

NAP DATA INITIATIVE

Session: Early Warning System as an Effective Climate Adaption

Date: 27/03/2023

Time: 16:00 - AM



Early warning system

Risk Knowledge

(evidence-based risk assessments, incl. hazards, exposure, vulnerabilities, capacities)

Monitoring and Forecasting

(incl. detection, models & thresholds for hazards and impacts)

Early Warning System

Communication of Warnings

(incl. timely dissemination, systems & processes, effective messages)

Preparedness and Response

(incl. plans, education & drills)

EWS AND ADAPTATION

Is EWS an adaptation measure
or
is adaptation part of EWS?

EWS AND ADAPTATION

EWS as adaptation:

- Rapid/sudden onset threads
- Climate Change manifest itself in the present weather
- Due to CC, weather/climate has become more erratic

Adaptation/NAP as part of EWS

- Prediction (CCS) -> Risk Assessment -> Plans -> Response (Formulation & Implementation of NAPs)

**NAP Data Initiative is integral part of
formulation and implementation of NAP**

Problem statement



Access to usable data, in particular climate scenario data, usually ranked high in gaps related to addressing adaptation and formulating NAPs



In addition to climate data/scenario data, there are numerous global and regional datasets that have been meticulously put together for various (global) studies



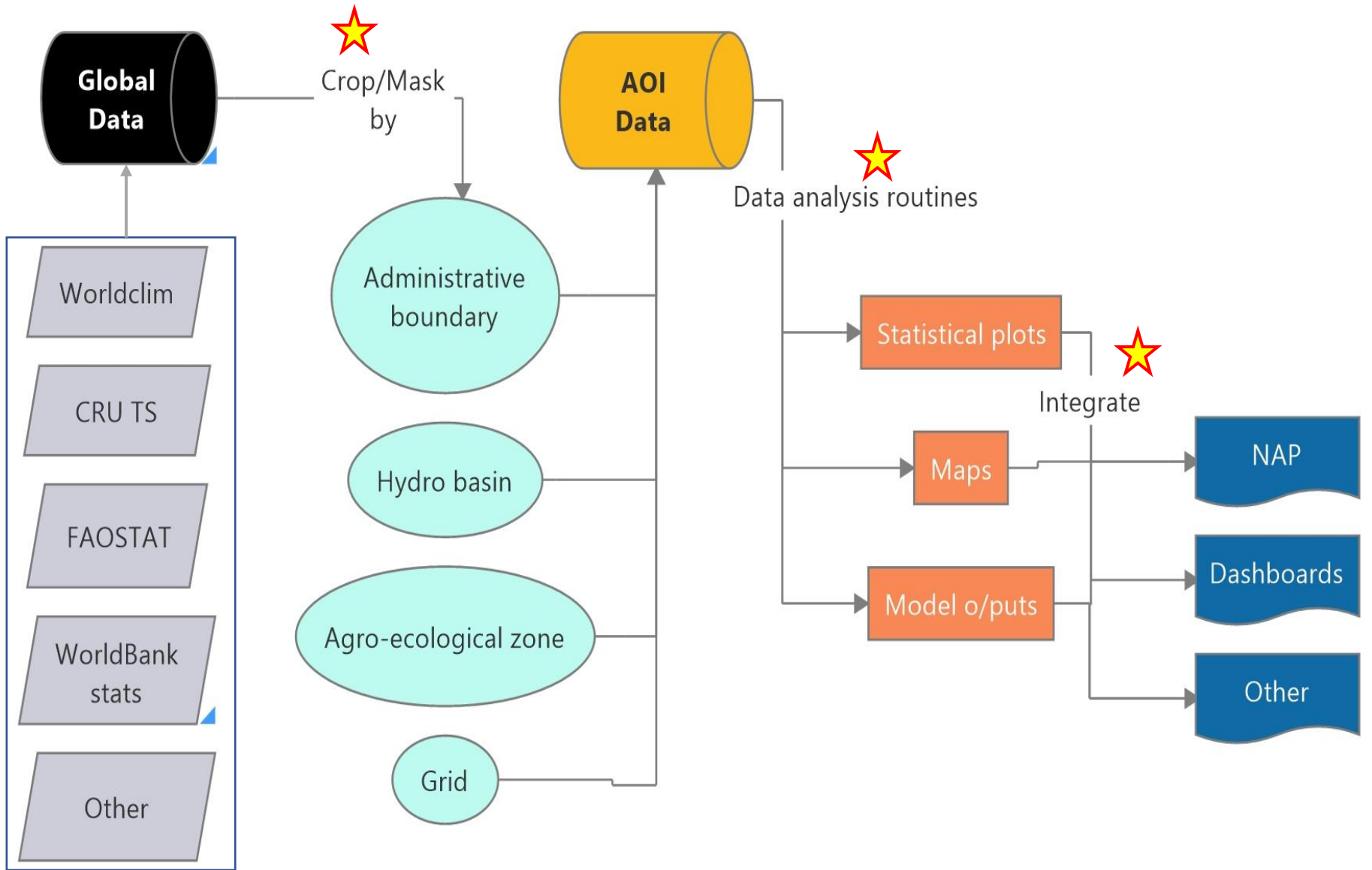
Managing huge datasets is cumbersome, costly, and can be daunting when conducting assessments and preparing the NAP

