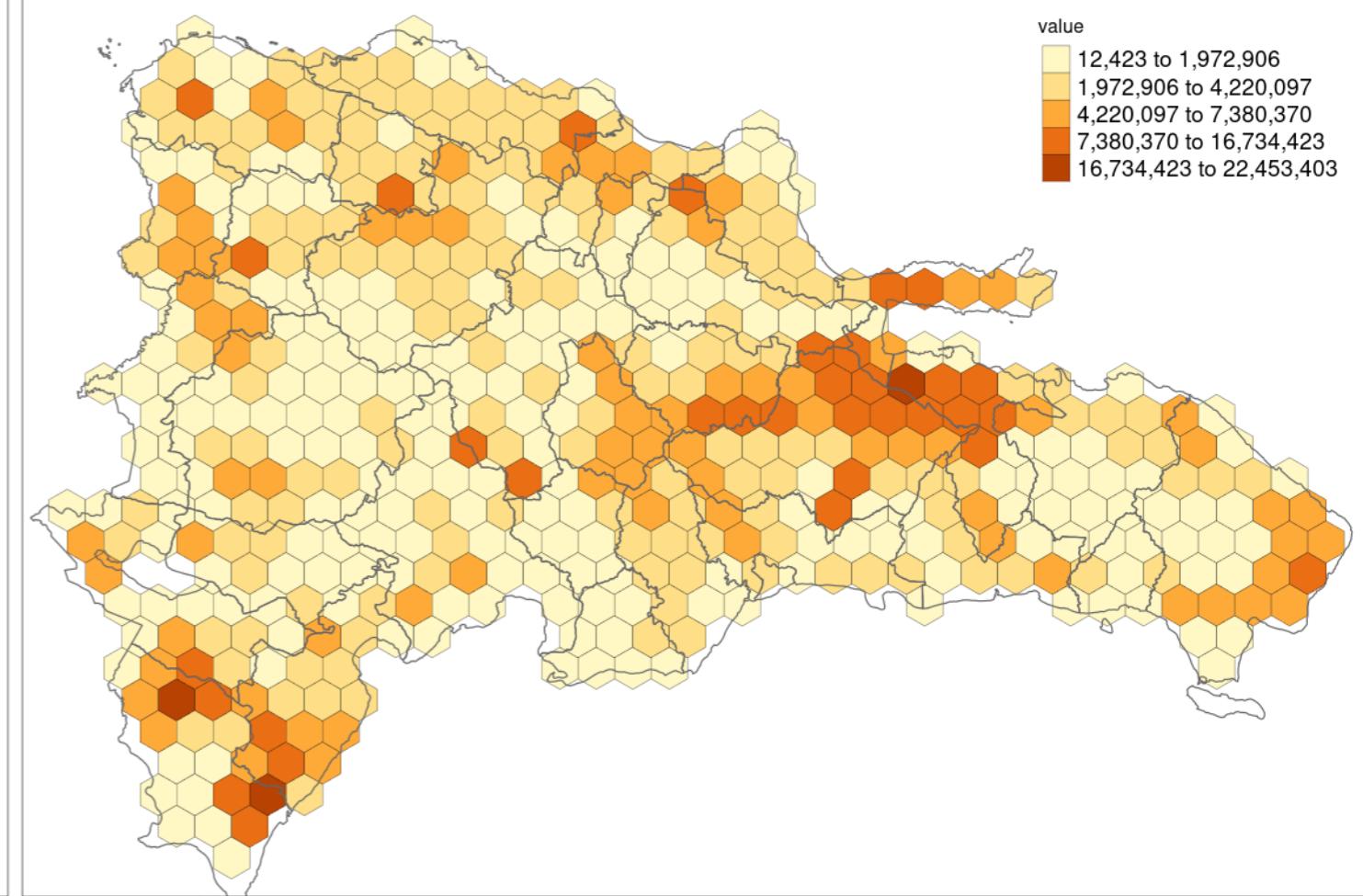


```
# Total loss 2012-2018
grdzonal %>% select(matches('`LOSS1218`')) %>% select(-matches('`NA`')) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'kmeans') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 2, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(prov) + tm_borders()
```

