Introduction to rasters

ENS-215

Winter 2023

A. Cell IDs

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

B. Cell values

92	55	48	21
58	70	NA	37
NA	12	94	11
36	83	4	88

C. Colored values

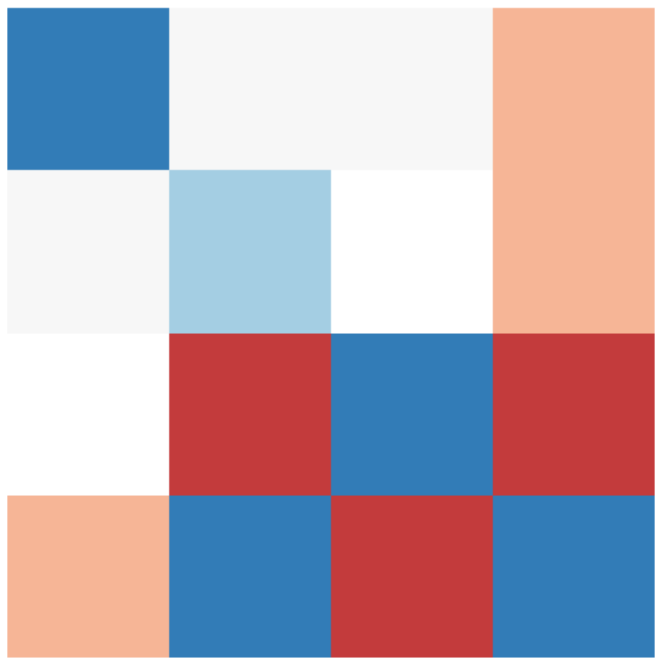
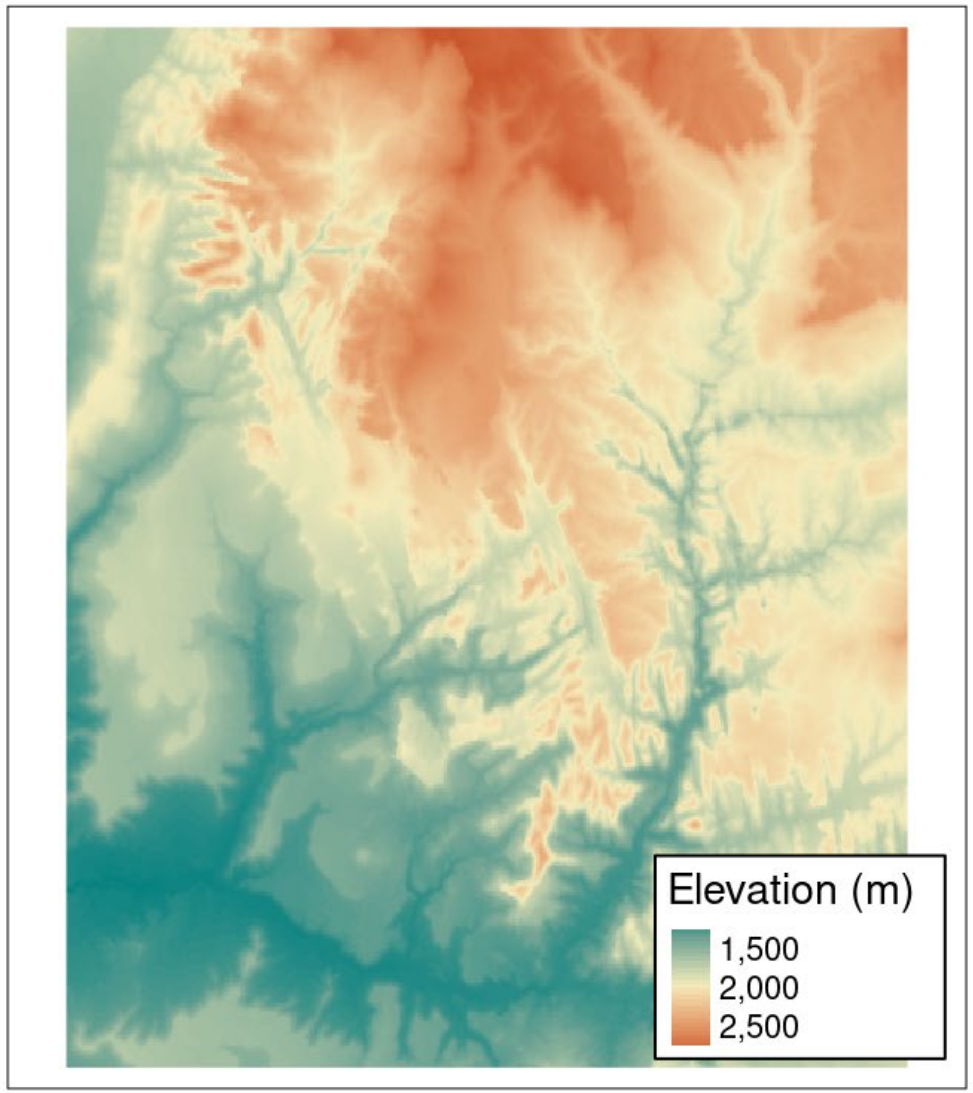


