tmap

Jan-Philipp Kolb

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Package tmap

- Load the package tmap
- The following examples are based on the vignette of the package tmap

```
# install.packages("tmap")
library(tmap)
```

Quick thematic map

- qtm - Quick thematic map plot

```
data(Europe)
qtm(Europe)
```

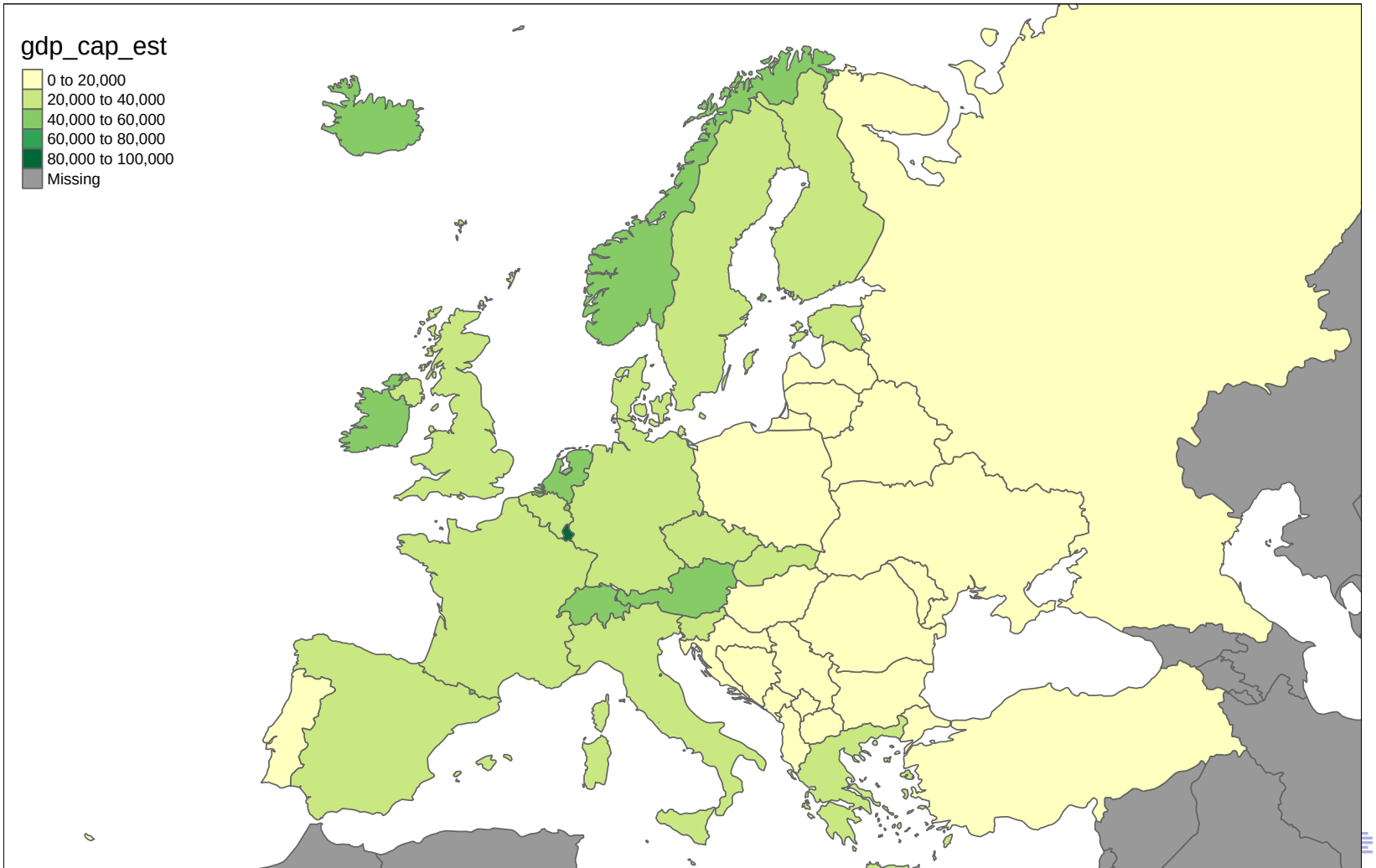
The underlying data set of Europe

	iso_a3	name	sovereignt	continent
5	ALB	Albania	Albania	Europe
6	ALA	Aland	Finland	Europe
7	AND	Andorra	Andorra	Europe
10	ARM	Armenia	Armenia	Asia
17	AUT	Austria	Austria	Europe
18	AZE	Azerbaijan	Azerbaijan	Asia
20	BEL	Belgium	Belgium	Europe
24	BGR	Bulgaria	Bulgaria	Europe
27	BIH	Bosnia and Herz.	Bosnia and Herzegovina	Europe
29	BLR	Belarus	Belarus	Europe
40	CHE	Switzerland	Switzerland	Europe
57	CZE	Czech Rep.	Czech Republic	Europe
58	DEU	Germany	Germany	Europe
61	DNK	Denmark	Denmark	Europe
63	DZA	Algeria	Algeria	Africa
65	EGY	Egypt	Egypt	Africa
67	ESP	Spain	Spain	Europe

For a map with other colors

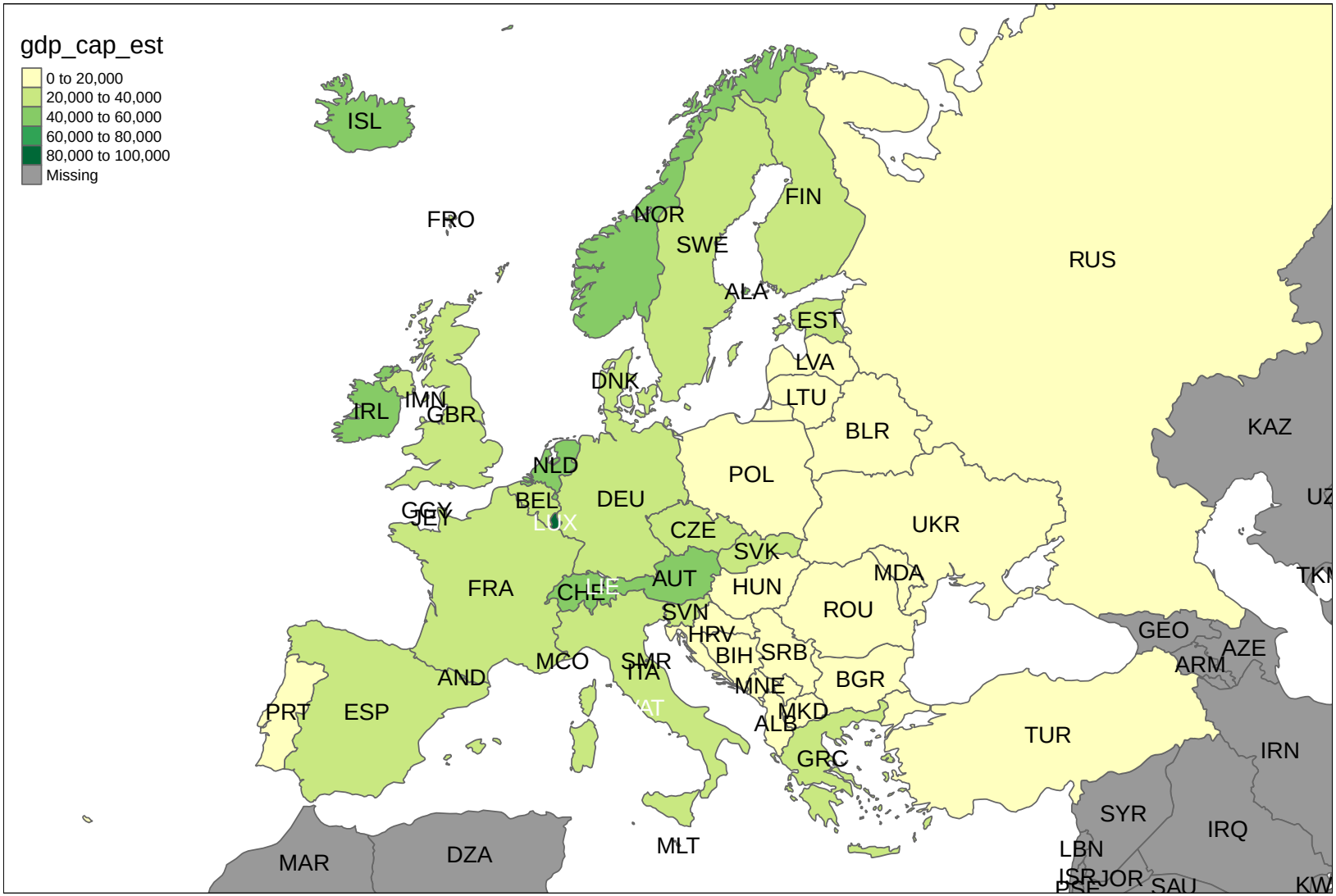
- Visualising Natural Earth data

```
qtm(Europe, fill="gdp_cap_est")
```