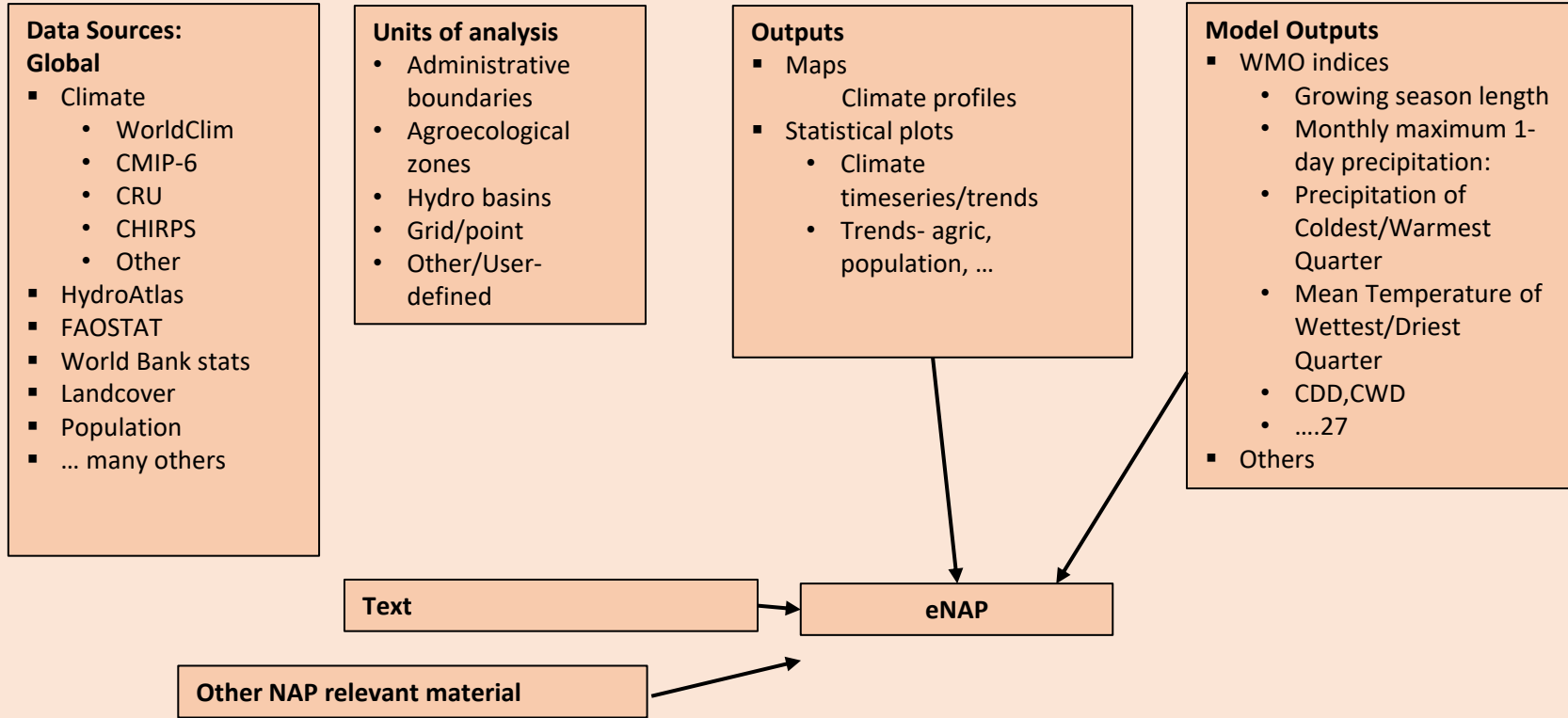
Motivation

- 1 How to make data usefully available to country teams without the need to learn complex data analysis tools?
- 2 How to integrate data and analysis results easily in reports/the NAP with ability for easy continuous update when data is updated year after year?
- 3 How to reproduce high quality displays that are typically produced by researchers or expensive specialist consultants?
- 4 How to follow global trends in open access, data sharing, and use of state-of-the-art tools? – many published papers are making their data and tools available openly via online collaborative tools such as GitHub