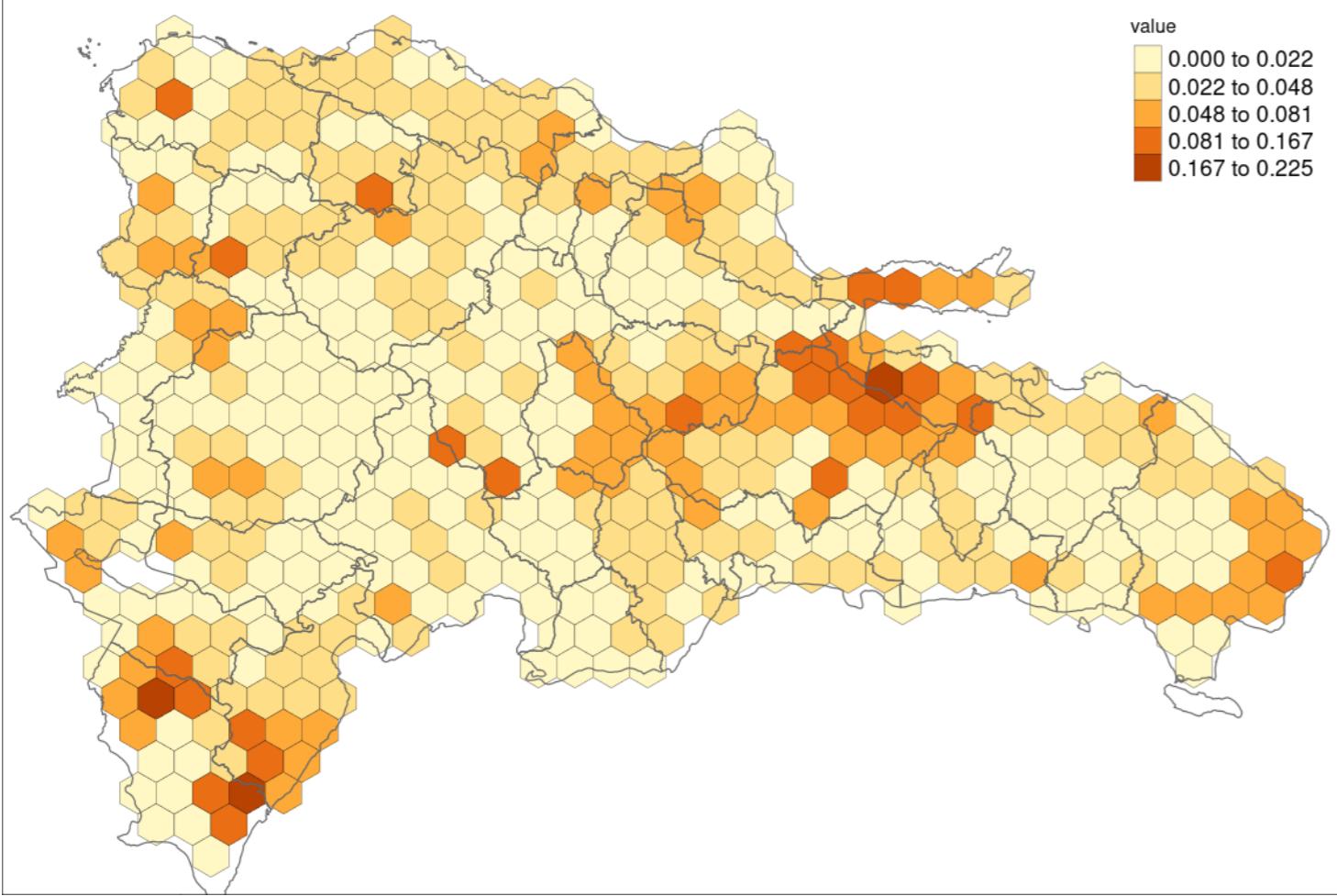
LOSS1218_PCT



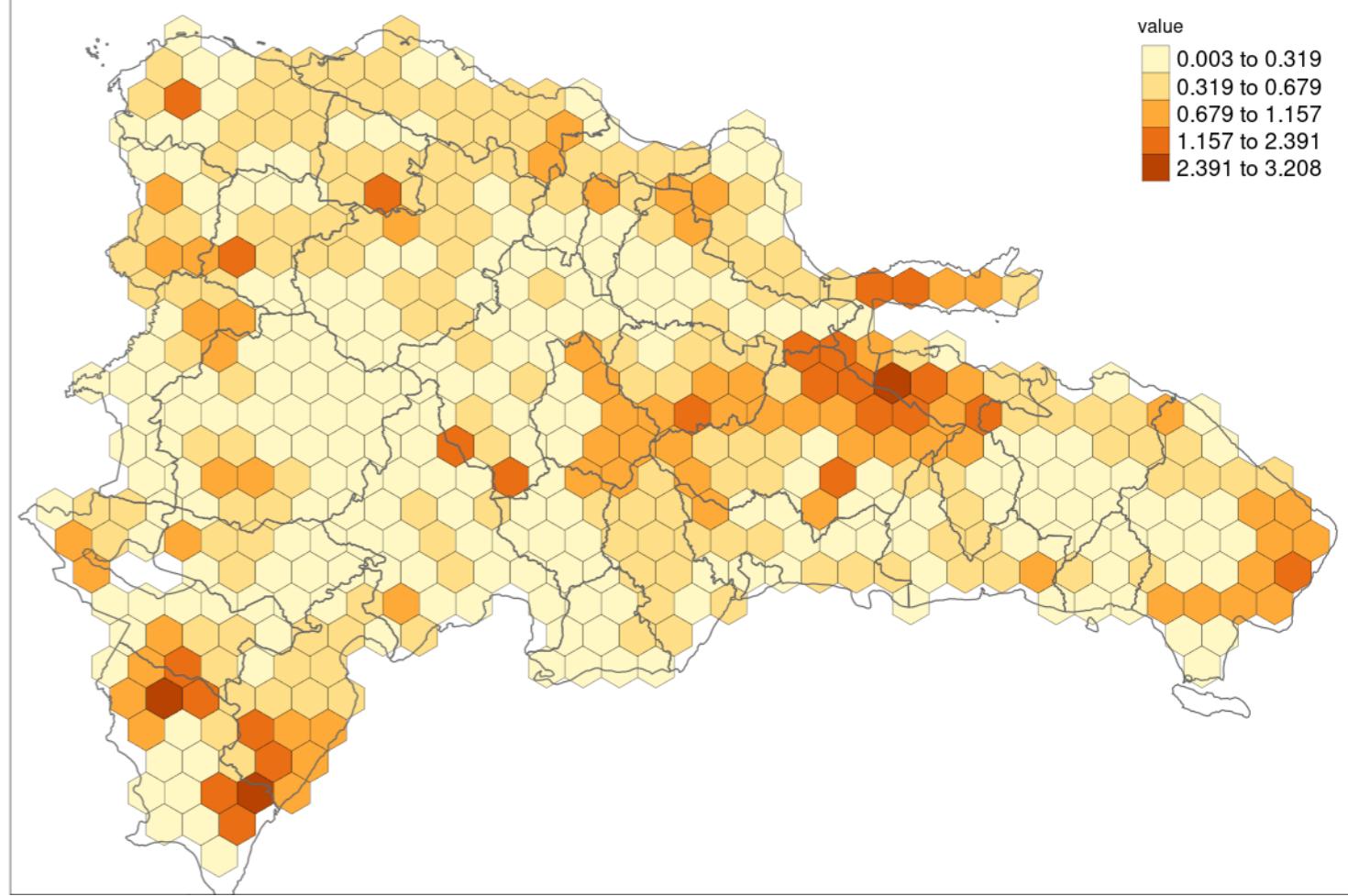
LOSS1218_AREASQM



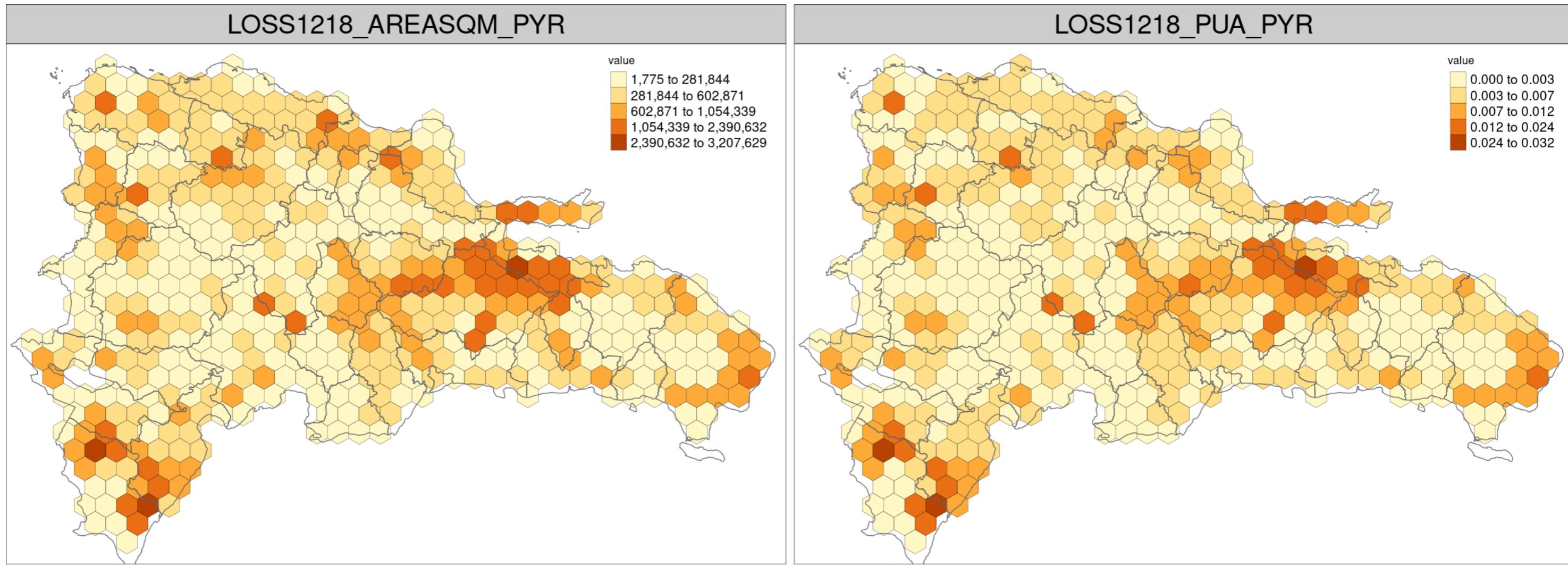
LOSS1218_PUA



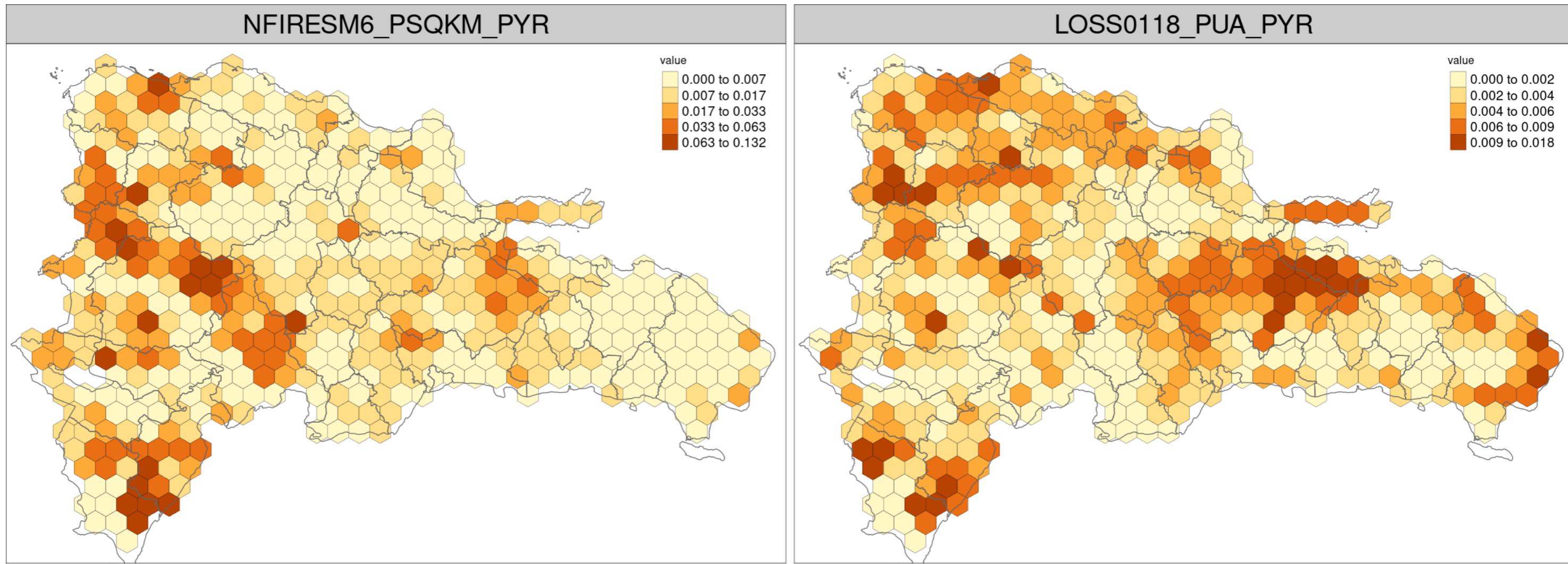
LOSS1218_PCT_PYR



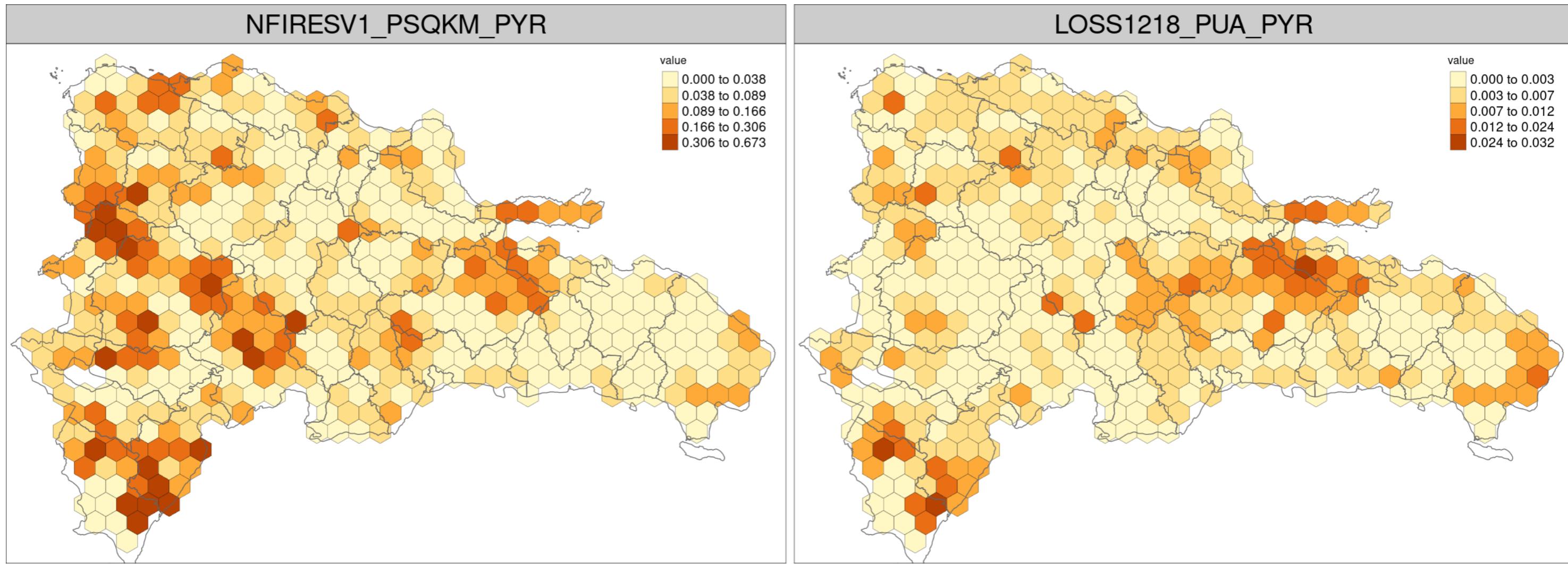
=====



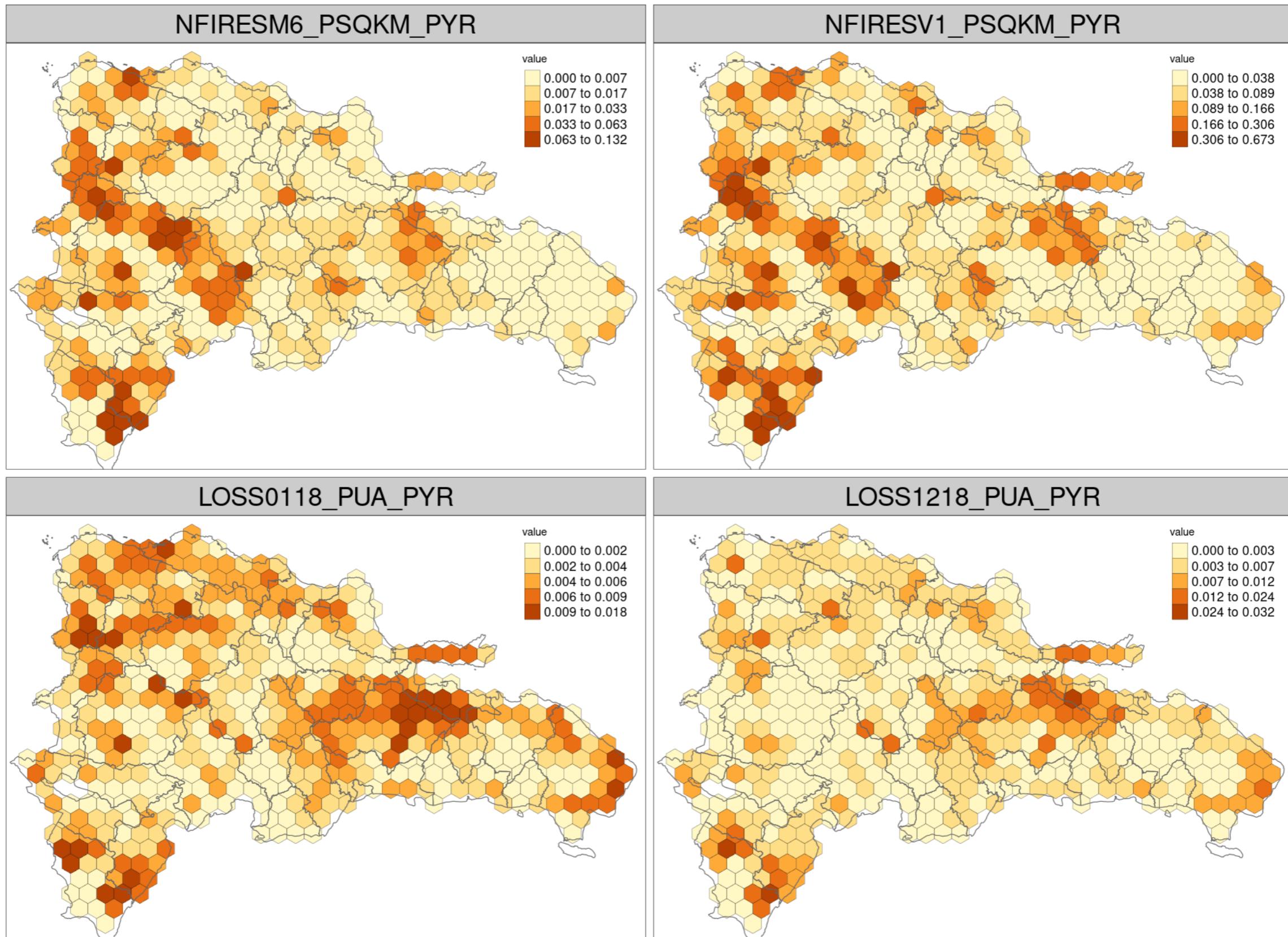
```
# Fires M6 and LOSS0118
grdzonal %>% dplyr::select(matches('LOSS0118_PUA_PYR|NFIRESM6_PSQKM_PYR')) %>%
  replace(is.na(.), 0) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'kmeans') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 2, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(prov) + tm_borders()
```



```
# Fires V1 and LOSS1218
grdzonal %>% dplyr::select(matches('LOSS1218_PUA_PYR|NFIRESV1_PSQKM_PYR')) %>%
  replace(is.na(.), 0) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'kmeans') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 2, nrow = 1, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 2, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(prov) + tm_borders()
```