Image source: https://geocompr.robinlovelace.net

A. Continuous data



B. Categorical data

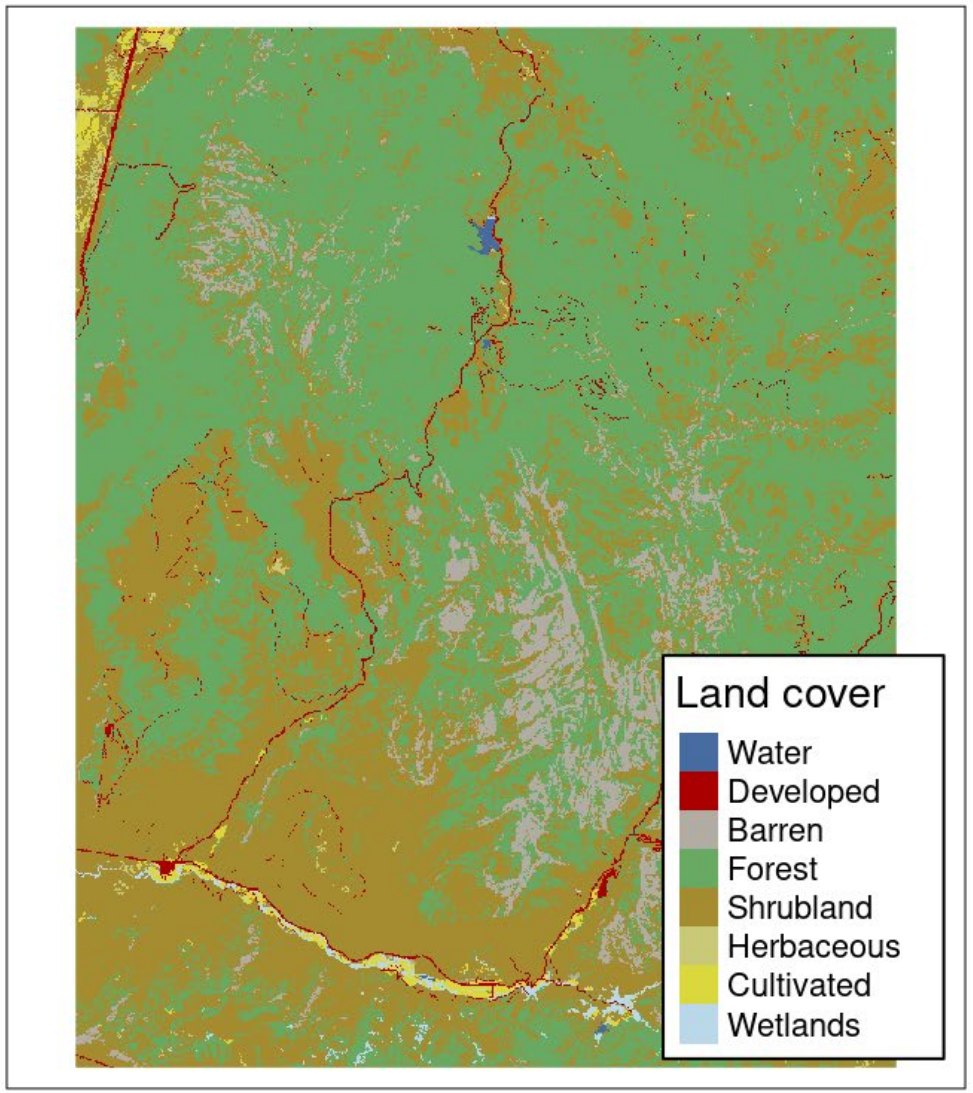