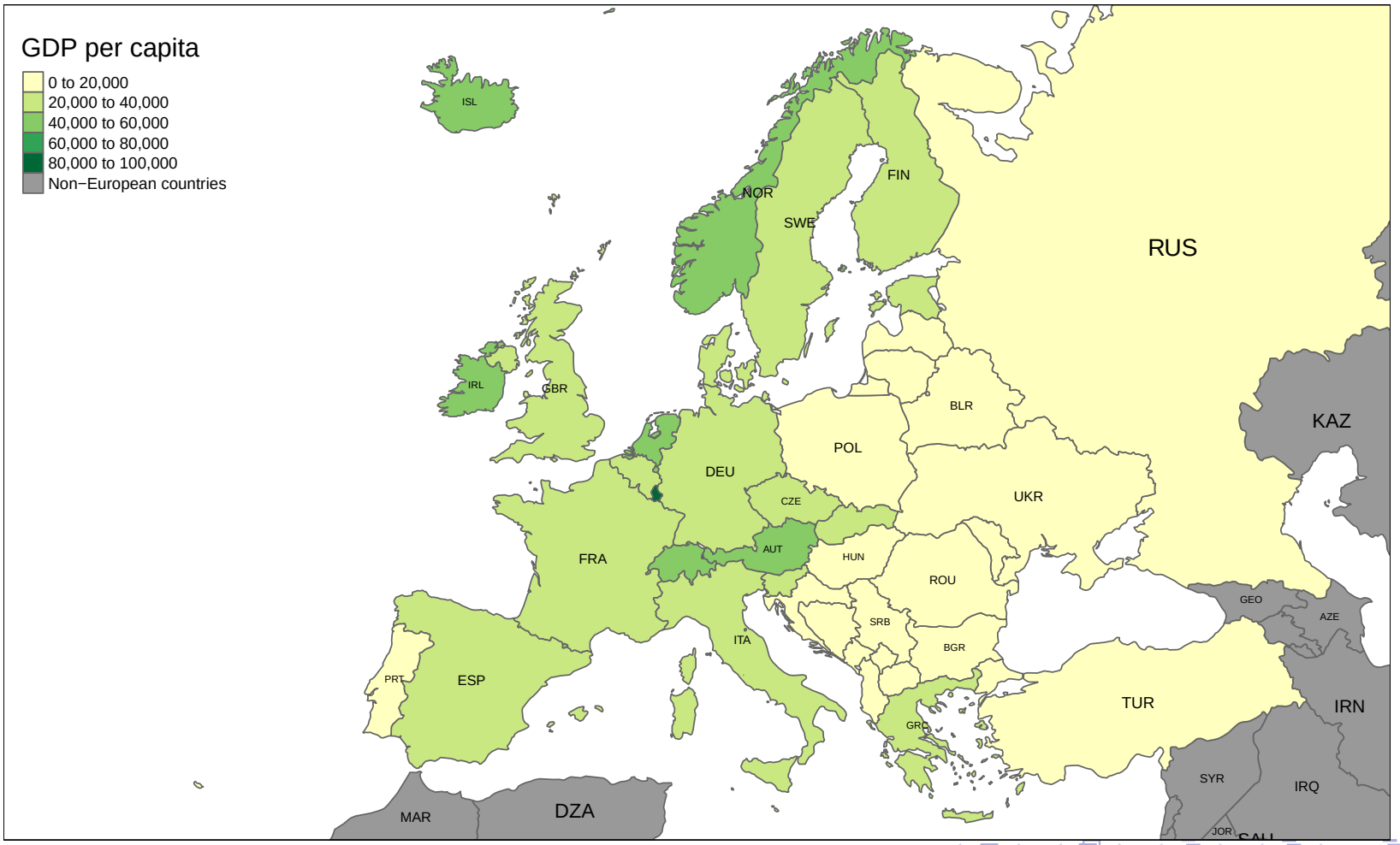
For a map with with text

```
qtm(Europe, fill="gdp_cap_est", text="iso_a3")
```



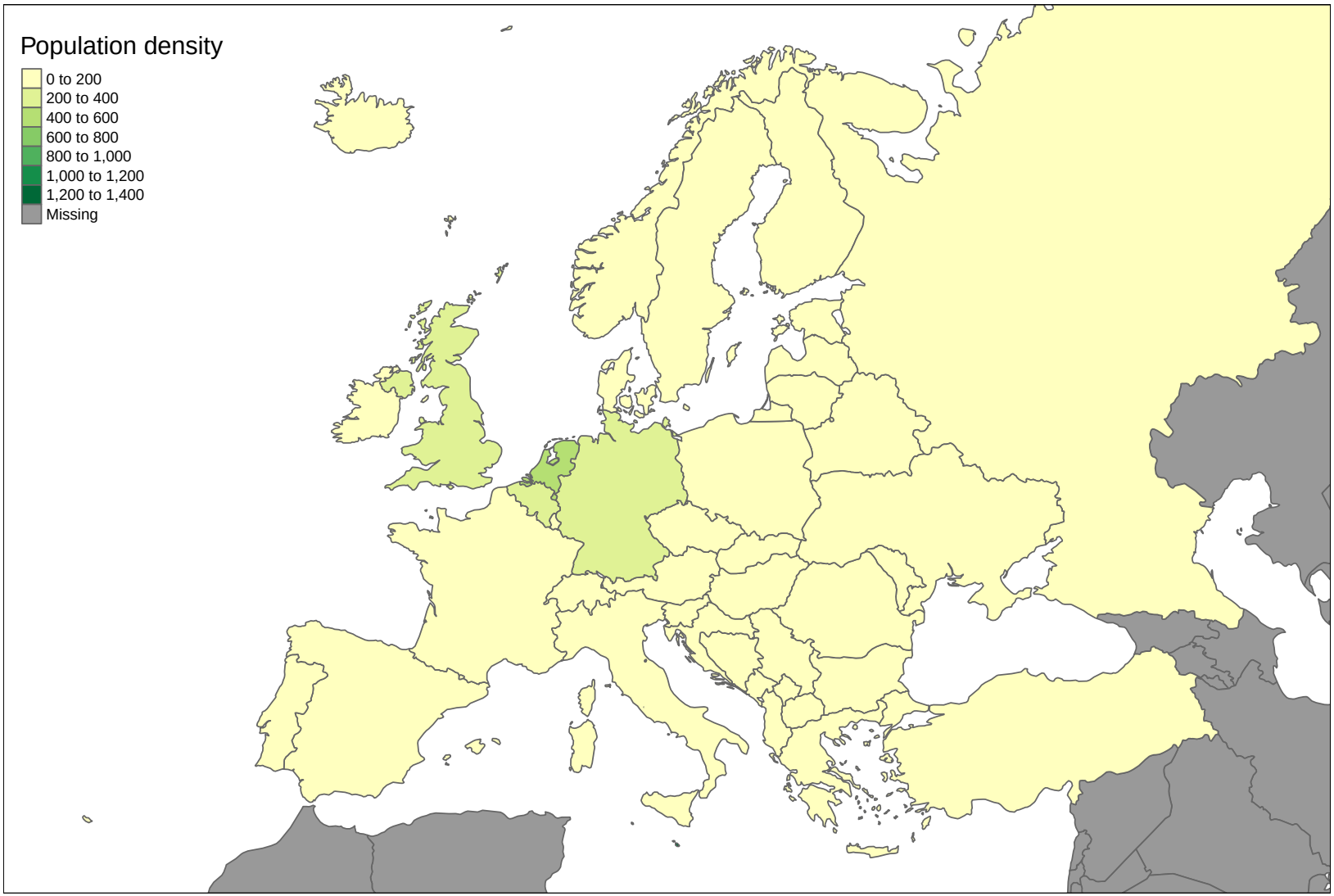
A theme which fits better

```
qtm(Europe, fill="gdp_cap_est", text="iso_a3", text.size="A
    fill.textNA="Non-European countries", theme="Europe")
```



Population density

```
qtm(Europe, fill="pop_est_dens", fill.title="Population den
```



Topics with Europe data

- ISO classification
- Country name
- Sovereignt, continent, part of Europe,
- Area, Population, Population density,
- Gross domestic product
- GDP at purchasing power parity
- Economy, Income group

Names and topics

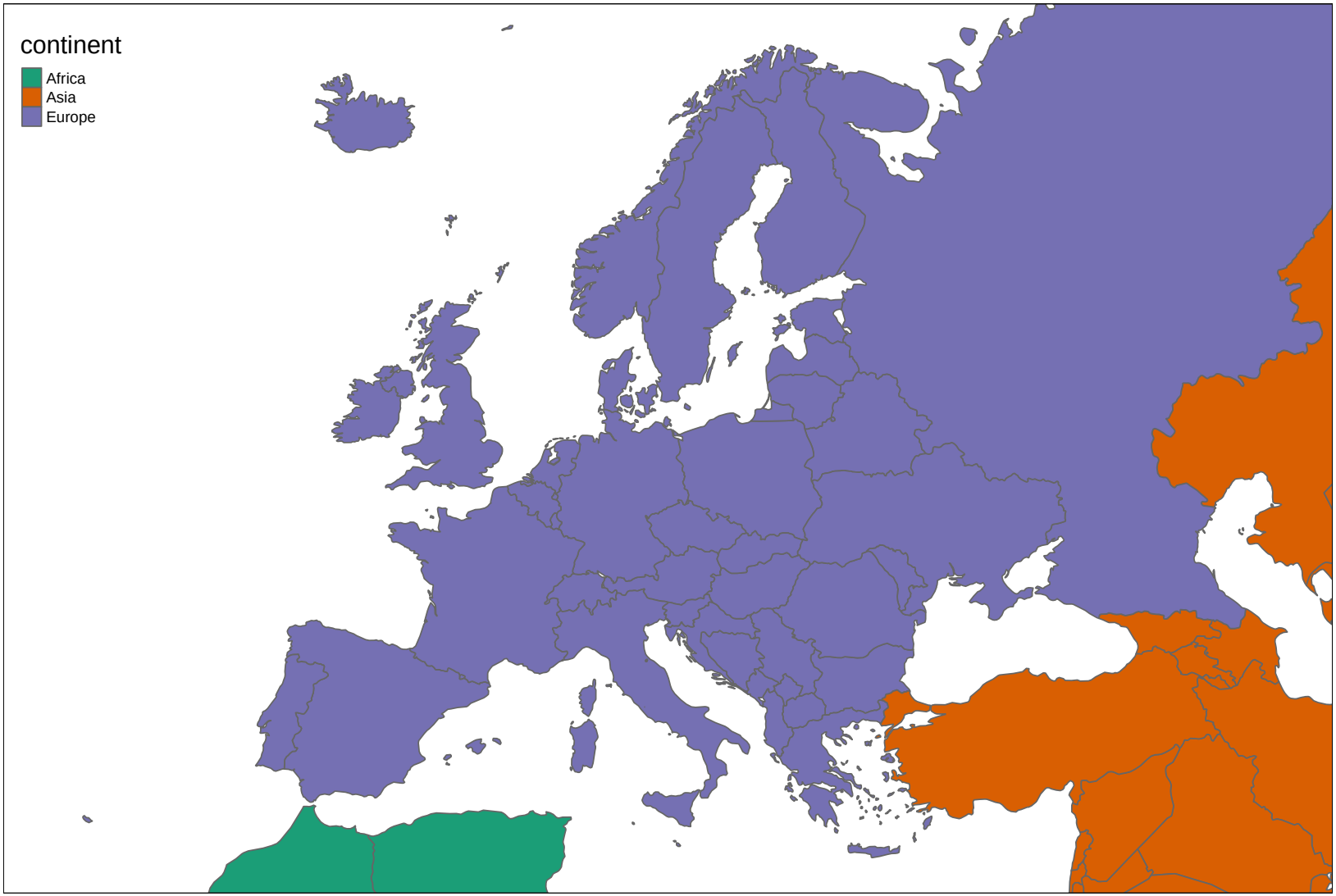
names	topics
iso_a3	ISO
name	Country name
sovereignt	Sovereignt
continent	continent
part	part of Europe
area	Area
pop_est	Population
pop_est_dens	Population density
gdp_md_est	Gross domestic product
gdp_cap_est	GDP per capita
economy	Economy
income_grp	Income group