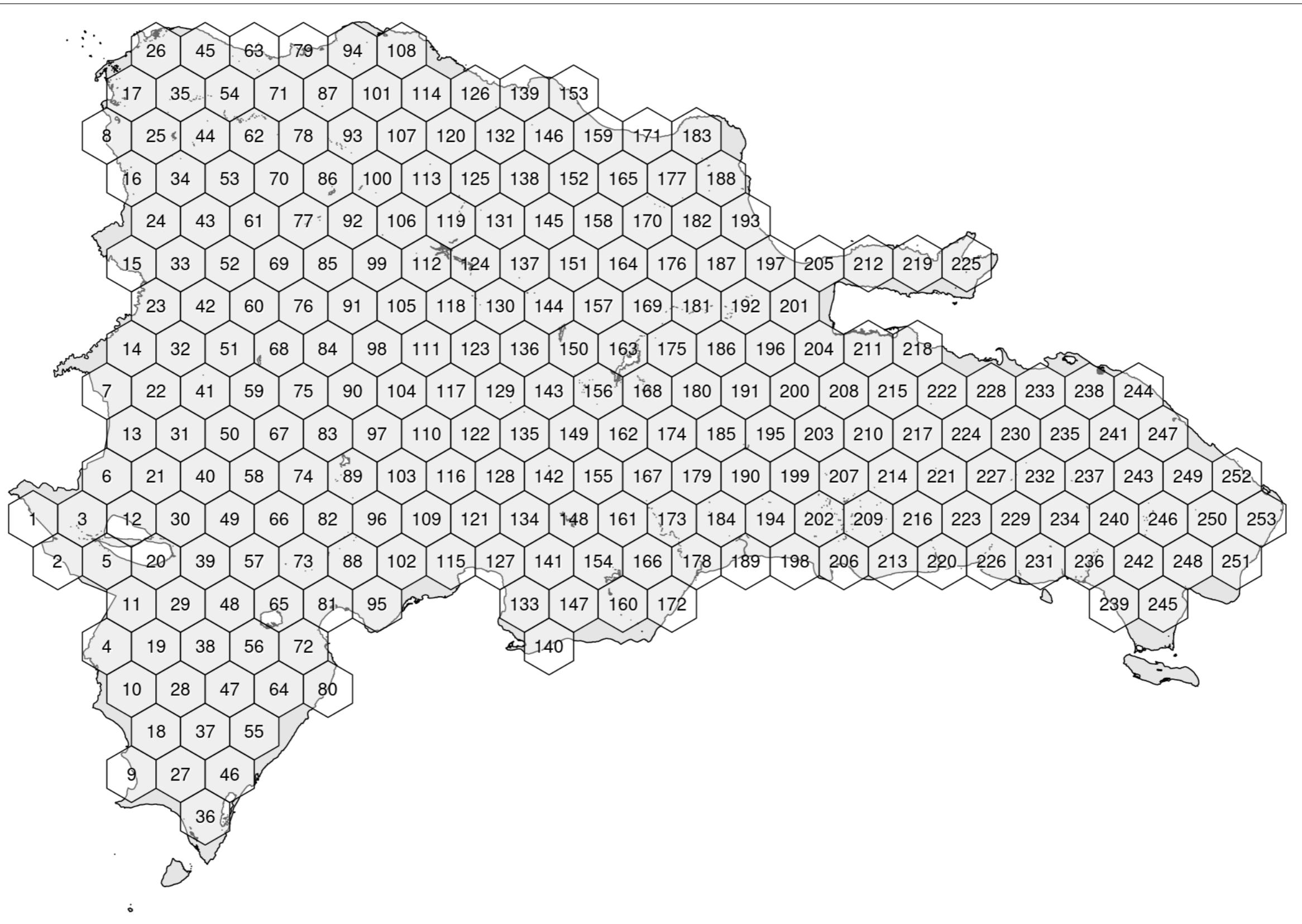


```
# Fires M6 and LOSS0118, fires V1 and LOSS1218
grdzonal %>% dplyr::select(matches('LOSS1218_PUA_PYR|NFIRESV1_PSQKM_PYR|LOSS0118_PUA_PYR|NFIRESM6_PSQKM_PYR')) %>%
  replace(is.na(.), 0) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1, style = 'kmeans') +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 2, nrow = 2, free.coords = FALSE, free.scales = TRUE) +
  tm_layout(panel.label.size = 2, legend.title.size = 1, legend.text.size = 1) +
  tm_shape(prov) + tm_borders()
```



11.6 Zonal, by grid used in the annual analytical approach

```
hexsf <- readRDS('out/honeycomb_grid_sf.RDS')
tm_shape(cline) +
  tm_fill('grey90') +
  tm_borders('black') +
  tm_shape(hexsf) +
  tm_fill('white', alpha = 0.4) +
  tm_borders('black') +
  tm_text('ENLACE', size = 1, shadow = T)
```



