Track 5: Rainfall Reliability Explorer

Key questions, technical information and recommended datasets

In this track, the aim is to build a decision-support tool designed to help users assess how the start and duration of the rainy season have changed across Kenyan counties, a critical factor for agricultural planning. By analysing historical and projected climate data, the tool offers insights into seasonal variability, highlighting counties facing shifts in rainfall onset or growing period length. These insights are especially valuable for smallholder farmers and stakeholders planning climate-smart agriculture, insurance schemes, and adaptation investments.

Tailored for county planners, researchers, and proposal developers, the tool should allow users to filter by county, time period, and climate scenario, and to export maps, graphs, and key data summaries. Optional features include county comparisons and crop-specific overlays. With a user-friendly interface and decision-ready outputs, the notebook will support evidence-based planning to improve resilience in Kenya's rain-fed agricultural systems.

Below, you can find suggestions and recommendations for datasets that might help you answer these questions. The only datasets you need to use are those found in the [Baseline Datasets](#) notebook provided.

1. **When does the rainy season start, and what is the typical length and year-to-year variability of the length of growing period (LGP) across counties?**
   - GLASS NVDI (seasonal phenology dataset - note that 'X' in the S3 bucket path below should be replaced by the relevant ISO3c country code)
     - *s3://digital-atlas/domain=phenology/type=sos_eos/source=glass_nvdi/region=africa/processing=raw/level=adm1/X_seasonal-phenology.parquet*
   - [AAA Atlas | How to use season data](#)
   - [Geo Knowledge Hub | Phenology dataset](#) (length and start of season)

2. **Which counties are experiencing significant shifts in onset or shortening of the rainy season?**
   - GLASS NVDI (seasonal phenology dataset - note that 'X' in the S3 bucket path below should be replaced by the relevant ISO3c country code)
     - *s3://digital-atlas/domain=phenology/type=sos_eos/source=glass_nvdi/region=africa/processing=raw/level=adm1/X_seasonal-phenology.parquet*

- - Looking for trends over the historical data and intersection with Kenya Admin1 GAUL Boundaries
- AAA Atlas | How to use season data

3. What do these rainfall trends imply for key rain-fed crops (maize, sorghum, fodder) and for livestock populations (cattle, goats, sheep, poultry)?

- Crops (Maize & Sorghum)
  - AAA Atlas Hazard Data:
    - NWDS, NDD, PTOT
    - Tifs & Parquet Tables
    - Annual and quarterly hazard & anomalies parquets used in climate rationale notebooks
    - Hazard Trends + Anomalies: This dataset shows climate hazards and hazard trends across 3 month seasons or annually across the historic and future timeframes. It can be used to perform time series analysis of hazards across the specified growing seasons
    - Hazard x Exposure: This dataset shows the historical production exposed to historic and future climate hazards in USD for crop and livestock. This can be used to identify what key crops and where are most exposed to rainfall related hazards (PTOT & NDWS)
  - **Maize, rice, wheat & soybean yields**
    - GlobalCropYield5min | Mendeley Data (global gridded annual major crops yield dataset at 5-minute resolution during 1982-2015)
    - Mapping global yields of four major crops at 5-minute resolution from 1982 to 2015 using multi-source data and machine learning
  - Crop climate requirements:
    - Crop weather and climate vulnerability profiles | Concern Worldwide
      - https://github.com/AdaptationAtlas/hazards_prototype/blob/main/metadata/crop_climate_profiles.xlsx
- Livestock (rangelands or pastures in mixed systems)
  - Dry Matter Productivity 1999-2020 (raster 1 km), global, 10-daily – version 2
  - eMODIS Africa Data Portal (FEWS NET - USGS, USAID)

4. How does rainfall variability correlate with crop yields, livestock vulnerability and rural population exposure to identify compounded-risk areas?

- Intersection of exposure with rainfall variability data (from Q1).
  - Exposure (crop yields, livestock density, rural population) is available from Atlas in tif or parquet form.
- Rural Population:

- *s3://digital-atlas/domain=exposure/type=population/source=worldpop2020/region=ssa/processing=analysis-ready/variable=rural_pop.tif*
- Livestock:
  - *s3://digital-atlas/domain=exposure/type=livestock/source=glw4/region=ssa/time=2020/processing=atlas-harmonized/variable=vop_nominal-usd-2021/glw4-2020_vop_nominal-usd-2021.tif*
- Crops:
  - *s3://digital-atlas/domain=exposure/type=crop/source=spam2020v1r2_ssa/region=ssa/processing=atlas-harmonized/variable=vop_nominal-usd21/spam_vop_nominal-usd21_all.tif*

5. Which counties or sub-counties potentially require supplementary irrigation to mitigate shortened or unreliable rainy seasons?

- Intersection of crop hazard exposure with irrigation suitability
- Precipitation by season (Kenya only)
  - *s3://digital-atlas/domain=phenology/type=sos_eos/source=glass_nvdi/region=africa/processing=raw/level=adm1/KEN_seasonal-phenology_plus-rain.parquet*
- [AAA Atlas | How to use season data](#)
- AAA Atlas Irrigation suitability layers (from IFPRI):
  - *s3://digital-atlas/domain=solution/type=suitability/source=ifpri/region=africa/processing=raw*
- Crop climate requirements:
  - [Crop weather and climate vulnerability profiles | Concern Worldwide](#)
    - https://github.com/AdaptationAtlas/hazards_prototype/blob/main/metadata/crop_climate_profiles.xlsx