The ISO codes:

```
##   [1] "AALAND ISLANDS
```

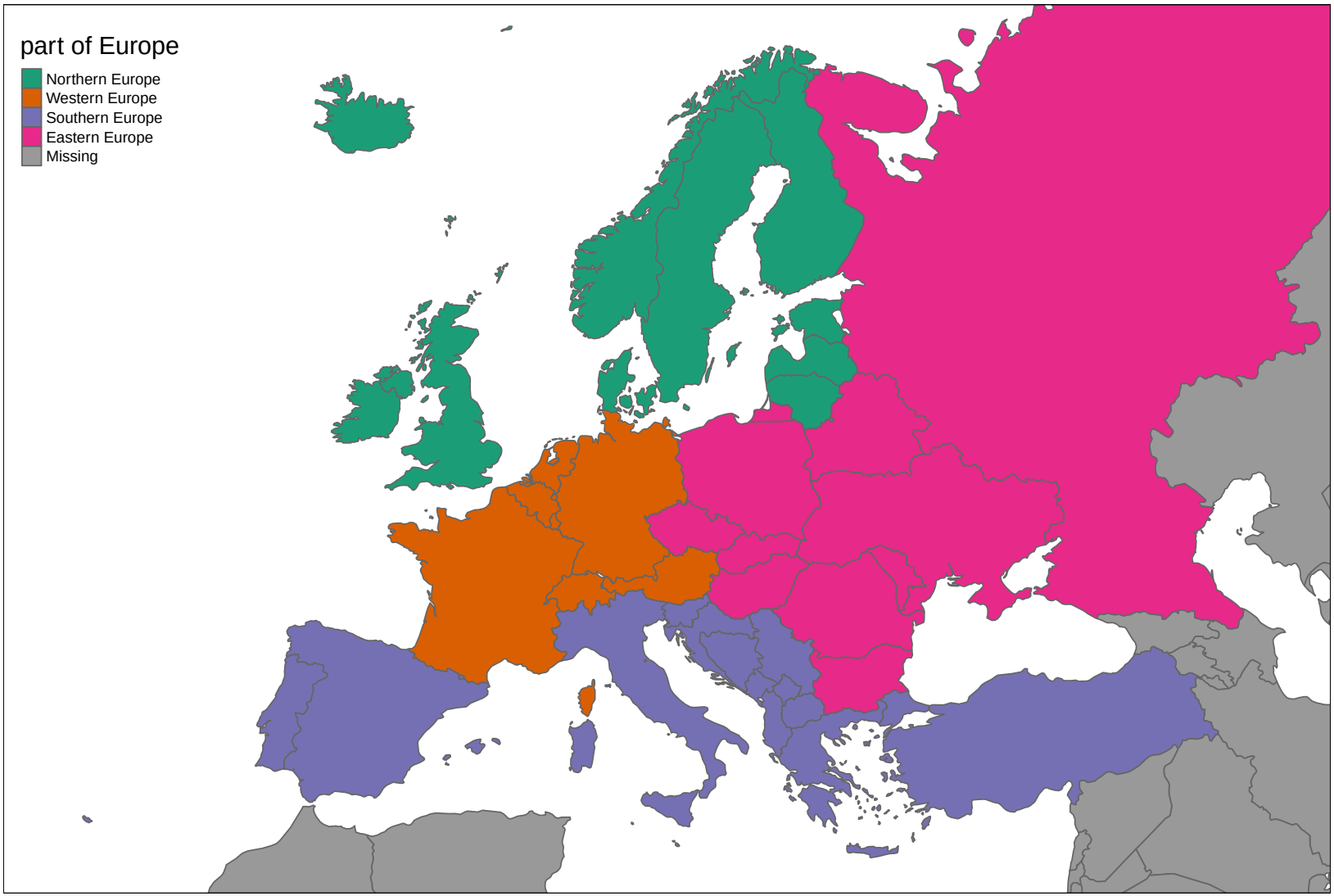
Part of Europe

```
qtm(Europe, fill="continent")
```



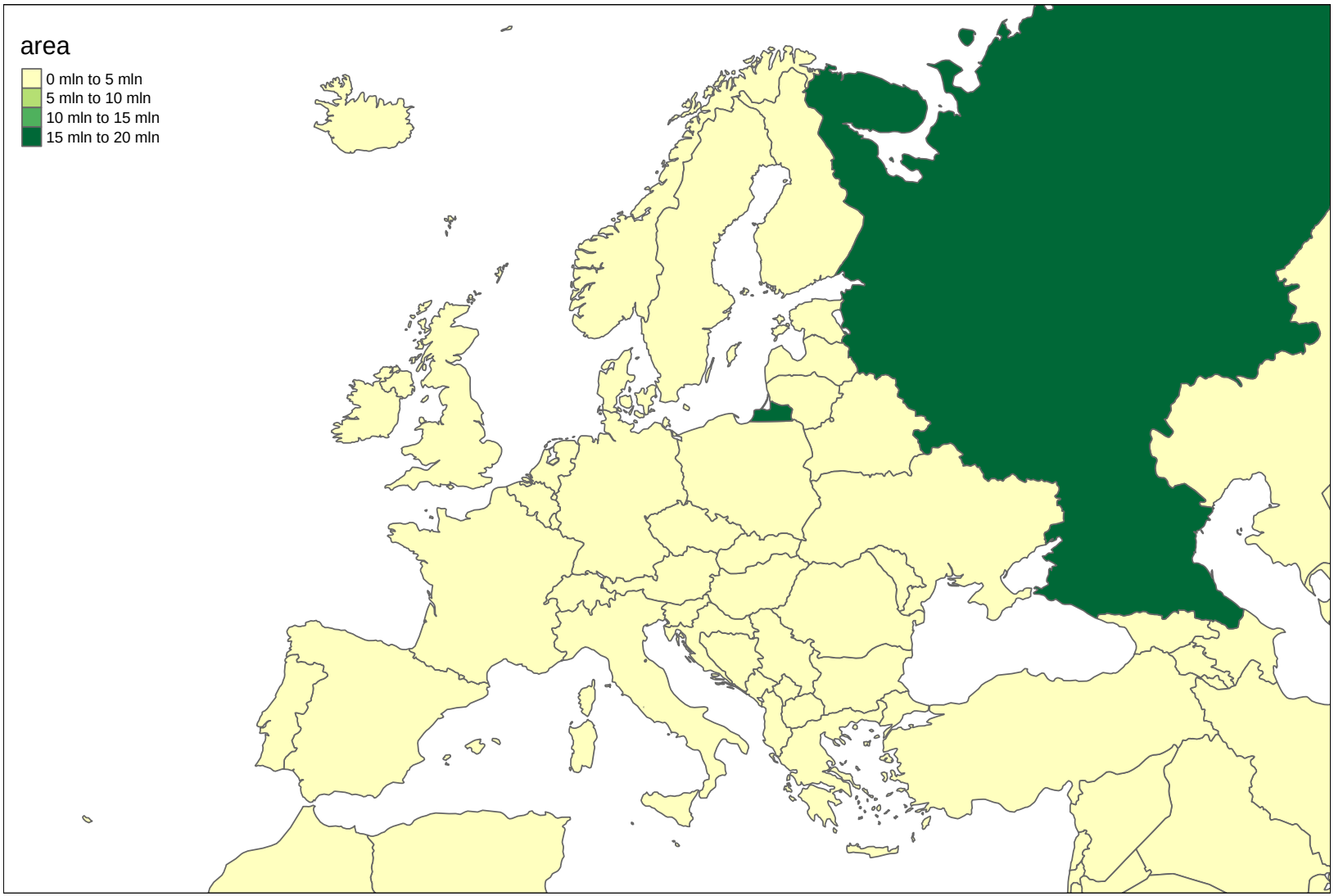
Part of Europe

```
qtm(Europe, fill="part",fill.title="part of Europe")
```