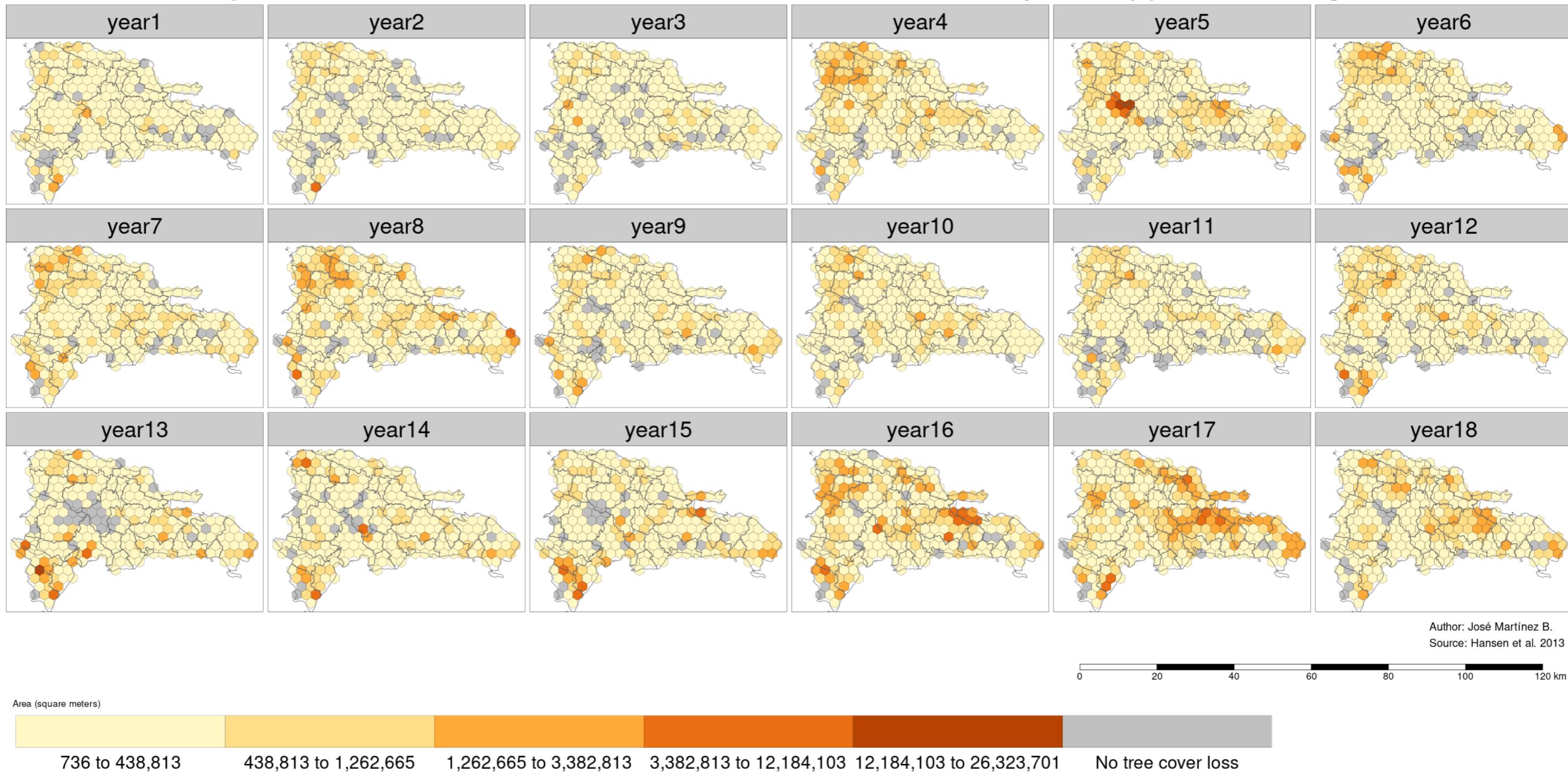
```
#Zonal statistics object  
hexzonal <- readRDS('out/hex_zonal_statistics.RDS')  
  
# Patches of forest loss > 1 Ha
```

```

hexzonal %>% select(matches('`year.*loss1ha_AREASQM')) %>%
  rename_at(vars(matches('`year.*loss1ha_AREASQM`)), funs(gsub('\\.loss1ha_AREASQM', '', .))) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1,
         style = 'kmeans', legend.is.portrait = F, title = 'Area (square meters)',
         textNA = "No tree cover loss") +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 6, nrow = 3, free.coords = FALSE, free.scales = FALSE) +
  tm_layout(panel.label.size = 3, legend.title.size = 1, legend.text.size = 1.5,
            legend.outside.position = "bottom", legend.outside.size = .1,
            main.title = 'Dominican Republic. Tree cover loss 2001-2018 within annual analytical approach hex grid', main.title.size = 2, attr.outside=TRUE) +
  tm_credits('Author: José Martínez B.\nSource: Hansen et al. 2013', size = 1.5) +
  tm_scale_bar(size = 1.3) +
  tm_shape(prov) + tm_borders()

```

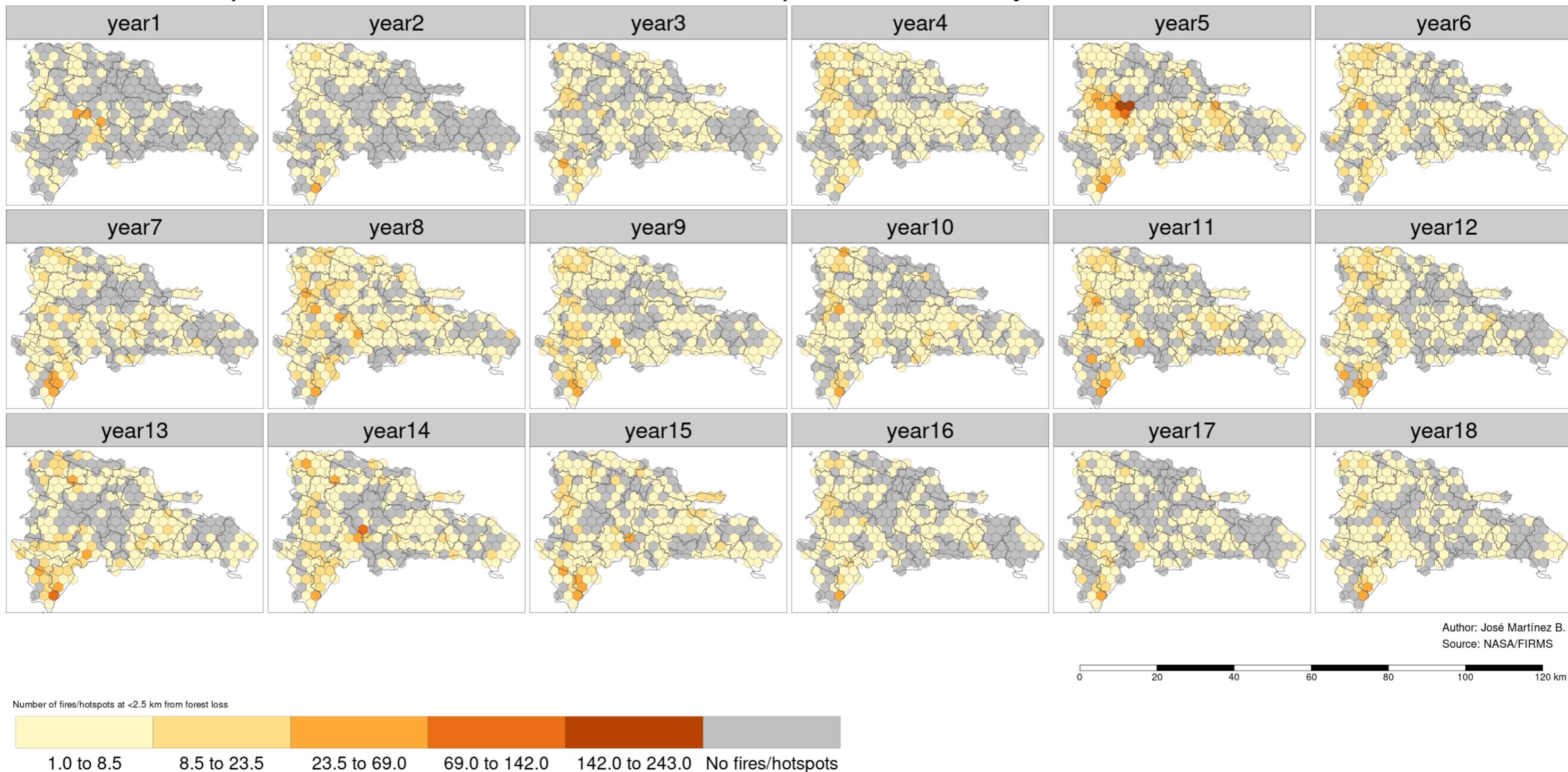
Dominican Republic. Tree cover loss 2001-2018 within annual analytical approach hex grid



```
# Fires M6
hexzonal %>% select(matches('NFIRESM6')) %>% select(-matches('<NA>')) %>%
  rename_at(vars(matches('^NFIRESM6')), funs(gsub('^NFIRESM6_', '^', .))) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1,
    style = 'kmeans', legend.is.portrait = F, title = 'Number of fires/hotspots at <2.5 km from forest loss',
    textNA = "No fires/hotspots") +
```

```
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 6, nrow = 3, free.coords = FALSE, free.scales = FALSE) +
tm_layout(panel.label.size = 3, legend.title.size = 1, legend.text.size = 1.5,
  legend.outside.position = "bottom", legend.outside.size = .1,
  main.title = 'Dominican Republic. Number of selected fires/hotspots detected by MODIS, 2001-2018, within annual analytical approach hex grid',
  main.title.size = 2, attr.outside=TRUE) +
tm_credits('Author: José Martínez B.\nSource: NASA/FIRMS', size = 1.5) +
tm_scale_bar(size = 1.3) +
tm_shape(prov) + tm_borders()
```

