# DAy 3

# Chapter 8, 9: ggplot, mapping

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# Load packages

library(tidyverse)

library(boot) # need urine dataset

# Plotting with boot

urine <- boot::urine

# Create scatterplot i.e. point graph

ggplot(data = urine, aes(x = osmo, y = ph)) +

geom\_point(aes(colour = cond)) + # cond = conduct

labs(x = "Osmoregulation", y = "pH")

### Mapping in R

# Load packages

library(tidyverse)

library(ggpubr) # to use ggplot

# Load data

# Note: not csv format

# highight all and then run

load("data/south\_africa\_coast.RData")

load("data/sa\_provinces.RData")

load("data/rast\_annual.RData")

# load("data/MUR.RData") # removed by adding # cos its high resoluion i.e.takes long

load("data/MUR\_low\_res.RData")

# Custome palette already made

# The colour pallette we will use for ocean temperature

cols11 <- c("#004dcd", "#0068db", "#007ddb", "#008dcf", "#009bbc",

"#00a7a9", "#1bb298", "#6cba8f", "#9ac290", "#bec99a")

# appears in enviro under " Values" cos not dataset but stil in R memory

# Create map

ggplot(data = south\_africa\_coast, aes(x = lon, y = lat)) + # need lat & longi to plot points as map

geom\_point()

# Creating land mask

ggplot(data = south\_africa\_coast, aes(x = lon, y = lat)) +

geom\_polygon(colour = "black", fill = "grey70", aes(group = group)) # The land mask

# polygon to create shape based on plots

# cant be geom\_line cos it'll only join lines & not the top part

# clarify: when to use aes & when you can?

# aes(group = group) creates polygons within the major polygon

# Adding SA province borders

ggplot(data = south\_africa\_coast, aes(x = lon, y = lat)) +

geom\_polygon(colour = "black", fill = "grey70", aes(group = group)) +

geom\_path(data = sa\_provinces, aes(group = group)) # The province borders

# limiting coords with coord\_equal

ggplot(data = south\_africa\_coast, aes(x = lon, y = lat)) +

geom\_polygon(colour = "black", fill = "grey70", aes(group = group)) +

geom\_path(data = sa\_provinces, aes(group = group)) +

coord\_equal(xlim = c(15, 34), ylim = c(-36, -26), expand = 0) # Force lon/lat extent

# expand cuts off above polygon

#

sst <- MUR\_low\_res # rename MUR data to sst by assigning new name to it

# why rename?

ggplot(data = south\_africa\_coast, aes(x = lon, y = lat)) +

geom\_raster(data = sst, aes(fill = bins)) + # The ocean temperatures

geom\_polygon(colour = "black", fill = "grey70", aes(group = group)) + #black outline

geom\_path(data = sa\_provinces, aes(group = group)) +

coord\_equal(xlim = c(15, 34), ylim = c(-36, -26), expand = 0)

# run each line (w.o. +) seperately to see where error lies

# raster contains...?

# each bin is a square, filling each box w diff cols

# Another example

ggplot(data = south\_africa\_coast, aes(x = lon, y = lat)) +

geom\_raster(data = sst, aes(fill = bins)) + # fill in bin boxes

geom\_polygon(colour = "black", fill = "grey70", aes(group = group)) +

geom\_path(data = sa\_provinces, aes(group = group)) + # adding prov bords

scale\_fill\_manual("Temp. (°C)", values = oc\_pal) + # add own palette oc\_pal

coord\_equal(xlim = c(15, 34), ylim = c(-36, -26), expand = 0) +

labs(x = "Longitude", y = "Latittude") # change axes names

# Create own palette

oc\_pal <- c("#3D9981", "#308477", "#28706C", "#225D5E", "#1D4A4F", "#19383F", "#14272E")

# Final map

final\_map <- ggplot(data = south\_africa\_coast, aes(x = lon, y = lat)) +

geom\_raster(data = sst, aes(fill = bins)) +

geom\_polygon(colour = "black", fill = "grey70", aes(group = group)) +

geom\_path(data = sa\_provinces, aes(group = group)) +

geom\_tile(data = rast\_annual, aes(x = lon, y = lat, fill = bins),

colour = "white", size = 0.1) +

scale\_fill\_manual("Temp. (°C)", values = cols11) +

coord\_equal(xlim = c(15, 34), ylim = c(-36, -26), expand = 0) +

scale\_x\_continuous(position = "top") + # Put x axis labels on top of figure

theme(axis.title = element\_blank(), # Remove the axis labels

legend.text = element\_text(size = 7), # Change text size in legend

legend.title = element\_text(size = 7), # Change legend title text size

legend.key.height = unit(0.3, "cm"), # Change size of legend

legend.background = element\_rect(colour = "white"), # Add legend background

legend.justification = c(1, 0), # Change position of legend

legend.position = c(0.55, 0.4) # Fine tune position of legend

)

final\_map

# 92: map assigned name, appears in enviro, but need to run for map to appear as plot

### Chapter 10: Mapping wih style

# Load packages

library(tidyverse)

library(scales)

library(ggsn) # to add North arrow to map

library(maps)

# Load data

load("data/africa\_map.RData") # load func cos data is in R.data format N.B. to look at file format

# Default maps

ggplot() +

borders() + # The global shape file

coord\_equal() # Equal sizing for lon/lat

# gives world map

# can use map to cut out area of interest with coord\_equal func

# create new plot as map

sa\_1 <- ggplot() +

borders(fill = "grey70", colour = "black") +

coord\_equal(xlim = c(12, 36), ylim = c(-38, -22), expand = 0) # Force lon/lat extent

sa\_1

# adding on to sa\_1

sa\_2 <- sa\_1 + # edit sa\_1

annotate("text", label = "Atlantic\nOcean", #\n so that two words appear in 2 diff line

x = 15.1, y = -32.0,

size = 5.0, # text size

angle = 45, # angle of text

colour = "navy") +

annotate("text", label = "Indian\nOcean",

x = 33.2, y = -34.2,

size = 5.0,

angle = 330,

colour = "springgreen")

sa\_2

# annotate edits of map text

#

sa\_3 <- sa\_2 +

scalebar(x.min = 22, x.max = 26, y.min = -36, y.max = -35, # Set location of bar

dist = 200, height = 1, st.dist = 0.8, st.size = 4, # Set particulars

transform = TRUE, model = "WGS84") + # Set appearance

north(x.min = 22.5, x.max = 25.5, y.min = -33, y.max = -31, # Set location of symbol

scale = 1.2, symbol = 16)

sa\_3

# north adds arrow, x.min & max shifts arrow position