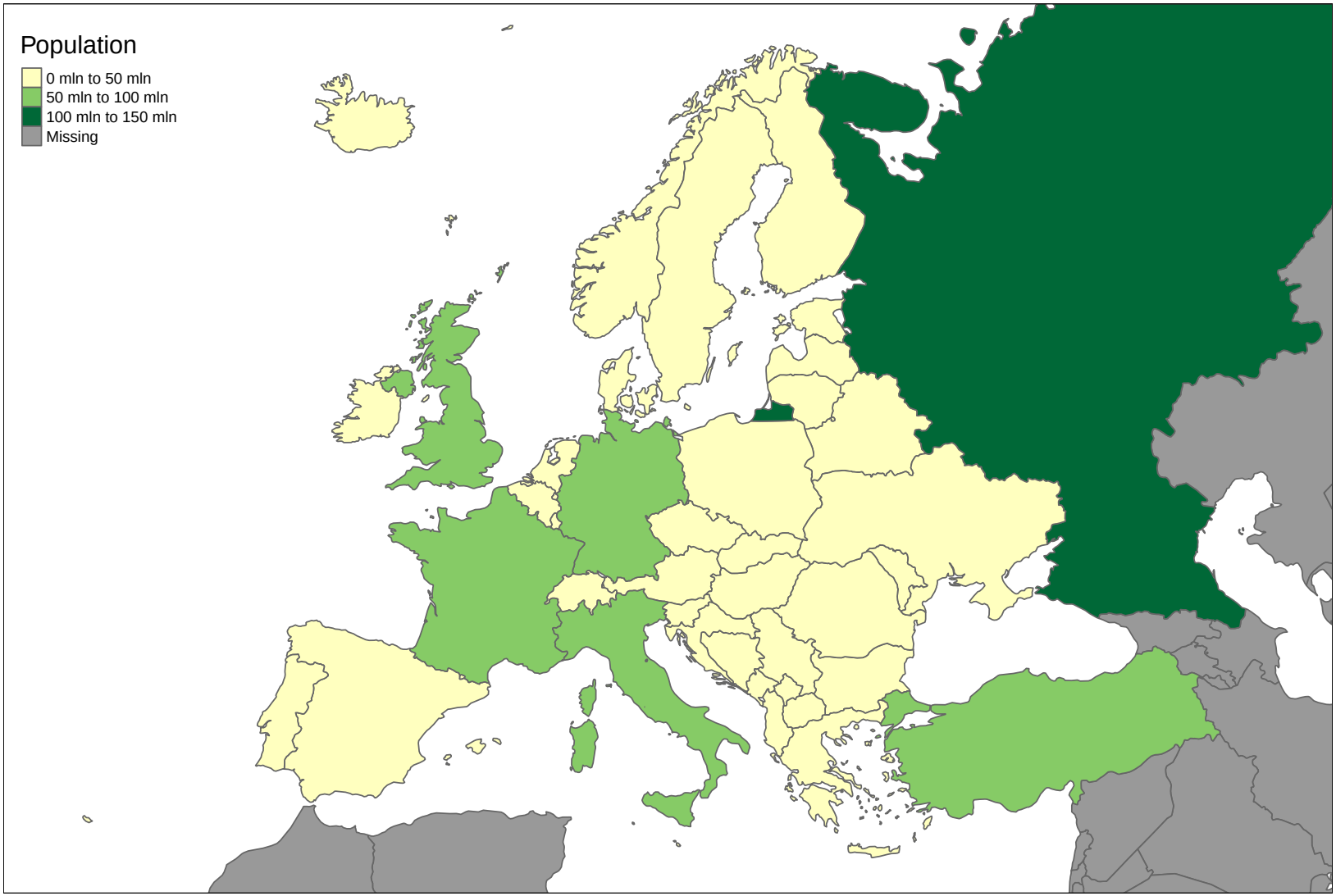
Area

```
qtm(Europe, fill="area") # Russia is huge
```



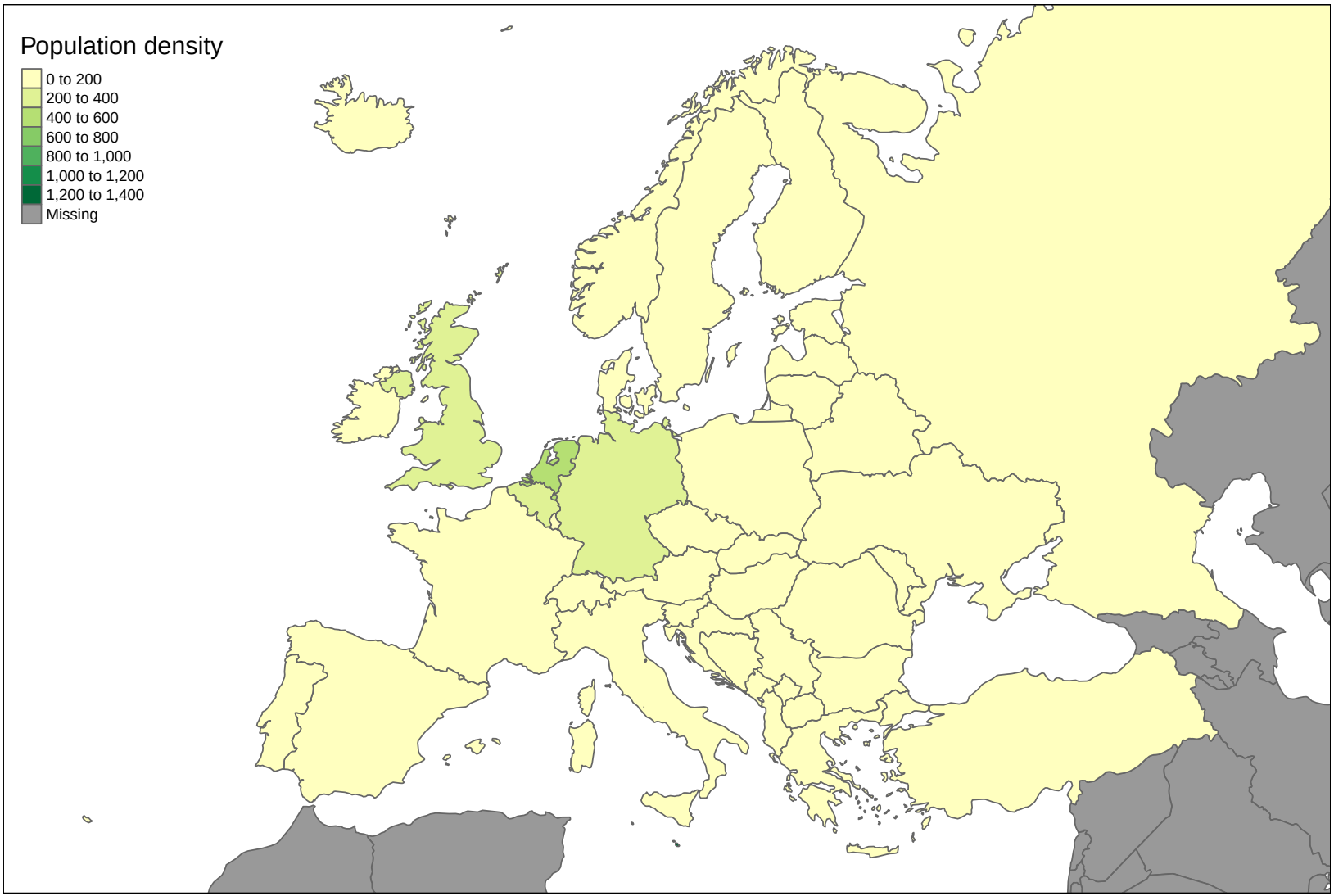
Population

```
qtm(Europe, fill="pop_est",fill.title="Population")
```



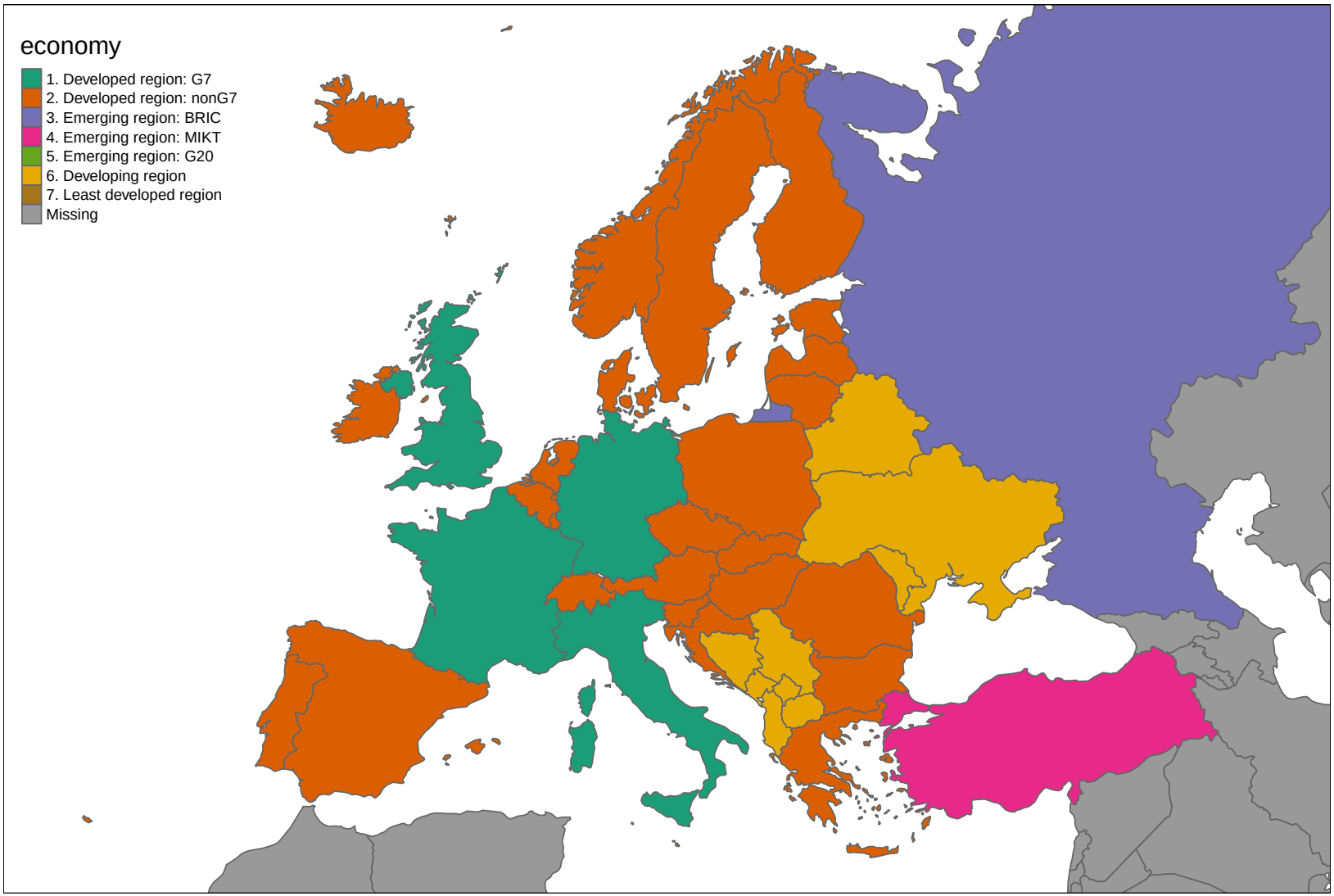
Population density

```
qtm(Europe, fill="pop_est_dens",fill.title="Population dens
```