Dominican Republic. Number of selected fires/hotspots detected by MODIS, 2001-2018, within annual



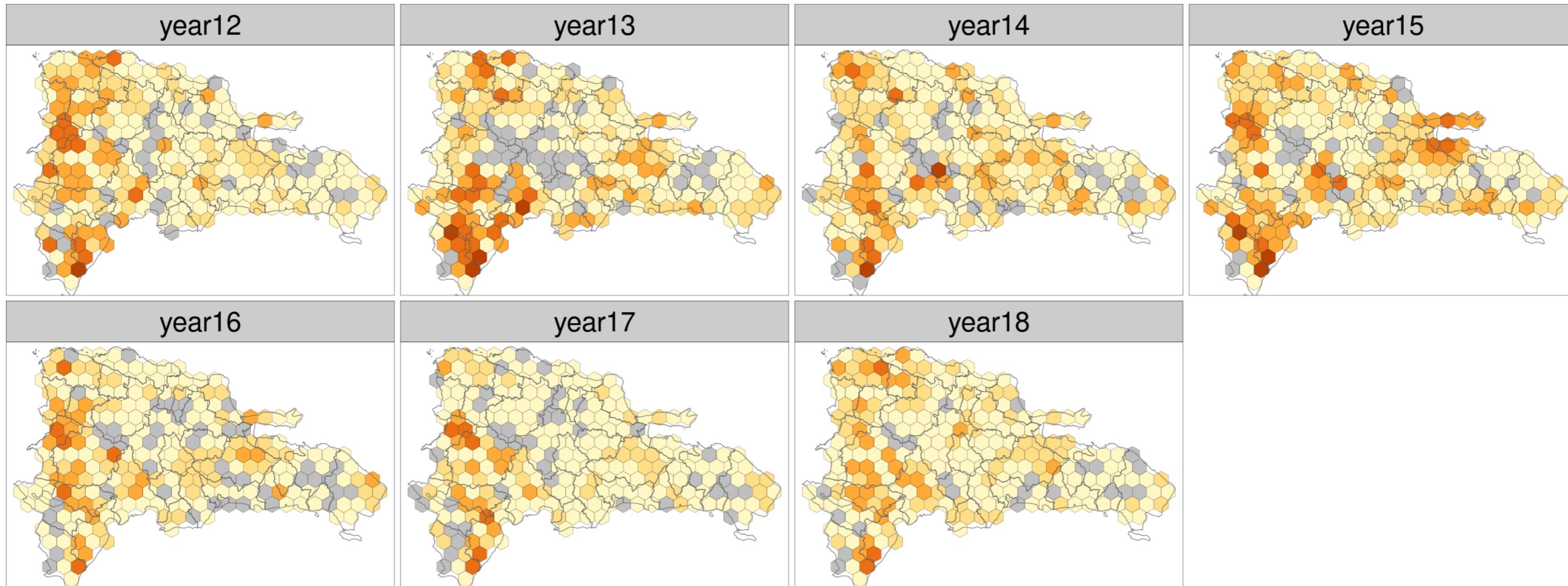
```
# Fires V1
hexzonal %>% select(matches('NFIRESV1')) %>% select(-matches('<NA>')) %>%
  rename_at(vars(matches('^NFIRESV1')), funs(gsub('^NFIRESV1_','',.))) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1,
         style = 'kmeans', legend.is.portrait = F, title = 'Number of fires/hotspots at <2.5 km from forest loss',
         textNA = "No tree cover loss") +
```

```

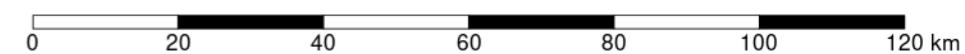
tm_borders(col = 'grey15', lwd = 0.3) +
tm_facets(by = "variable", ncol = 4, nrow = 2, free.coords = FALSE, free.scales = FALSE) +
tm_layout(panel.label.size = 3, legend.title.size = 1, legend.text.size = 1.5,
  legend.outside.position = "bottom", legend.outside.size = .1,
  main.title = 'Dominican Republic. Number of selected fires/hotspots detected by VIIRS, 2001-2018, within annual analytical approach hex grid',
  main.title.size = 2, attr.outside=TRUE) +
tm_credits('Author: José Martínez B.\nSource: NASA/FIRMS', size = 1.5) +
tm_scale_bar(size = 1.3) +
tm_shape(prov) + tm_borders()