Image source: https://geocompr.robinlovelace.net

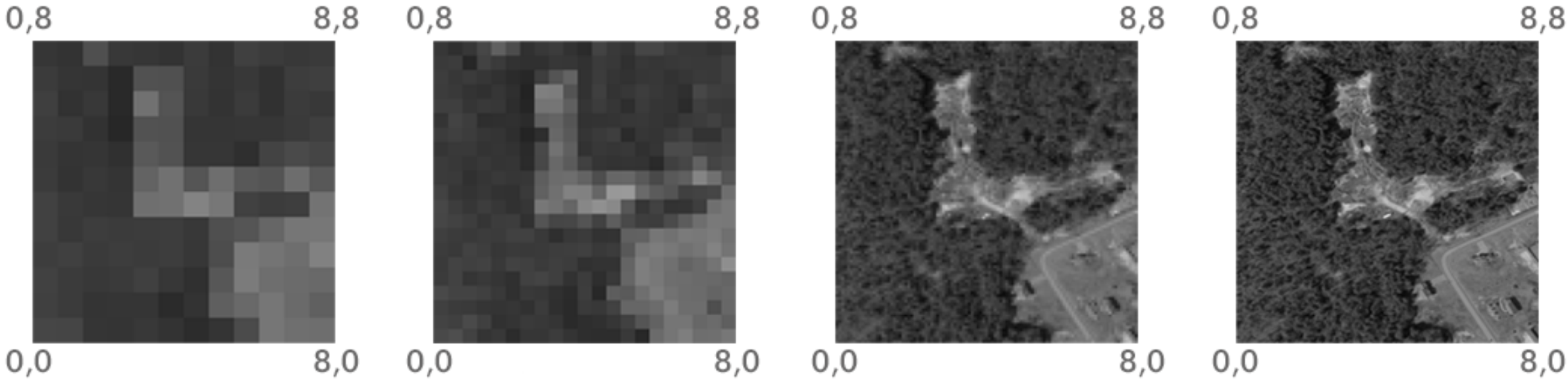
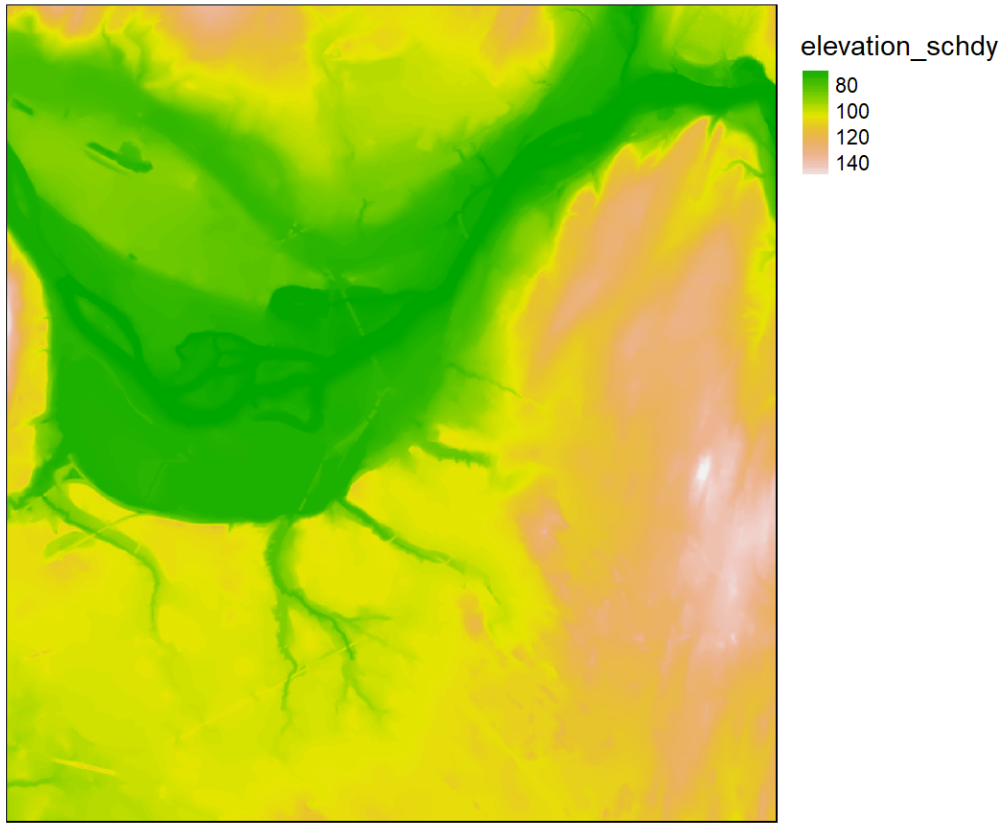