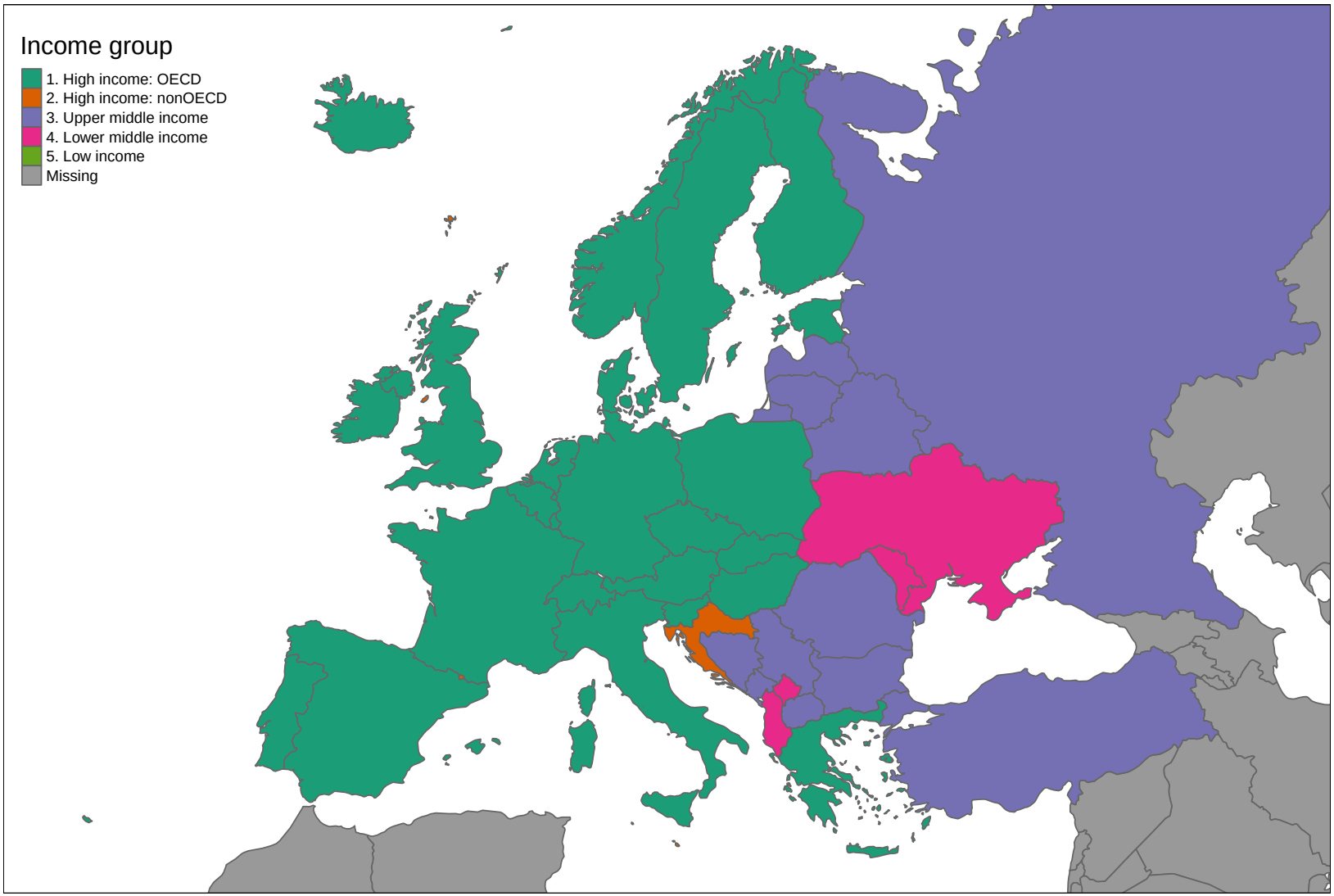
Economy

```
qtm(Europe, fill="economy")
```



Income group

```
qtm(Europe, fill="income_grp",fill.title="Income group")
```

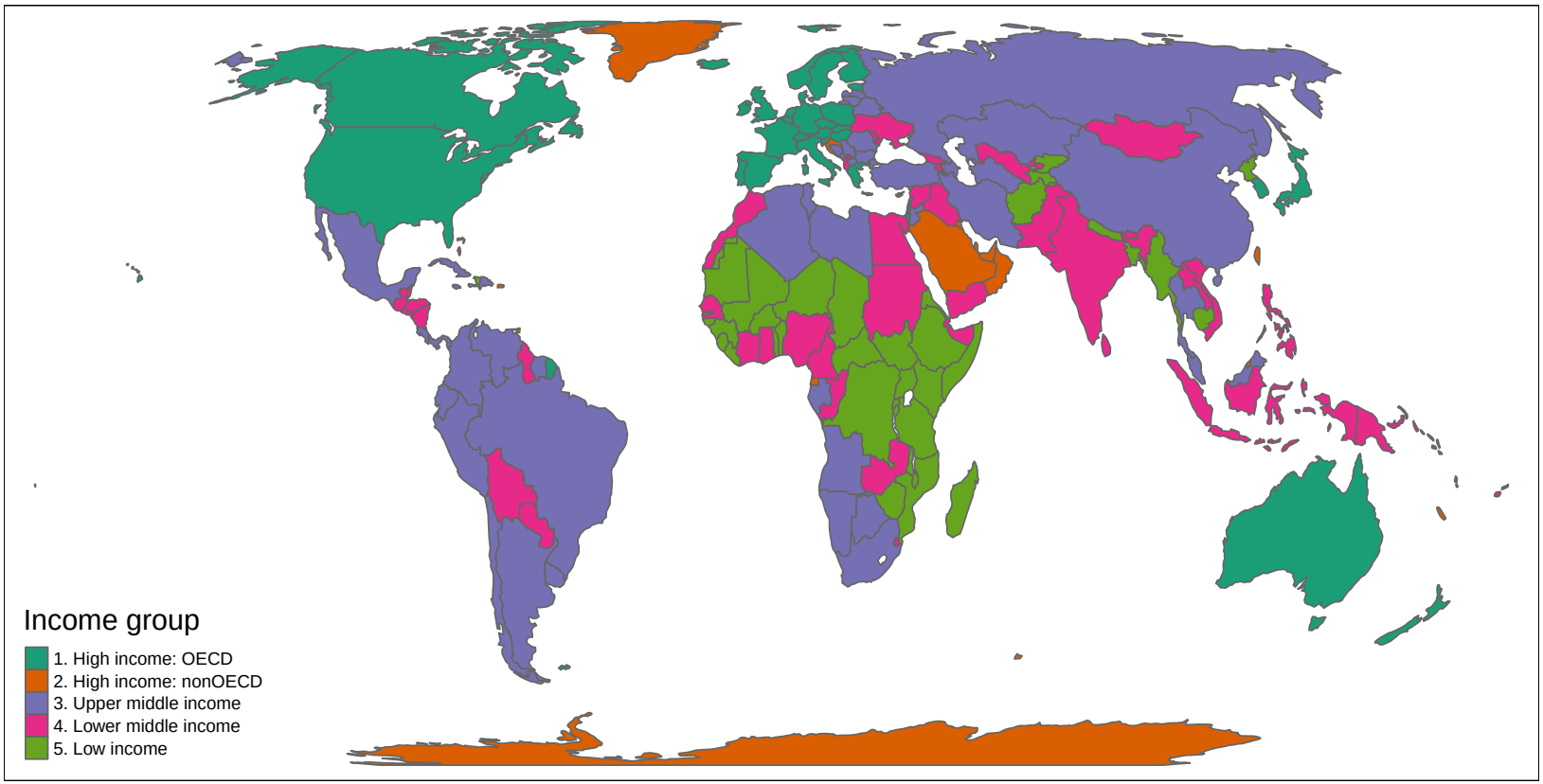


The World data set in R-package `tmap`

	iso_a3	name	sovereignt
2	AFG	Afghanistan	Afghanistan
3	AGO	Angola	Angola
5	ALB	Albania	Albania
8	ARE	United Arab Emirates	United Arab Emirates
9	ARG	Argentina	Argentina
10	ARM	Armenia	Armenia
12	ATA	Antarctica	Antarctica
14	ATF	Fr. S. Antarctic Lands	France
16	AUS	Australia	Australia
17	AUT	Austria	Austria
18	AZE	Azerbaijan	Azerbaijan
19	BDI	Burundi	Burundi
20	BEL	Belgium	Belgium
21	BEN	Benin	Benin
22	BFA	Burkina Faso	Burkina Faso
23	BGD	Bangladesh	Bangladesh
24	BGR	Bulgaria	Bulgaria

World - countries by income group

```
qtm(World, fill="income_grp",fill.title="Income group")
```