Approach

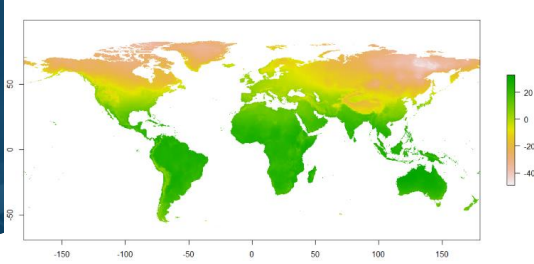
- 01 Build a system around R (using Rstudio), the open source statistical package and many useful extensions including Rmarkdown > bookdown > “napdown” ...
- 02 Markdown is a scripting language, similar to html, simpler, more standard
- 03 From RStudio, you can do pretty much most things – create pdfs, slides, websites, books, dashboards, etc
- 04 We have automated everything, and you can also find thousands other examples online that you can easily copy and reproduce high quality results;
- 05 RStudio of course is the R statistical package, within the RMarkdown routines, you can run Python, Fortran, C++ routines, and many more





Examples

Recipes: Global to Local data



```
library(raster)
tmean<-getData("worldclim", var='tmean', res=2.5)
gain(tmean)<-0.1

# plot global temp for January
plot(tmean$tmean1)
```

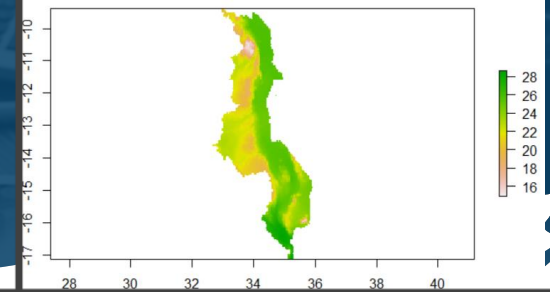
1. Define/load Data



```
# define local geometry(malawi)/area of interest
malawi0<-getData('GADM', country='MWI',
                 level=0)%>%st_as_sf() |

plot(malawi0$geometry)
```

2. Define or draw
area of interest

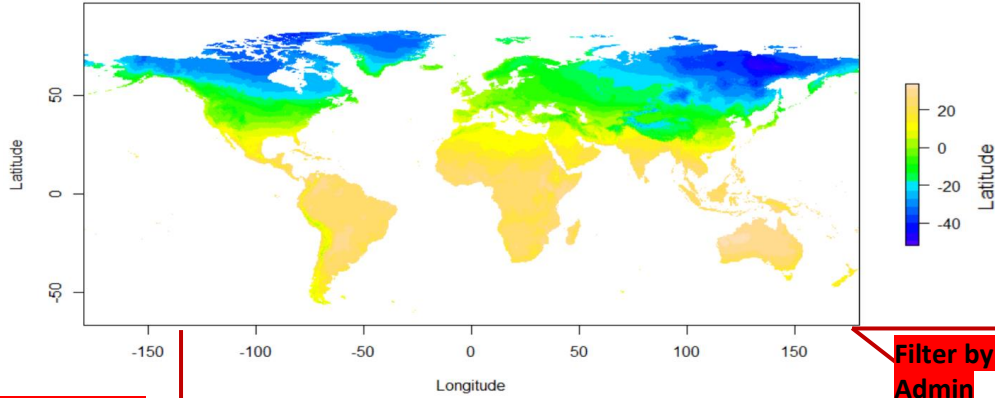


```
# use geometry to subset data
mwi_tmean<-raster::crop(tmean, malawi0)
%>%raster::mask(malawi0)

# plot temp for subset region
plot(mwi_tmean$tmean1)
```