Image source: http://datacarpentry.org/organization-geospatial/01-intro-raster-data/index.html

- *Non-spatial* properties
  - Values
  - Dimensions (rows, columns, layers)
- *Spatial* properties
  - Extent (x_{min}, y_{min}, x_{max}, y_{max}) *or* origin (x_{min}, y_{max}) and resolution ($delta_x$, $delta_y$)
  - Coordinate Reference System (CRS)

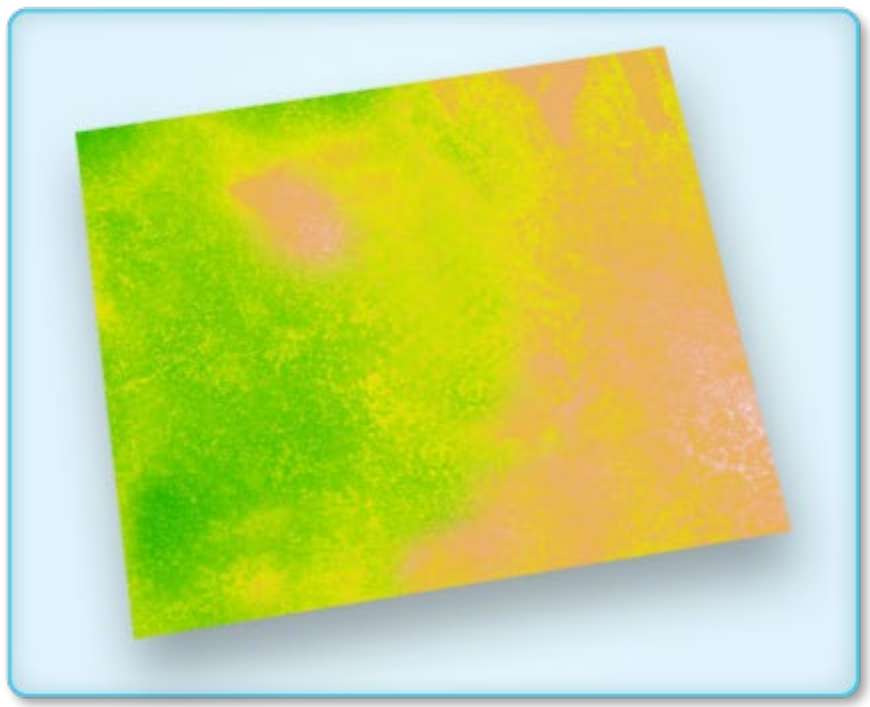
Schenectady elevation map




```
> elevation
class       : RasterLayer
dimensions  : 2457, 3158, 7759206  (nrow, ncol, ncell)
resolution  : 3.762354e-05, 3.762354e-05  (x, y)
extent      : -73.99898, -73.88016, 42.76802, 42.86046  (xmin, xmax, ymin, ymax)
crs         : +proj=longlat +datum=WGS84 +no_defs
source      : https://github.com/stahlm/stahlm.github.io/raw/master/ENS_215/Winter_2022/Lectures/Data/elevation_schdy.tif
names       : elevation_schdy
values      : 63.11039, 154.3264  (min, max)
```

Type	Format	File extension
“Simple”	GeoTIFF	`.tif`
	Erdas Imagine Image	`.img`
“Complex” (>3D and/or metadata)	HDF	`.hdf` , `he5` , and others
	NetCDF	`.nc`

