RDAS Training
Hands-on Exercises

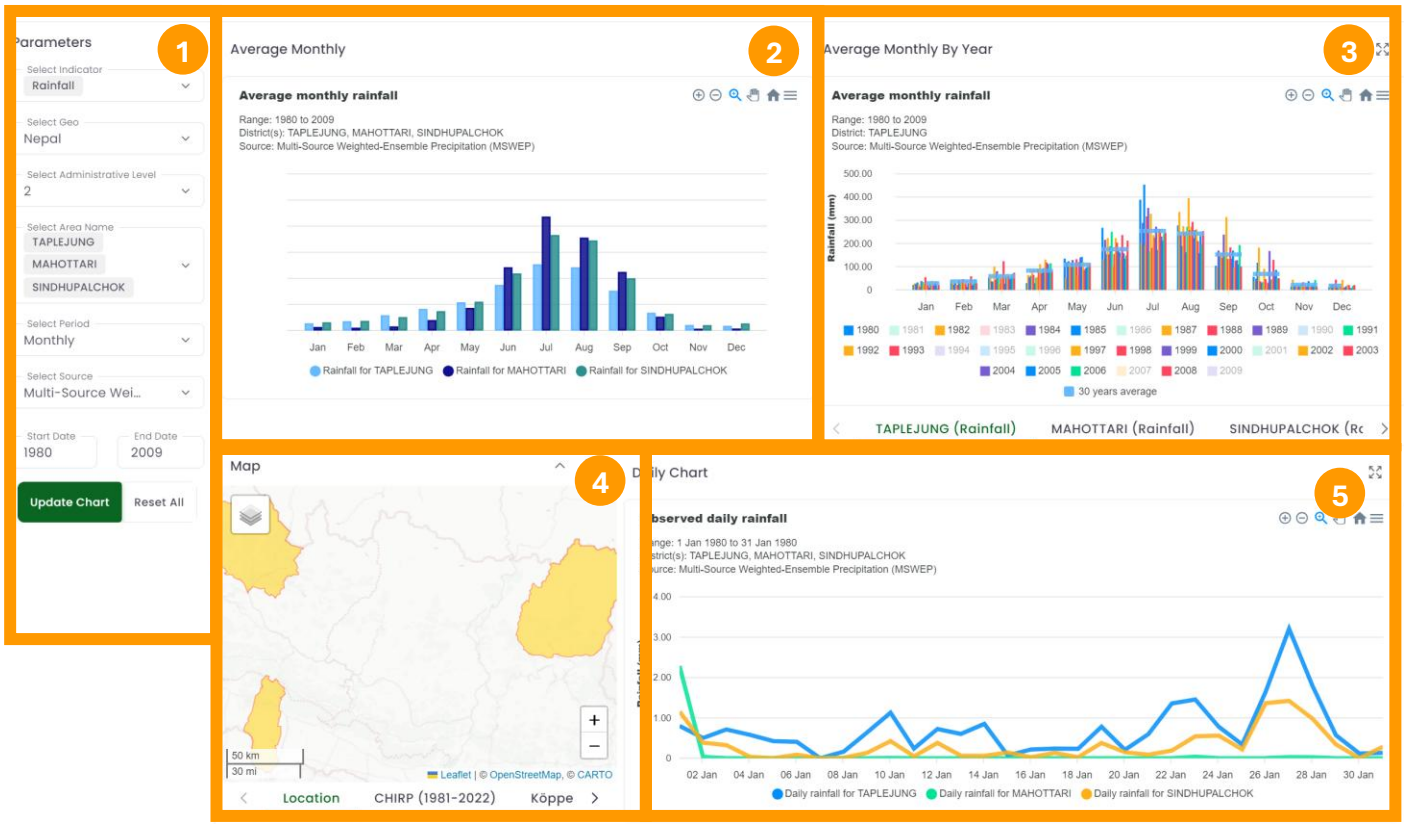
Data Tool 1: Climate Data

https://rdas.rimes.int/catalog/climate

This tool visualizes regional climate datasets of various spatial and timescales that can be downloaded, and used by stakeholders for a number of analyses, on its own or paired with other datasets.