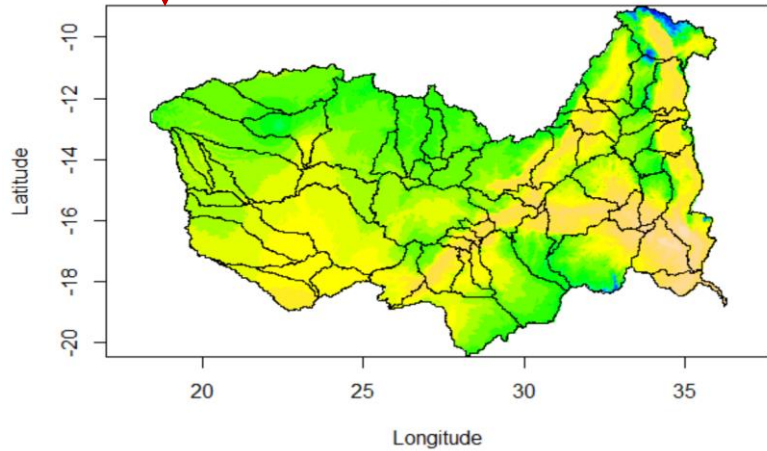
3. Subset data to
your area of interest

Mean Temperature - January



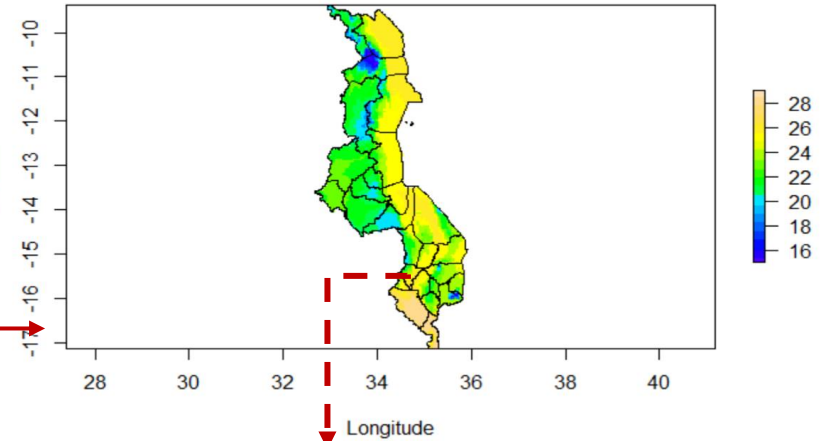
Filter by Basin

Zambezi Mean Temperature - January

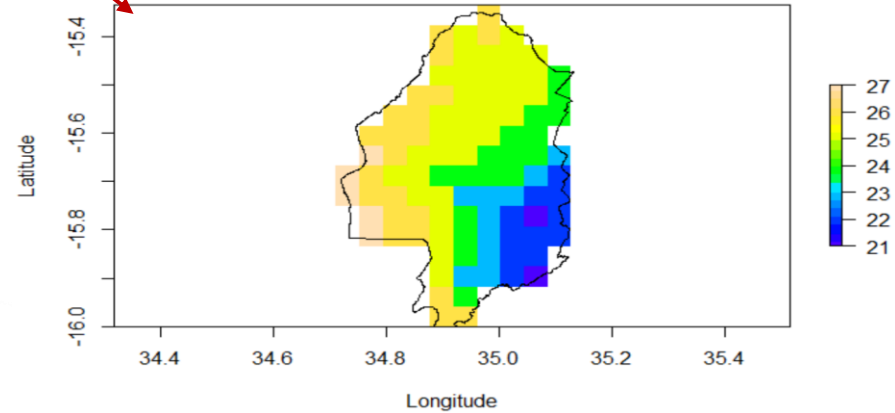


Filter by Admin

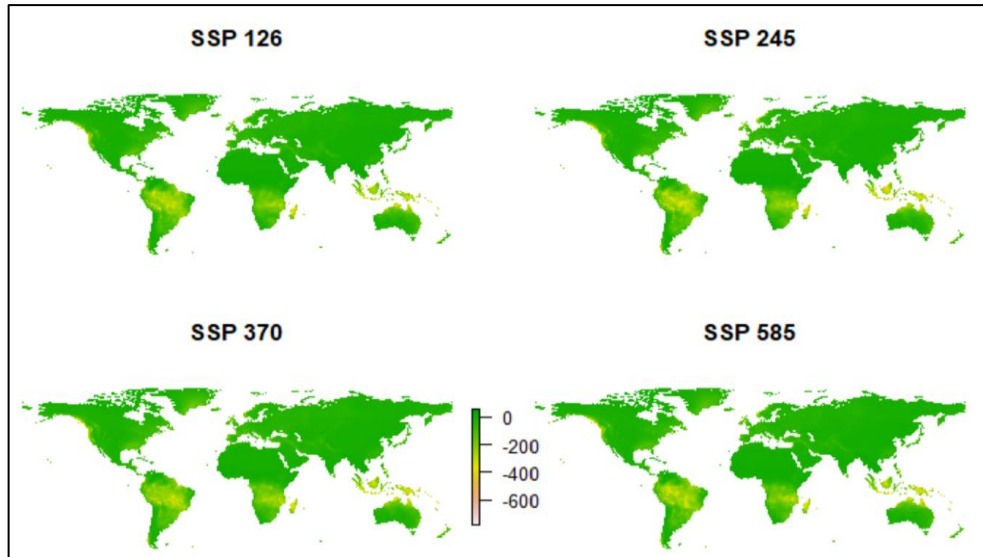
Malawi Mean Temperature - January



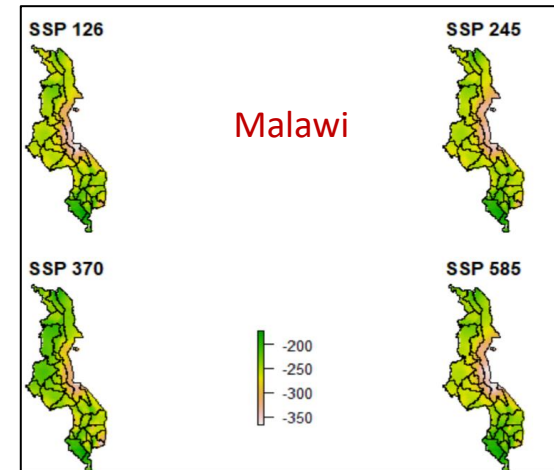
Blantyre Mean Temperature - January



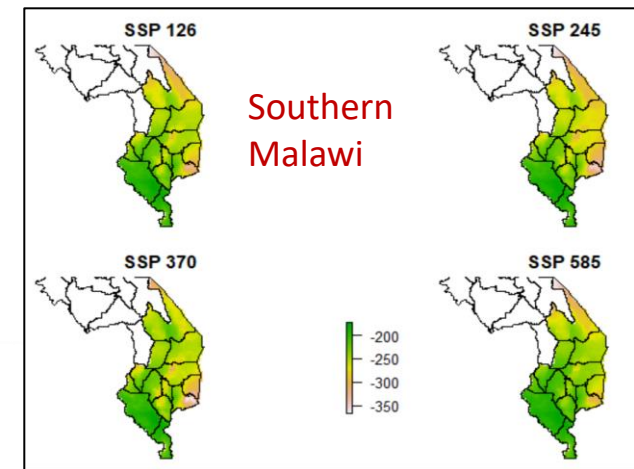
Worldclim: CMIP6



Global



Malawi



Southern Malawi

FAOSTAT

```
library(FAOSTAT)
alldata<-FAOsearch()
data_folder <- "data_raw"