Single Band Raster



Multi Band Raster

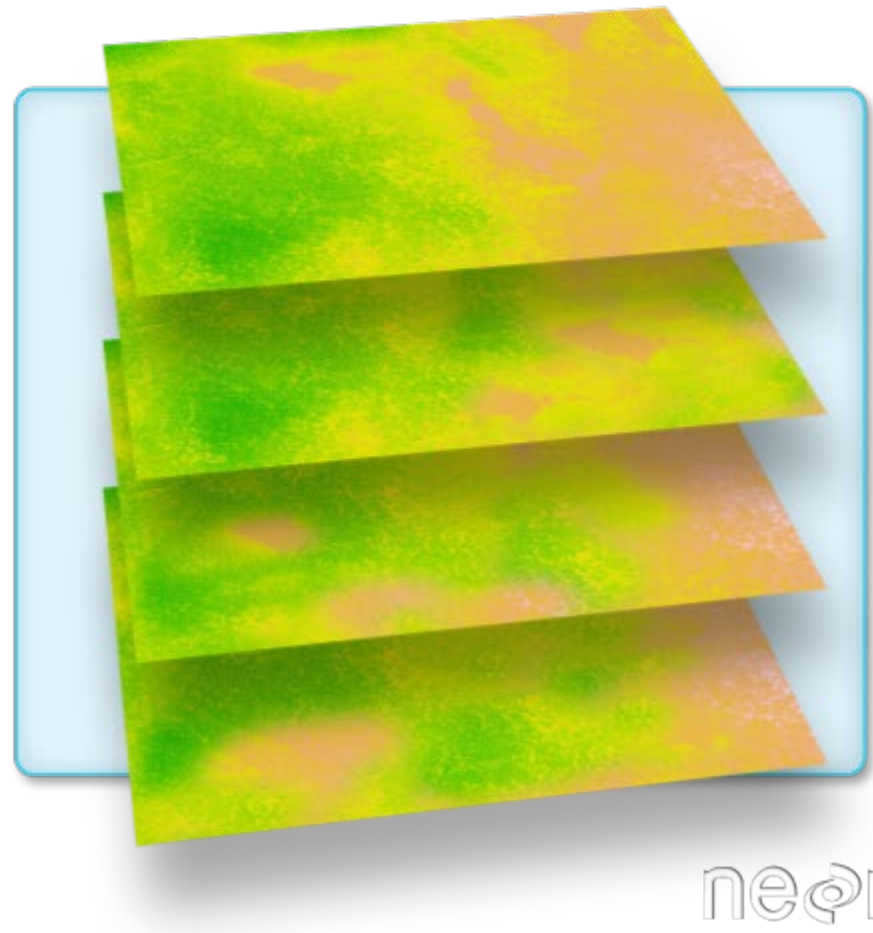
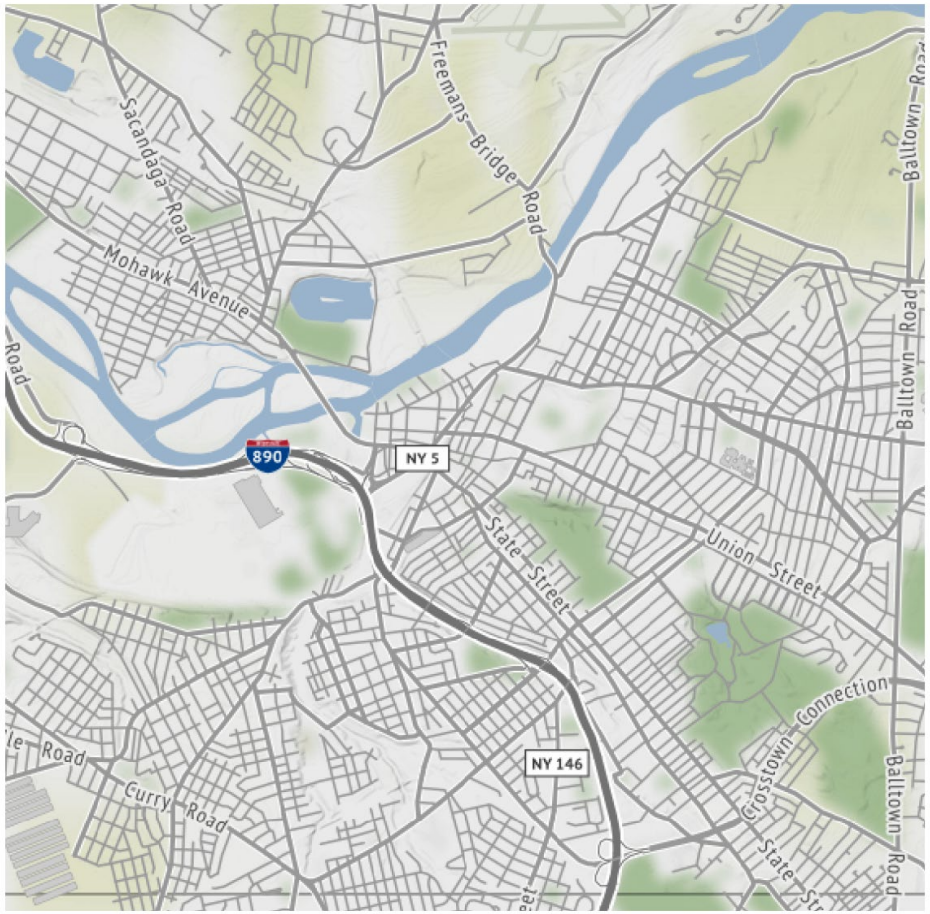