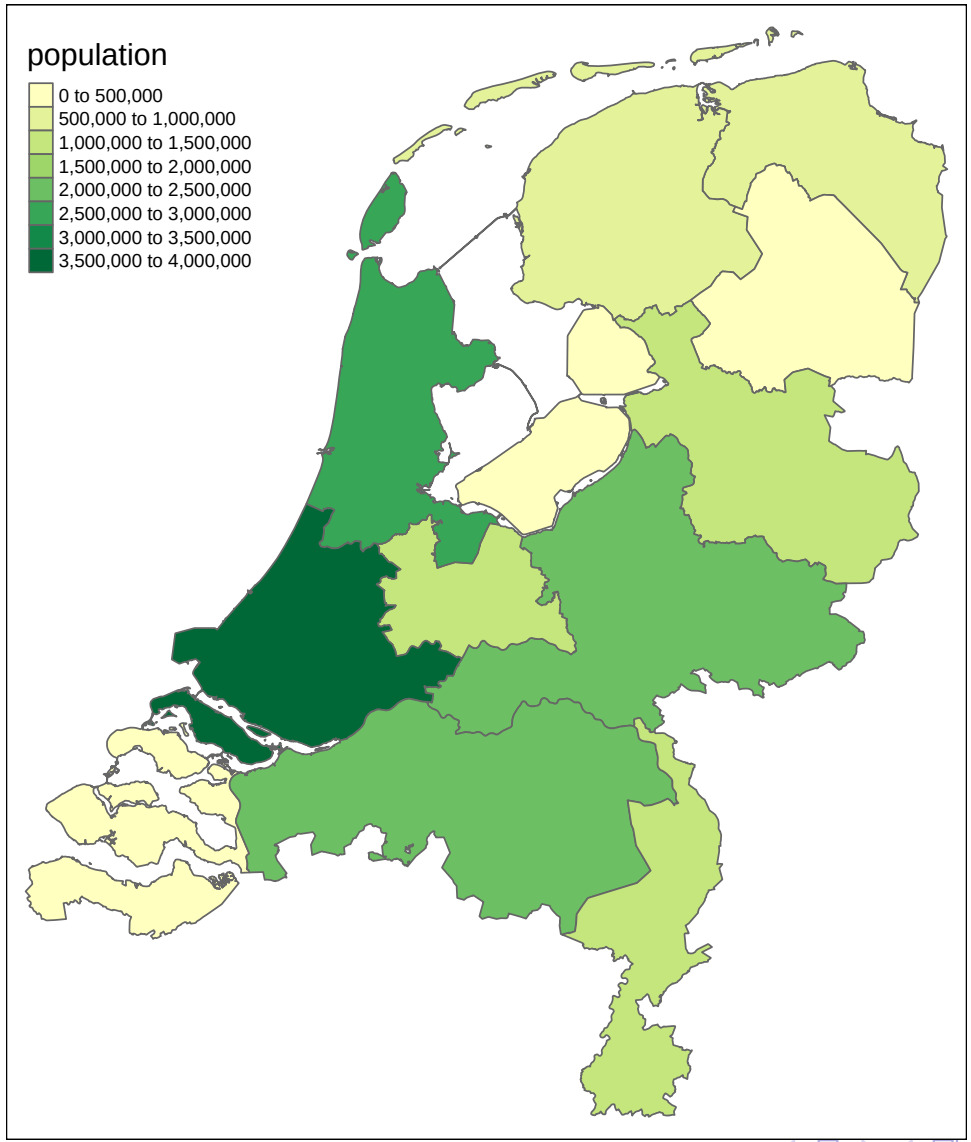


A data set about the provinces in the Netheralnds (R-package `tmap`)

	code	name	code.data	name.data	province
0	20	Groningen	1895	Oldambt	Groninge
1	21	Friesland	1900	Sudwest-Fryslan	Friesland
2	22	Drenthe	0114	Emmen	Drenthe
3	23	Overijssel	1708	Steenwijkerland	Overijsse
4	24	Flevoland	0171	Noordoostpolder	Flevolan
5	25	Gelderland	0200	Apeldoorn	Gelderla
6	26	Utrecht	1581	Utrechtse Heuvelrug	Utrecht
7	27	Noord-Holland	1911	Hollands Kroon	Noord-H
8	28	Zuid-Holland	0599	Rotterdam	Zuid-Ho
9	29	Zeeland	1714	Sluis	Zeeland
10	30	Noord-Brabant	1709	Moerdijk	Noord-B
11	31	Limburg	1507	Horst aan de Maas	Limburg

Netherlands - population in provinces

```
qtm(NLD_prov, fill="population",fill.title="population")
```



Compute Proportions

```
pop <- NLD_prov@data$population
pop
```

```
##  [1]  582705  646290  488970 1139680  399885 2019635 125
##  [9] 3576960  380610 2479220 1119980
```

```
popmen <- NLD_prov@data$pop_men
popmen
```

```
##  [1]  289795  323215  242225  570185  199940  997805  61
##  [9] 1764855  188655 1238600  555450
```

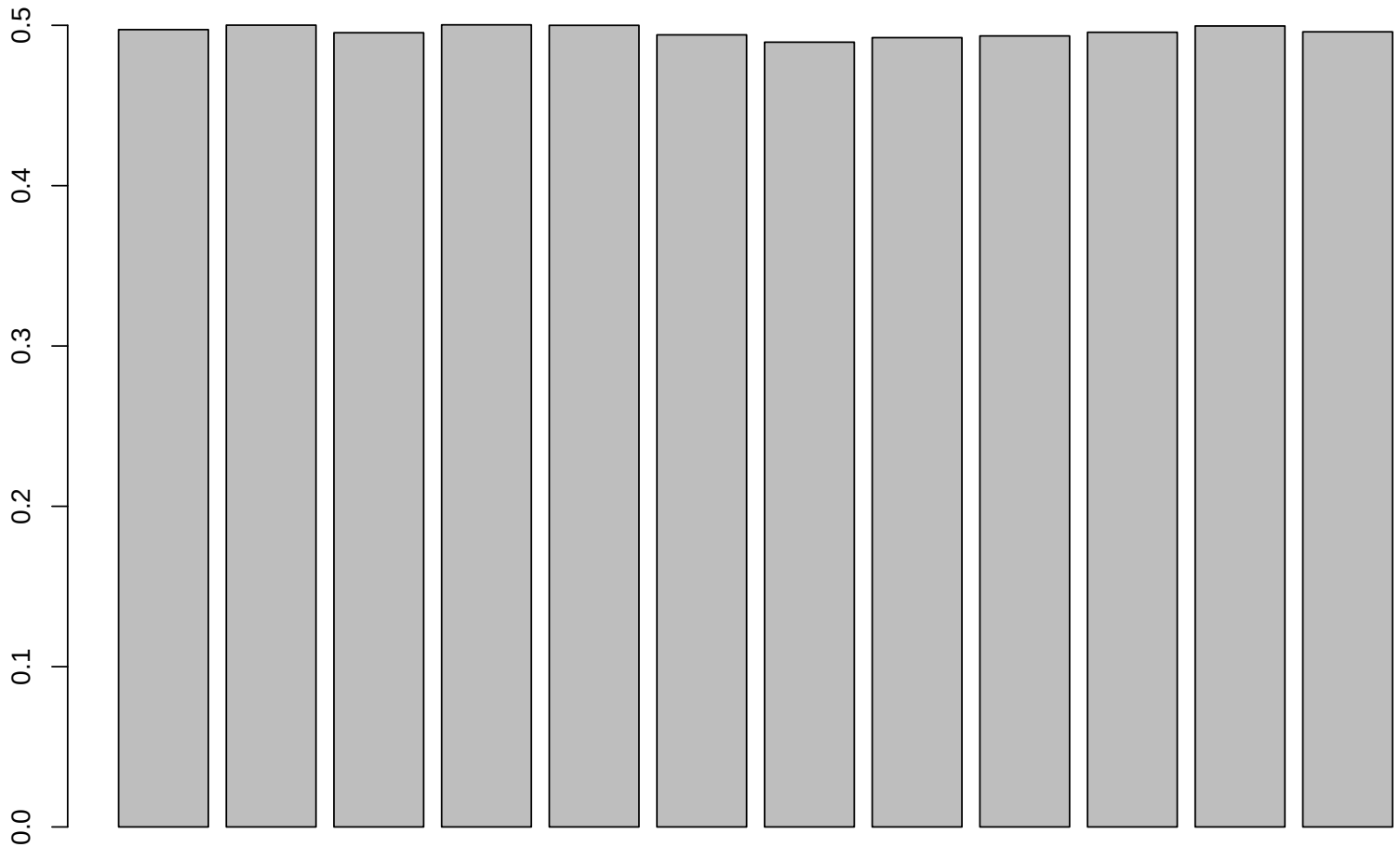
```
prop <- popmen/pop
prop
```

```
##  [1] 0.4973271 0.5001083 0.4953780 0.5003027 0.4999937 0
##  [8] 0.4923212 0.4933952 0.4956649 0.4995926 0.4959464
```

Excursus: Barplot of proportion men

Barplot of proportion of men

```
barplot(prop)
```

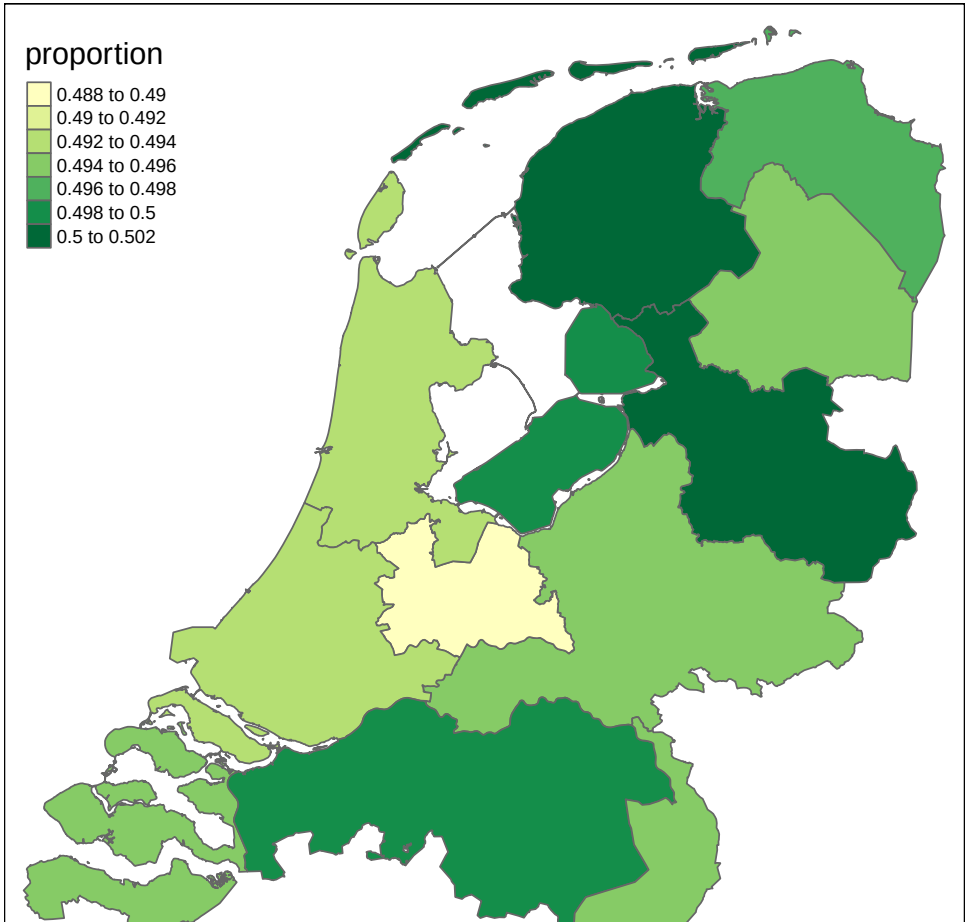


Netherlands - proportion of men

Add information to dataframe

```
NLD_prov@data$proportion <- prop
```

```
qtm(NLD_prov, fill="proportion",fill.title="proportion")
```