dir.create(data_folder)
crops<- get_faostat_bulk(code = "QCL", data_folder = data_folder)
```

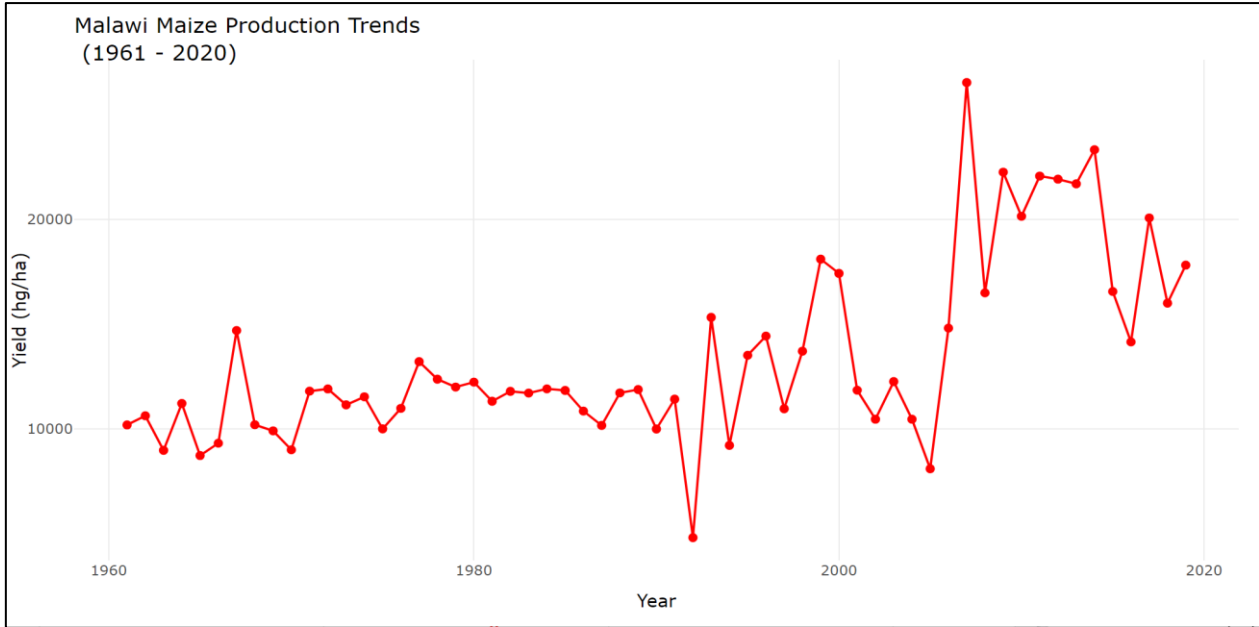
1. Access Data

2: Filter by area and variable

```
maize<-crops%>%dplyr::filter(item=="Maize",area=='Malawi')
```

```
yield<-maize%>%filter(element=='Yield')%>%na.omit()%>%
  group_by(year)%>%summarise(value=sum(value))
prod<-maize%>%filter(element=='Production')%>%na.omit()
%>%group_by(year)%>%summarise(value=sum(value))
colnames(yield)[colnames(yield)=="value"]<-"Yield"
colnames(prod)[colnames(prod)=="value"]<-"Production"
mycrops<-cbind(yield,prod)
mycrops<-mycrops[, -3]
```