```

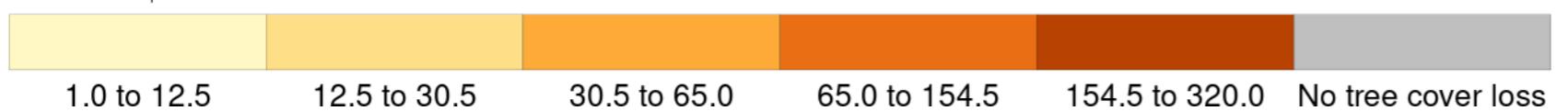
Dominican Republic. Number of selected fires/hotspots detected by VIIRS, 2001-2018, within annual ar



Author: José Martínez B.
Source: NASA/FIRMS



Number of fires/hotspots at <2.5 km from forest loss

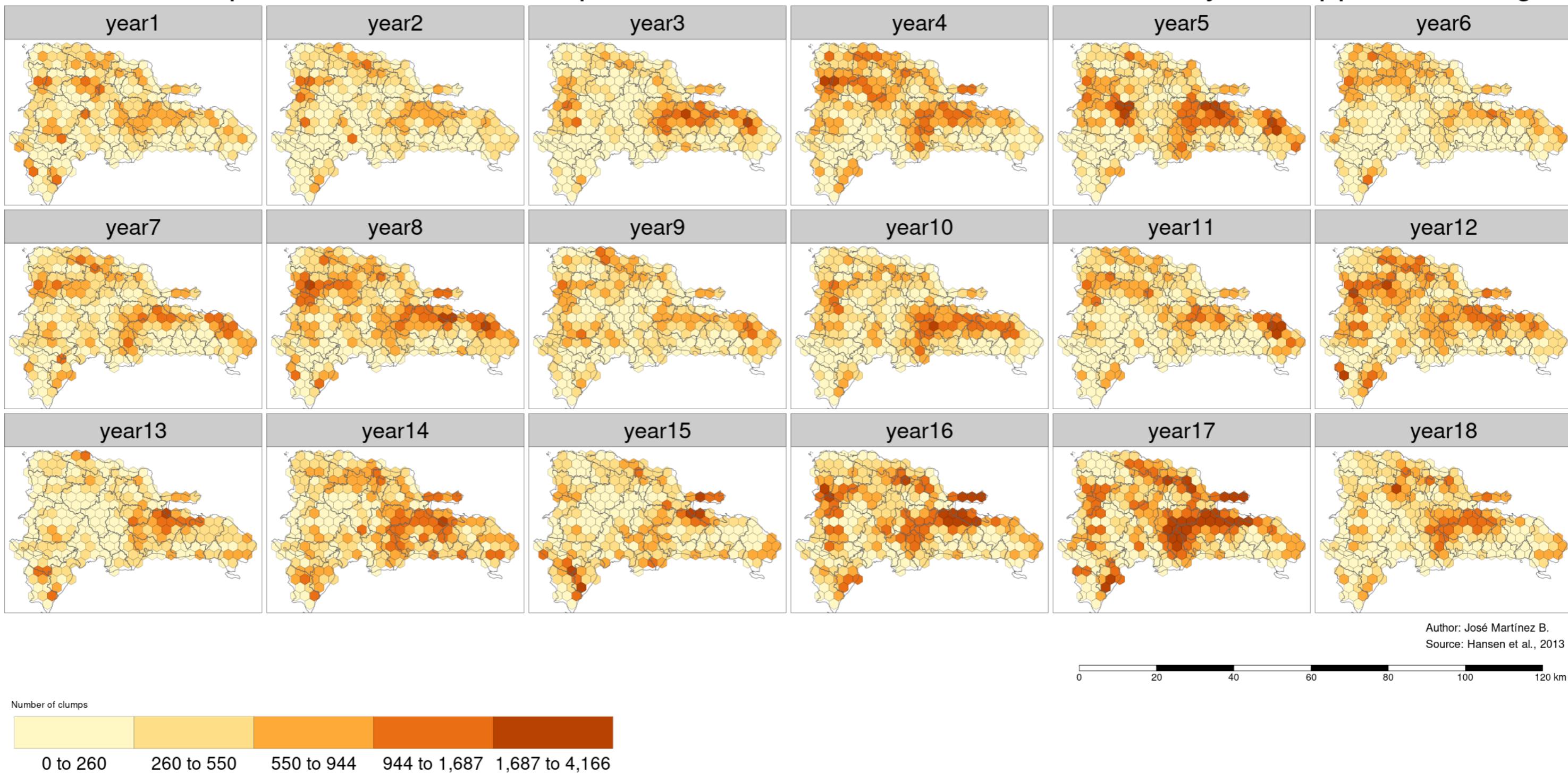


```

# Patches of forest loss < 1 ha
hexzonal %>% select(matches('NCLUMPSSMALLER1HA_')) %>%
  rename_at(vars(matches('^NCLUMPSSMALLER1HA_')), funs(gsub('^NCLUMPSSMALLER1HA_', '^', .))) %>%
  gather(variable, value, -geometry) %>%
  mutate(variable = factor(variable, levels = unique(variable))) %>%
  tm_shape() +
  tm_fill(col='value', palette = "YlOrBr", size = 0.1,
         style = 'kmeans', legend.is.portrait = F, title = 'Number of clumps',
         textNA = "No tree cover loss") +
  tm_borders(col = 'grey15', lwd = 0.3) +
  tm_facets(by = "variable", ncol = 6, nrow = 3, free.coords = FALSE, free.scales = FALSE) +
  tm_layout(panel.label.size = 3, legend.title.size = 1, legend.text.size = 1.5,
            legend.outside.position = "bottom", legend.outside.size = .1,
            main.title = 'Dominican Republic. Number of clumps of forest loss <1ha, within annual analyticial approach hex grid',
            main.title.size = 2, attr.outside=TRUE) +
  tm_credits('Author: José Martínez B.\nSource: Hansen et al., 2013', size = 1.5) +
  tm_scale_bar(size = 1.3) +
  tm_shape(prov) + tm_borders()

```

Dominican Republic. Number of clumps of forest loss <1ha, within annual analytic approach hex grid



References

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- Martínez Batlle, J. R. (2021). Forest loss and fire in the Dominican Republic during the 21st Century. *bioRxiv*. <https://doi.org/10.1101/2021.06.15.448604>
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