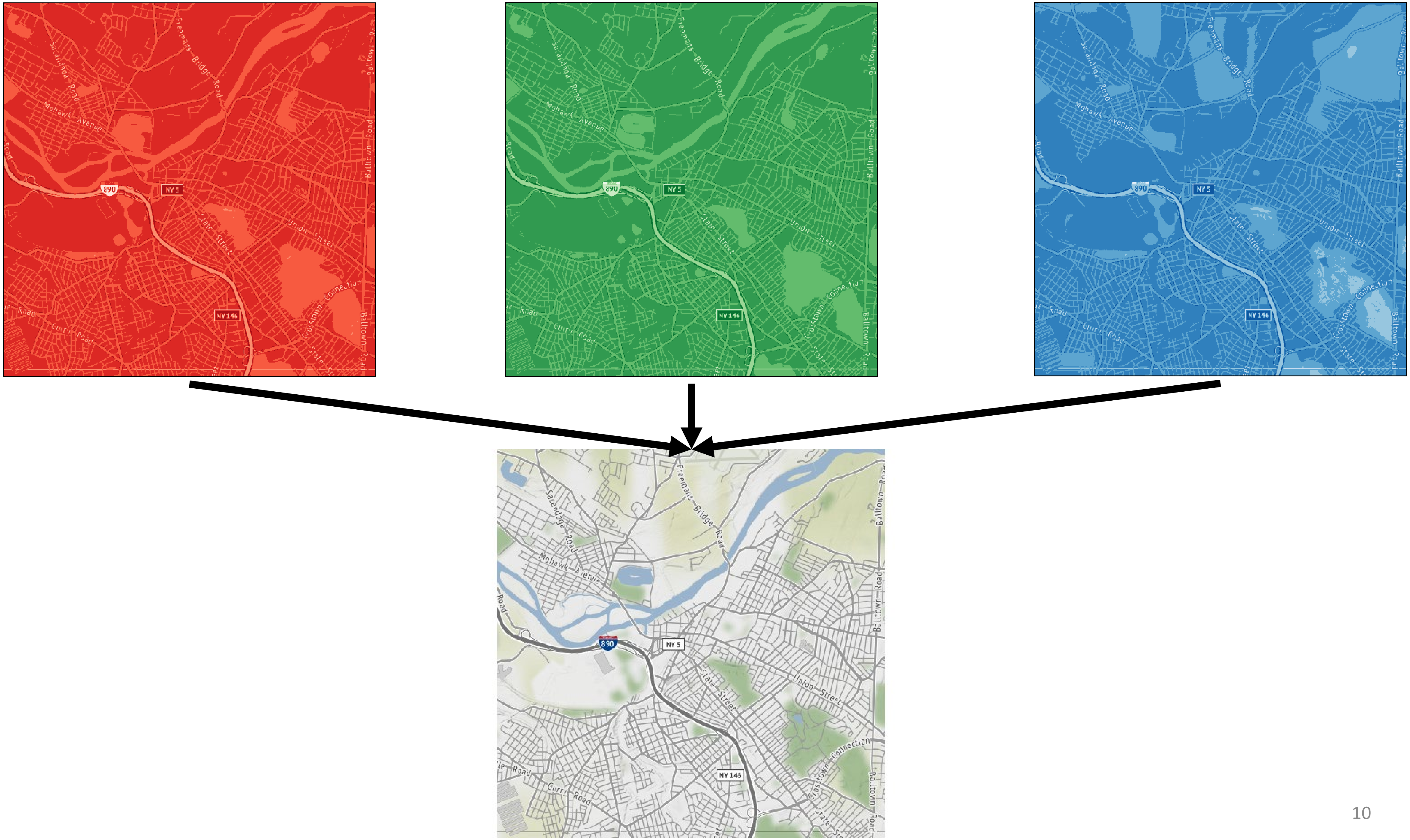
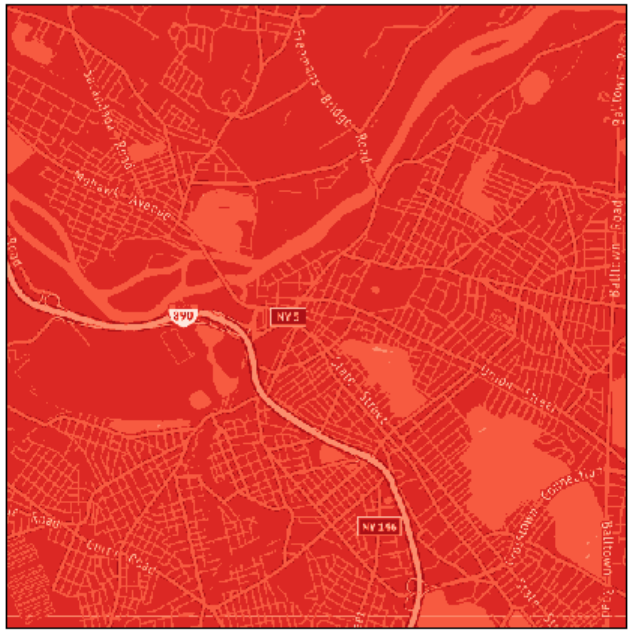