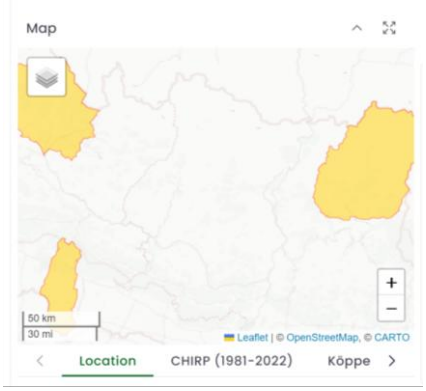
The tool's user interface contains the following components/panels:

1. **Parameter List,** provides the list of required parameters needed to initiate the analysis, which includes:
    - Parameter
    - Country
    - Administrative Level (e.g., province, district)
    - Area Name
    - Period of Analysis (e.g., annual, seasonal, monthly)
    - Data Source (e.g., MSWEP, ERA5, APHRODITE, CRU, CHIRPS, GPCC, IMD)
    - Period Coverage (start year, end year)
2. **Average Monthly,** provides location-wise comparison of observed rainfall/temperature parameters, disaggregated month-wise, season-wise
3. **Average Monthly by Year,** provides year-on-year comparison of observed rainfall/temperature parameters, disaggregated month-wise, season-wise
4. **Map,** highlights user-selected locations for analyses; CHIRPS (precipitation change from 1981-2022); Köppen-Geiger Climate Classification
5. **Daily Chart,** drill down of observed monthly rainfall/temperature data to daily rainfall/temperature data; useful for analyzing extreme events



Setting up parameters for analysis

1. In the *Indicator* panel, select one or more climate parameters (e.g., rainfall, mean/min/max temperature) to be analyzed.
2. Select the country, administrative level (1-province, 2-district), area/location names to be analyzed under the *Geo, Administrative Level,* and *Area Name* options. Selected areas will be highlighted on the *Map* view.

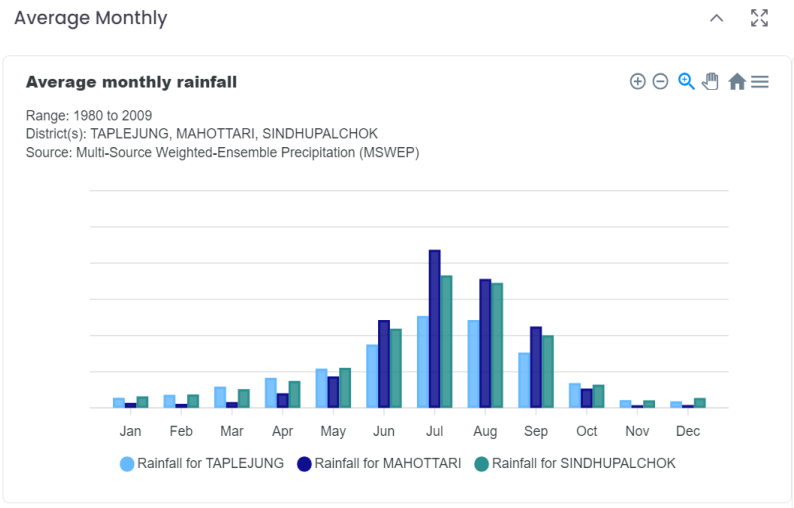


3. Under the *Period* option, select period of analysis (annual, seasonal, monthly)
4. Under the *Source* option, select preferred data source.
5. Select the start and end years for the analysis under the *Start Date* and *End Date* options.
6. Once all parameters have been selected, click on the *Update Chart* button to generate the analyses, charts, and maps. To reset analyses/charts/maps, click on the *Reset All* button.

Comparing rainfall/temperature patterns across different locations

In the *Average Monthly* chart, users can compare different climate parameters (e.g., rainfall, mean/min/max temperature) averaged over the period specified by the user for different locations.

1. To select one or more climate parameter/s (e.g., rainfall, temperature) per location to be included/removed from the analysis, simply click on parameters in the legend area.