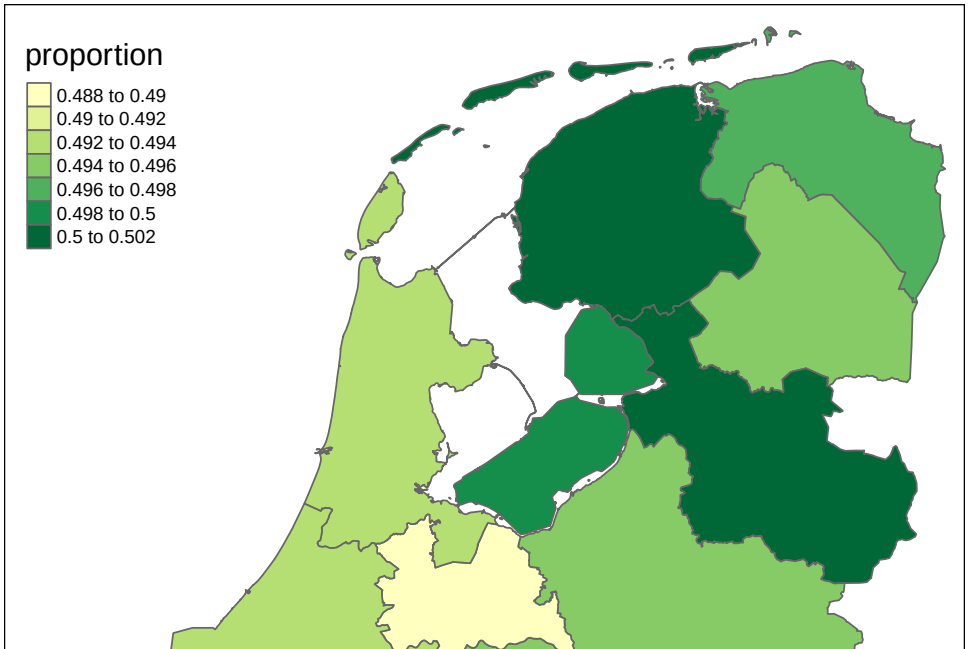
Netherlands - proportion 65 plus

Compute the proportion of people over 65

```
pop65plus <- NLD_prov@data$pop_65plus
prop65plus <- pop65plus/pop
NLD_prov@data$proportion65plus <- prop65plus
```

Plot this proportion

```
qtm(NLD_prov, fill="proportion",fill.title="proportion")
```



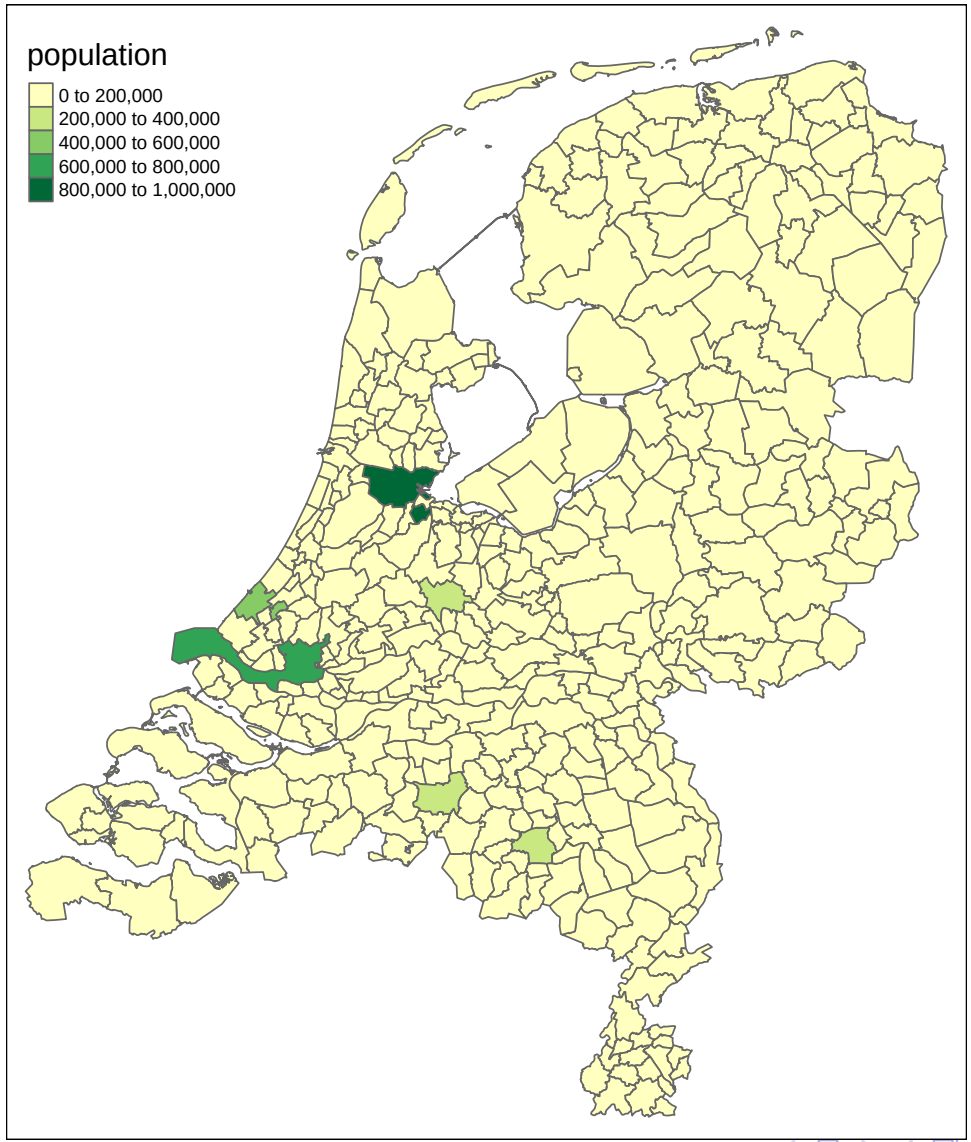
A data set about the municipalities in the Netheralnds (R-package `tmap`)

```
data(NLD_muni)
```

	code	name	province	popula
0	0003	Appingedam	Groningen	1
1	0005	Bedum	Groningen	1
2	0007	Bellingwedde	Groningen	
3	0009	Ten Boer	Groningen	
4	0010	Delfzijl	Groningen	2
5	0014	Groningen	Groningen	19
6	0015	Grootegast	Groningen	1
7	0017	Haren	Groningen	1
8	0018	Hoogezand-Sappemeer	Groningen	3
9	0022	Leek	Groningen	1
10	0024	Loppersum	Groningen	1
11	0025	Marum	Groningen	1
12	0034	Almere	Flevoland	19

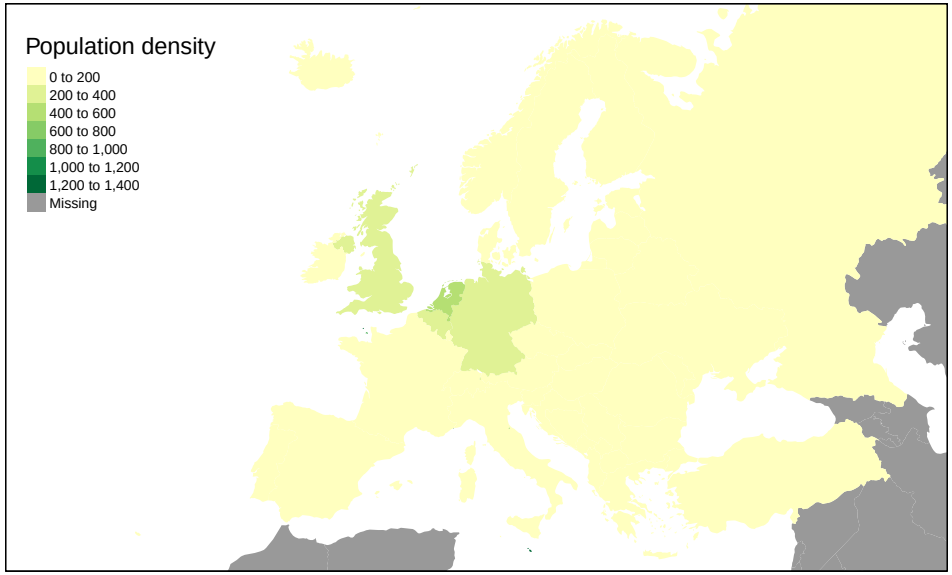
Population of municipalities in the Netherlands

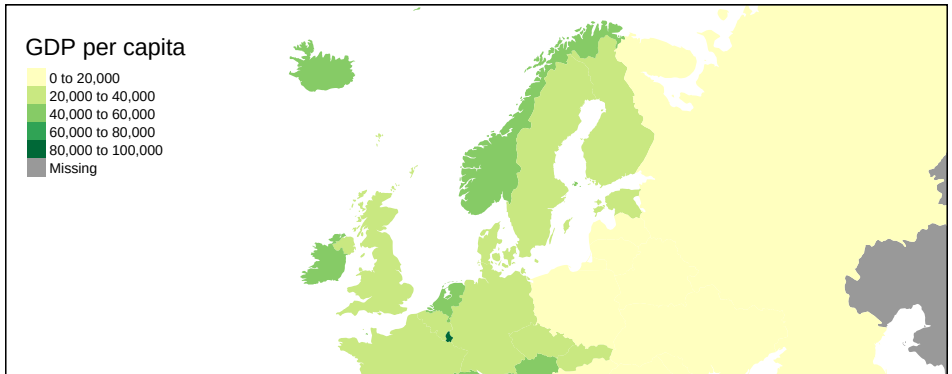
```
qtm(NLD_muni, fill="population")
```



Two maps

```
tm_shape(Europe) +
    tm_fill(c("pop_est_dens", "gdp_cap_est"),
        title=c("Population density", "GDP per capita")) +
tm_layout_Europe()
```



