Welcome to

The Session Will Begin Shortly

START

Spatial Data Analysis and Visualization in R

Session 4: Creating Common Thematic Map Types Using the R Package tmap

instats

Introduction to tmap

Goal

- Visualize spatial data
- Intuitive to use
- Flexible

Software to visualize spatial data

- Traditional GIS software: ArcGIS, QGIS, GRASS
- Data science programming languages: Python, R, Julia
- Web technologies: JavaScript

Traditional GIS software

Proprietary: ArcGIS
Free/open-source: QGIS, GRASS

- No programming required
- Many options and tools can be difficult to navigate
- Workflows often not easily reproducible or scriptable

Data science program languages

Python, R, Julia

- Require programming skills
- Support scripted, reproducible workflows
- Multiple ‘competing’ and complementary packages foster innovation
- Large and active communities

R packages

Package	Also non-spatial	Static	Interactive	Extendable
ggplot	✅	✅	-	✅
tmap	-	✅	✅	✅
mapsf	-	✅	-	-
mapview	-	—	✅	-
leaflet	-	—	✅	-
mapgl	-	—	✅	-

tmap and other packages

Compared

- with **ggplot2**
- with **mapview**
- with **mapsf**

Uses

- **leaflet** in its interactive `"view"` mode
- **mapgl** in its other interactive modes `"mapbox"` and `"maplibre"` via **tmap.mapgl**

JavaScript

- Interactive mapping
- d3, leaflet, Mapbox JS, Maplibre JS, etc.
- Many R and Python libraries use them under the hood
- More flexible to use them directly (instead of via R/Python library), but requires significantly more development effort and technical knowledge.

When to Use tmap

✅ Great choice if you want to:

- Make **publication-quality static maps**
- Quickly switch to **interactive maps** for exploration
- Use a **layered syntax** similar to ggplot2
- Teach spatial visualization in a **clear and structured way**
- Export maps for reports, articles, or dashboards

🚫 Not ideal for:

Getting started

Step 1: Installation

Instructions

```
install.packages("tmap")
# or for development version:
remotes::install_github("r-tmap/tmap")
```

Which version to use?

- CRAN version should always be stable
- Development version stability may vary:
  - → May have bug fixes found in the CRAN version (more stable)
  - → May have new features (less stable)

Step 2: find demo datasets

Included in **tmap**:

Vector data:

- `World` country data (polygons).
- `NLD_prov`, `NLD_muni`, `NLD_dist` regional data of the Netherlands (polygons)
- `metro` city data (points)
- `World_rivers` rivers data (lines)

Raster data:

- `land` land cover data (raster)

Step 3: Learn the basics

- Online vignettes
- Function names:
  - → `tm_` prefix: stackable layer functions, e.g. `tm_shape()` and `tm_polygons()`
  - → `tmap_` prefix: stand-alone functions, e.g. `tmap_save()`.

Recap

- **tmap** is a powerful and flexible R package for spatial data visualization
- Within the R spatial ecosystem there are alternatives, each with pros and cons.
- Main source of documentation

STOP