3: Extract/filter by type



```
Maizecrop<- ggplot2::ggplot(
  mycrops,aes(x=year, y=Yield))+
  ggtitle('Malawi Maize
  Production Trends
  \n (1961 - 2020)')+
  xlab('Year')+ylab('Yield (hg/ha)')+
  geom_line(col='red')+
  geom_point(col='red')+
  theme_minimal()
plotly::ggplotly(Maizecrop)
```

4: Plot graphic

Numerous datasets available ... here is a sampling

Category	Variable	Description	Source url	Source Resolution (G: Grid)	Year
Climate	Multiple	Global weather and climate extremes	World Meteorological Organisation		
Climate	Multiple	Hourly to seasonal regional climate model	CORDEX		2050
Climate	Multiple	Daily bioclimatic, precipitation, solar	Climate Change, Agriculture and Food Security	varying	
Climate	Air Temperature, Precipitation	Daily weather generator of precipitation,	MarkSim Weather Generator		2010-2095
Climate	Air Temperature, Precipitation	Daily bias corrected precipitation,	Projections (NEX-GDDP)	~25 km	1950-2100
Climate	Multiple	Daily meteorological variables (rainfall,	Pacific (RCCAP)		
Climate	multiple	Daily weather as well as exotic variables	Statistical Downscaling Model-Decision Centric		>1948
Climate	Multiple	Monthly global climate model output	KNMI Climate Explorer		
Climate	Air Temperature, Precipitation	Decadal mean projections and changes in	SEA START RC Data Distribution System		2010-2090
Climate	Multiple	Global climate model output (CMIP3 and	IPCC Data Distribution Center		
Climate	multiple	Global climate model projections (CMIP5) -	IPCC AR5 Annex1		1986-2100
Climate	Multiple	Global climate model change factors	World Bank Climate Change Knowledge Portal		
Climate	Multiple	Portal for accessing agriculture, water,	World Bank Climate Change Knowledge Portal		2020-2100
Hazards	Fire	Active fire products from the Moderate	Active Fire Data Earthdata (nasa.gov)	varying	>2002
Hazards	Fire	Worldview satellite imagery	EOSDIS Worldview (nasa.gov)	varying	>1948
Hazards	Fire	The Global Fire Emissions database	Data - Global Fire Emissions Database	0.25°	>1997
Hazards	Fire	The Global Fire Atlas is a new freely	Fire Atlas - Global Fire Emissions Database	500m	2003-2016
Hazards	Multiple	Inventories of river and urban flooding,	ThinkHazard		
Hazards	Multiple	National disaster risk profiles and loss	Preventionweb		
Hydrology	Surface water	The Global Surface Water Explorer is a	Global Surface Water - Data Access (global-		
Hydrology	Runoff	The Global Runoff Data Base (GRDB) is built	GRDC Data Portal (bafg.de)		1931-2020
Hydrology	Multiple	HydroATLAS is a comprehensive database	Global HydroAtlas	varying	
Hydrology	River Basin	This database provides the first-ever	Interactive Database of the World's River Basins	unspecified	
Hydrology	Flood	The Aqueduct Global Flood Risk Maps	Aqueduct Global Flood Risk Maps - Datasets -	unspecified	
Hydrology	River Basin	This dataset contains the major and largest	Major River Basins of the World Data Catalog	unspecified	
Hydrology	Flood	Assesses (large) flood risks by country, river	Aqueduct Global Flood Analyzer		
Hydrology	Flood	Global near real-time archive of large flood	Dortmouth Flood Observatory		1985
Hydrology	Runoff	Storm surface runoff and	Global Land Data Assimilation System	varying	>1948
Hydrology	Multiple	Weekly and monthly water and	CAWater-Info		>1980
Hydrology	Ice	Monthly ocean, ice, and hydrology	Gravity Recovery and Climate Experiment	0.25°	
Land cover/use	Crop genebank	Genesys is an online platform where you	Genesys PGR (genesys-pgr.org)		
Land cover/use	Multiple	The Global Land Service systematically	Home Copernicus Global Land Service	varying	
Land cover/use	Multiple	Global Forest Watch (GFW) is an online	Change Data GFW (globalforestwatch.org)		>2001
Land cover/use	Multiple	10 day average values of key indicators for	ASAP - EC (europa.eu)		>1989
Multiple	Multiple	The USGS FEWS NET Data Portal provides	Data Downloads Early Warning and		2001-2021

Examples

1 Prerequisites

- 1.1 Opening a markdown file
- 1.2 Installing packages
- 1.3 Loading Libraries

2 Getting started

- 2.1 About rmarkdown
- 2.2 Editing in markdown

3 Bookdown

- 3.1 [Setting up an Open NAP docu...](#)
 - 3.1.1 Some things to note
 - 3.2 Some Troubleshooting