Image source: https://datacarpentry.org/r-raster-vector-geospatial/01-raster-structure/index.html



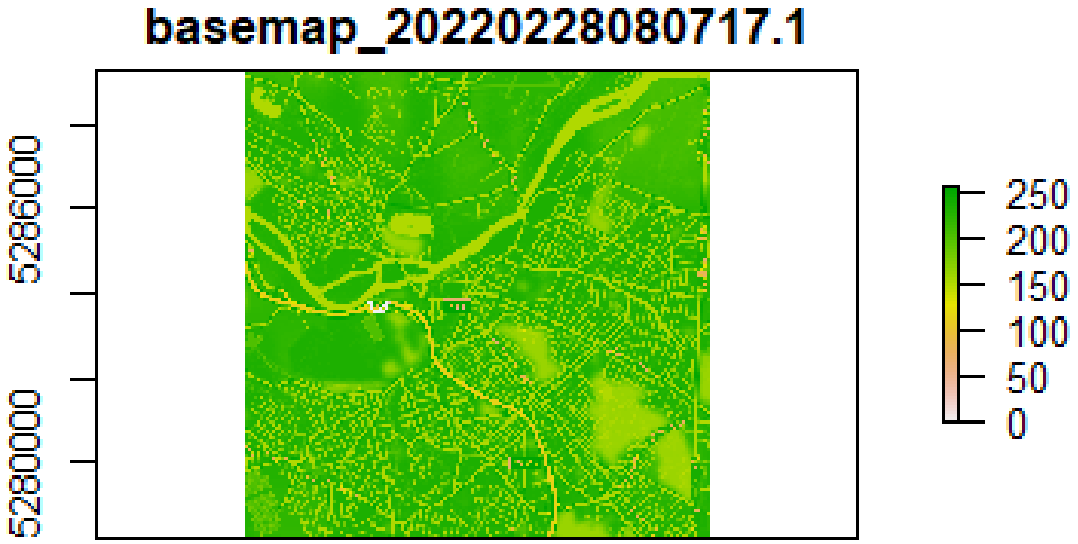

```
> base_schdy
class       : RasterBrick
dimensions  : 577, 576, 332352, 3  (nrow, ncol, ncell, nlayers)
resolution  : 19.10926, 19.10926  (x, y)
extent      : -8236415, -8225408, 5278225, 5289251  (xmin, xmax, ymin, ymax)
crs         : +proj=merc +a=6378137 +b=6378137 +lat_ts=0 +lon_0=0 +x_0=0 +y_0=0 +k=1 +units=m +nadgrids=@null +wktext +no_defs
source      : C:/Users/stahlm/AppData/Local/Temp/RtmpA17QMB/basemaps/basemap_20220228080717.tif
names       : basemap_20220228080717.1, basemap_20220228080717.2, basemap_20220228080717.3
```