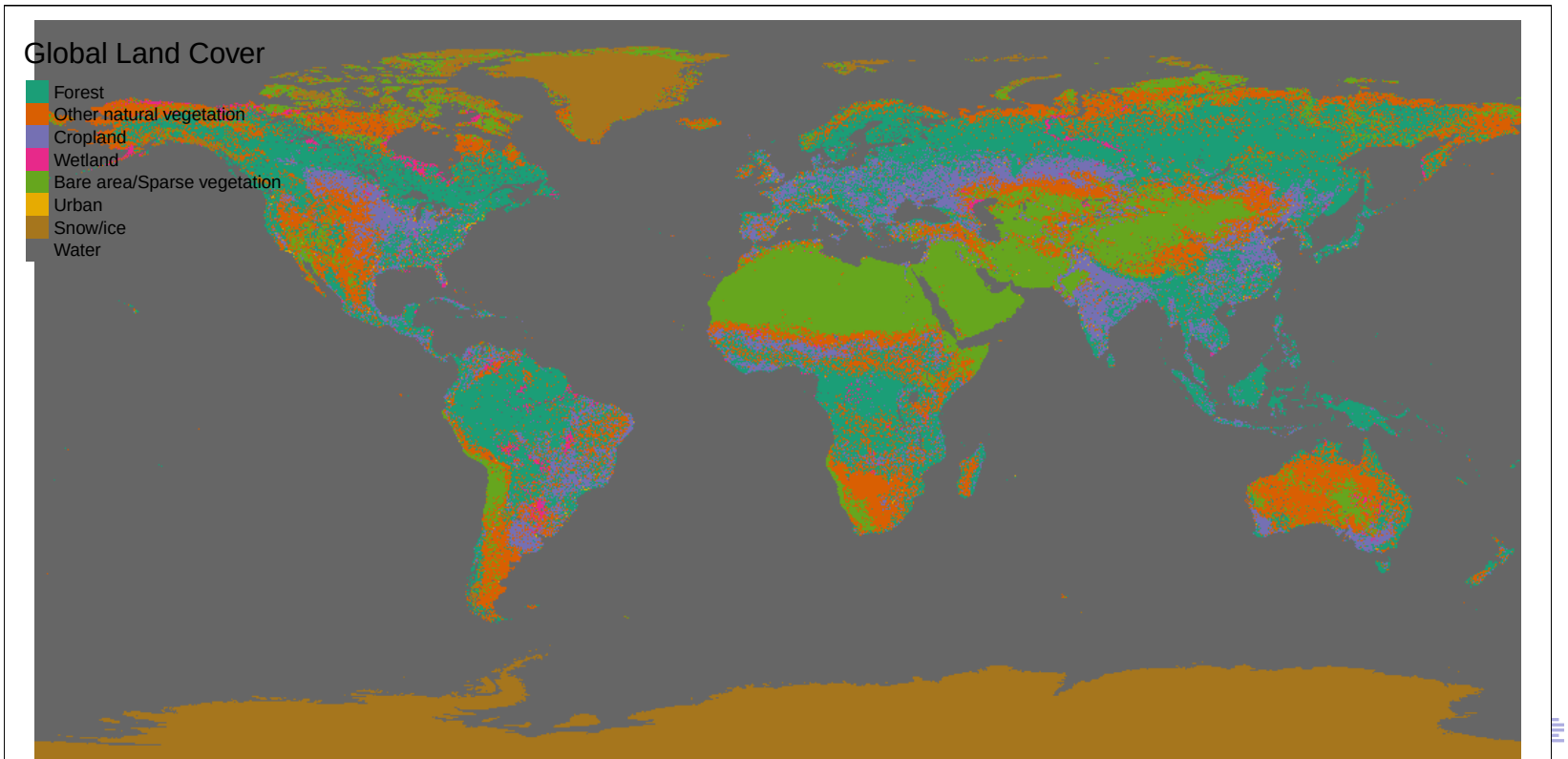


Spatial data of global land cover

cover	cover_cls	trees	elevation
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA
Water bodies	Water	NA	NA

Map of global Land Cover

```
data(land)
data(World)
tm_shape(land,  relative=FALSE) +
    tm_raster("cover_cls", title="Global Land Cover")
```

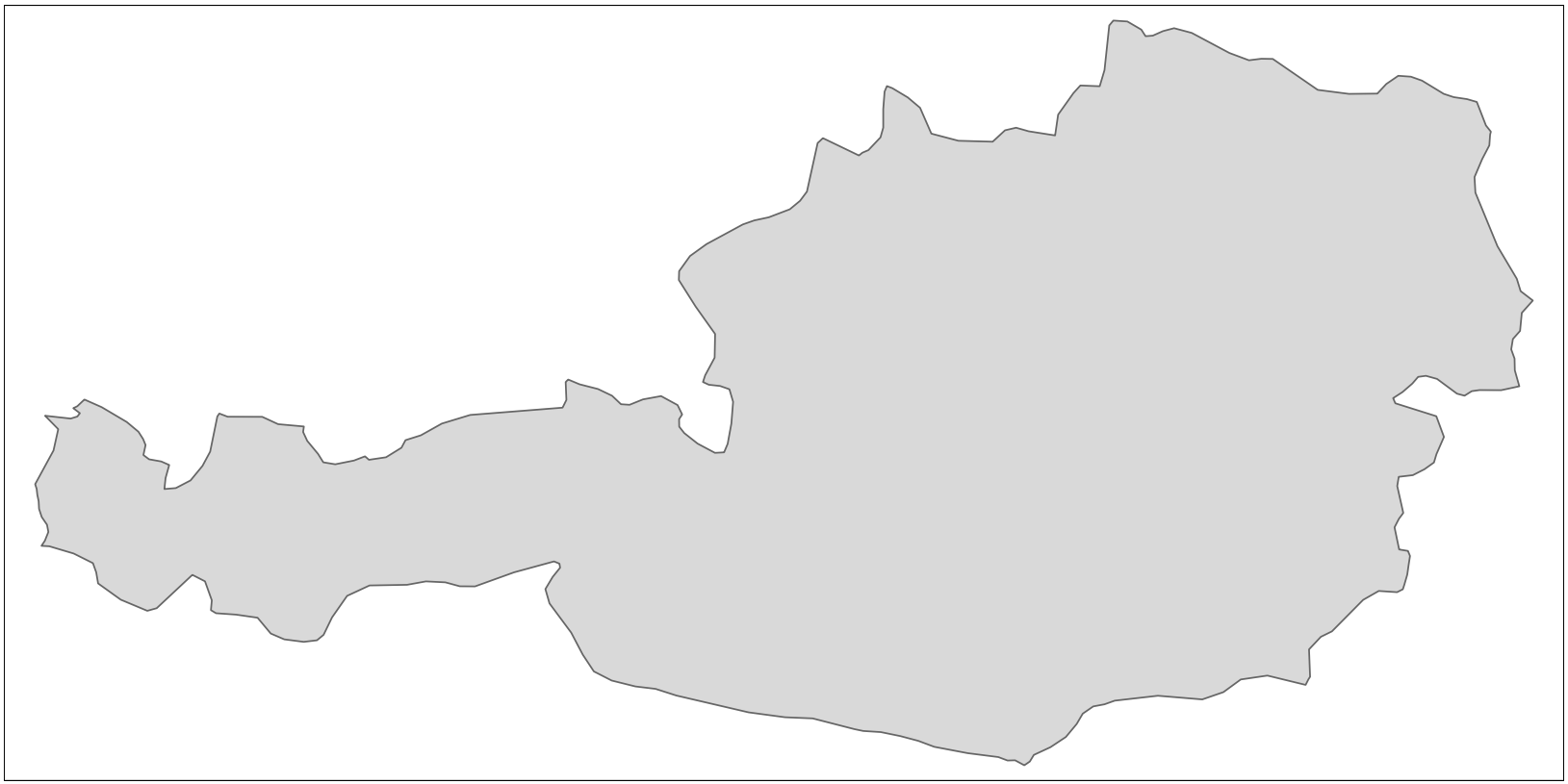


Spatial data of metropolitan areas

	name	name_long	iso_a3	pop195
2	Kabul	Kabul	AFG	17078
8	Algiers	El Djazair (Algiers)	DZA	51645
13	Luanda	Luanda	AGO	13841
16	Buenos Aires	Buenos Aires	ARG	509761
17	Cordoba	Cordoba	ARG	42924
25	Rosario	Rosario	ARG	55448
32	Yerevan	Yerevan	ARM	34143
33	Adelaide	Adelaide	AUS	42927
34	Brisbane	Brisbane	AUS	44171
37	Melbourne	Melbourne	AUS	133196
39	Perth	Perth	AUS	31075
41	Sydney	Sydney	AUS	168993
42	Vienna	Wien (Vienna)	AUT	161505
43	Baku	Baku	AZE	89676
49	Chittagong	Chittagong	BGD	28885
51	Dhaka	Dhaka	BGD	33576
52	Khulna	Khulna	BGD	6125

Plot only one country

```
tm_shape(Europe[Europe$name=="Austria", ]) +
    tm_polygons()
```



Global Land Cover

```
data(land)
data(World)
pal8 <- c("#33A02C", "#B2DF8A", "#FDBF6F", "#1F78B4", "#999
tm_shape(land, ylim = c(-88,88), relative=FALSE) +
    tm_raster("cover_cls", palette = pal8, title="Global La
tm_shape(World) +
    tm_borders() +
tm_layout_World(inner.margins=0,
    legend.text.size=1,
    legend.title.size=1.2,
    legend.position = c("left","bottom"),
    legend.bg.color = "white", legend.bg.alpha=.2,
    legend.frame="gray50",
    legend.width=.2, legend.height=.6,
    legend.hist.height=.2,
    legend.hist.bg.color="gray60", legend.hist.bg.alpha=.5)
```

Small multiples

```
tm_shape(Europe[Europe$continent=="Europe",]) +
    tm_fill("part", thres.poly = 0) +
    tm_facets("name", free.coords=TRUE, drop.shapes=TRUE) +
tm_layout(legend.show = FALSE, title.position = c("center",
          title.size = 2)
```

The development version of tmap

```
devtools::install_github("mtennekes/tmap/pkg", ref = "4585
```

Download information

```
library(tmap)
bb_schloss <- bb(q="Mannheim Schloss")
buildings_schloss <- read_osm(bb_schloss, buildings=osm_pol

tm_shape(buildings_schloss$buildings, bbox=bb_schloss) +
  tm_polygons(col = "darkolivegreen3")
```

Download information - bigger area

```
bb_Mannheim <- bb(q="Mannheim")
```