4 GitHub & GitHub Pages

- 4.1 Sharing on GitHub
- 4.2 Publishing to GitHub pages

5 Suggested Reads

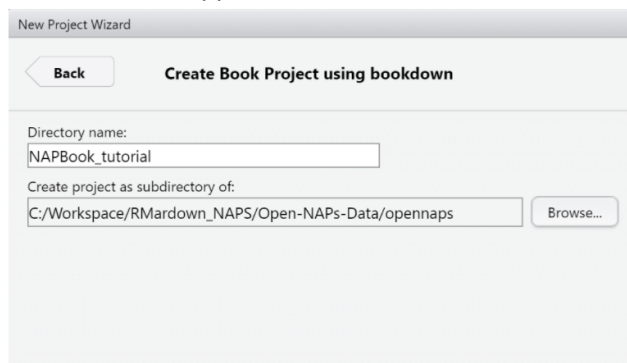
https://napdown.github.io/markdown_guidebook/

3.1 Setting up an Open NAP document

We will use the package `bookdown` to generate NAP document in a book format. Journal articles or reports can be produced in the same way. We will also use the package `tinytex` to build pdf format of the book document.

1. First, launch the rstudio app in your pc.
2. Install the bookdown and tinytex packages. Use any of the methods shown in the [Installing packages](#) section.
3. Then from the menu bar go to `File->New Project->>New Directory->>Book Project using bookdown`.