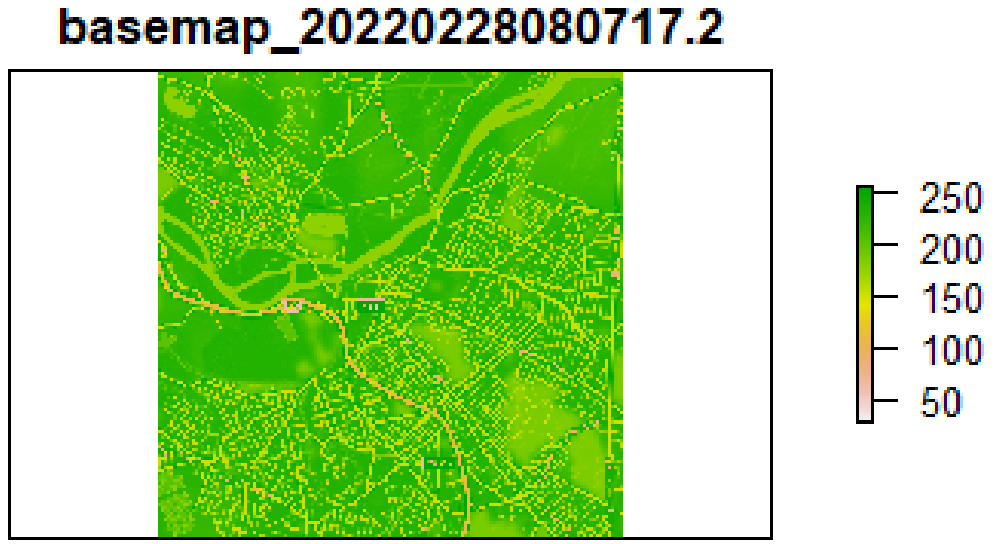

890
NY 5
Mohawk Avenue
State Street
Union Street

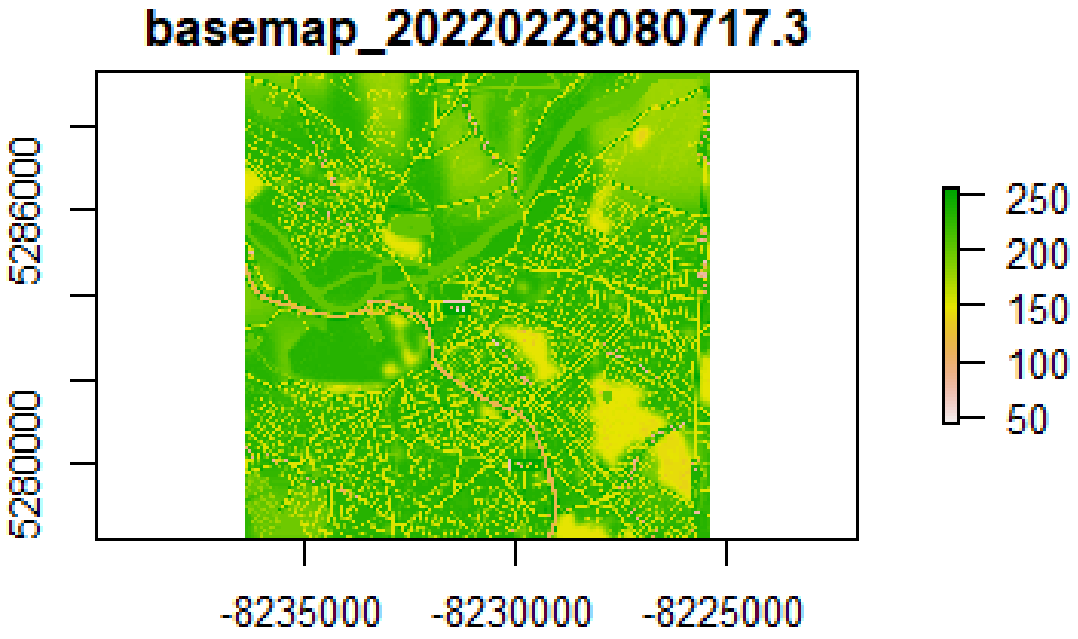

Mohawk Avenue
Union Street
NY 146


Mohawk Avenue
Union Street
NY 146


Mohawk Avenue
Union Street
NY 146


basemap_20220228080717.1
5286000
5280000
250
200
150
100
50
0


basemap_20220228080717.2
250
200
150
100
50


basemap_20220228080717.3
5286000
5280000
250
200
150
100
50
-8235000
-8230000
-8225000


NY 5
NY 145