A new window appears



2.4 Structure of the Text

3 National Contexts

3.1 Overview

3.2 Geographical Context

3.3 General Climate – Temperatur...

3.4 Socio-economic Context

3.5 The governmental, institutiona...

3.6 Challenges for institutional co...

3.7 Legal frameworks

4 Vulnerability And Adaptation Options

5 The National Adaptation Plan

5.1 Overview

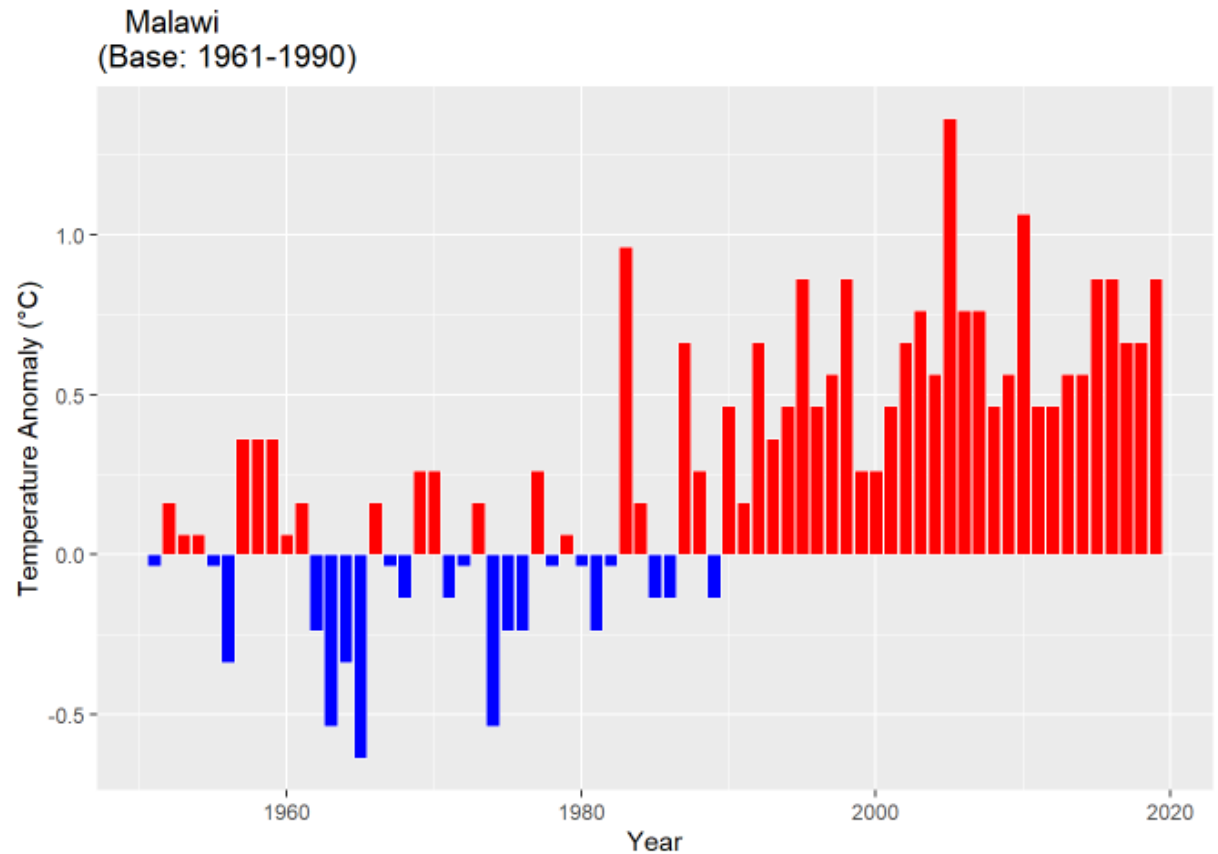
5.2 Guiding Principles

5.3 Adaptation Priorities

5.4 Implementation Strategy

5.5 Resources Mobilization

4.1.1 Temperature Anomaly



Examples

Routine

```
# Load /import excel data
library(readxl)
gef <- read_excel("C:/Workspace/RMarkdown_NAPS/Open-NAPS-Data/opennaps/O-NAPS-Dashboard/Open_NAPS_Database.xlsx", sheet = "GEF") # gef projects

regions <- read_excel("C:/Workspace/RMarkdown_NAPS/Open-NAPS-Data/opennaps/O-NAPS-Dashboard/Open_NAPS_Database.xlsx", sheet = "UNCTAD_Regions") # UN regions

# merge the gef projects and UN regions tables
projects <- merge(gef, regions, by = 'countryname', all.x = T)
```

Import excel data

```
# create bar chart of projects by region
library(plotly)
library(dplyr)

projects %>% group_by(Region)%>%
count(gef_regions$ID)%>%summarise("Projects"=sum(n))%>%
plot_ly(type = "bar", y = ~Projects, x = ~Region)
```

Create bar chart

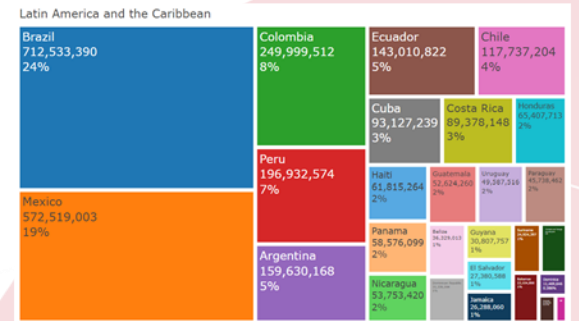
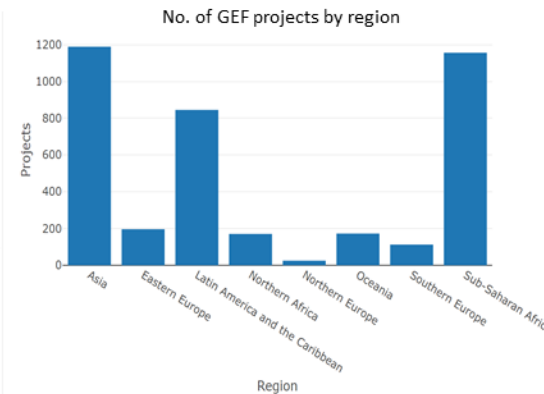
```
# create treemap for projects in region x
projects_regionx <- projects %>% filter(Region == "Latin America and the Caribbean") %>%
group_by(countryname, Region) %>% summarise("Total" = sum(Grant))

plot_ly(data = projects_regionx, type = "treemap", values = ~Total,
labels = ~countryname,
parents = ~Region,
name = "GCF Funding",
textinfo = "label+value+percent parent")
```

Create tree map

Output

countryname	ID	Title	Focal Areas	Grant	Co-Financing	Implementing Agencies
Afghanistan	2532	National Capacity Nee...	NA	200000	0	United Nations Environment
Afghanistan	5664	Building Resilience of C...	Climate Change	6900000	7000000	United Nations Environment I
Afghanistan	3174	Development of Natio...	Biodiversity	394000	70000	United Nations Environment I
Afghanistan	5610	Reducing GHG Emissio...	Climate Change	1735160	4811114	Food and Agriculture Organiz
Afghanistan	6814	Adapting Afghan Com...	Climate Change	5600000	65500000	United Nations Development
Afghanistan	1907	Natural Resources and ...	Biodiversity	975000	0	Asian Development Bank
Afghanistan	4839	Establishing Integrated...	Land Degradation, Bl...	6441819	53300000	United Nations Development
Afghanistan	10143	Investing in energy effi...	Climate Change	1321141	9711000	United Nations Industrial Dev
Afghanistan	9531	Conservation of Snow ...	Climate Change, Biod...	2704862	5951998	United Nations Development
Afghanistan	10312	Community-based CL...	Climate Change	8982420	20000000	United Nations Development
Afghanistan	10155	Strengthening capacity...	Climate Change	1350000	1500000	Food and Agriculture Organiz
Afghanistan	5017	Developing Core Capac...	NA	910000	1575000	United Nations Environment I
Afghanistan	4227	Building Adaptive Capa...	Climate Change	5390000	14400000	United Nations Environment I
Afghanistan	10169	Combating land degra...	Land Degradation, Bl...	5906850	30000000	Food and Agriculture Organiz



<https://napdown.github.io/O-NAPs-Dashboard/>