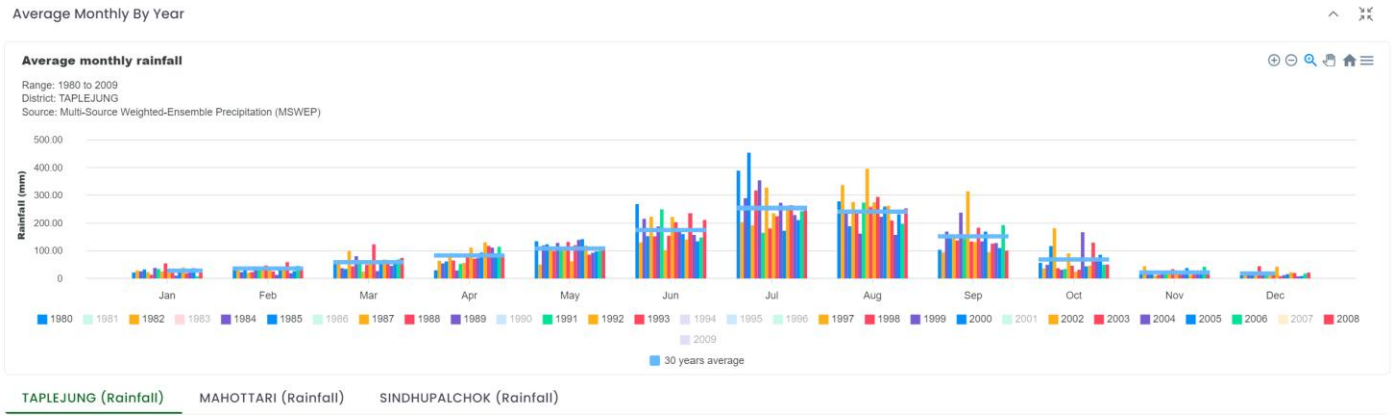


2. Users can click respective buttons for zooming in, zooming out, selecting zoom area, resetting zoom, and panning around the chart by clicking the respective buttons.
3. To download the chart, click on the *Menu* icon, and select data format (e.g., SVG, PNG, CSV)

Comparing rainfall/temperature patterns for across different years

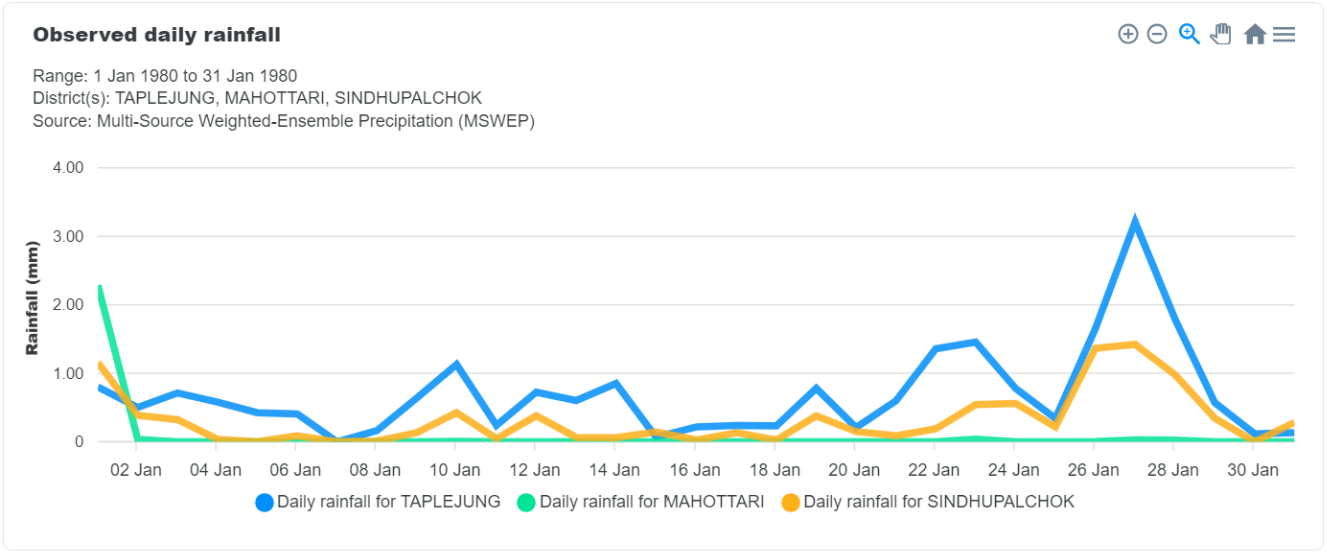
In the *Average Monthly By Year* chart, users can compare different climate parameters (e.g., rainfall, mean/min/max temperature) over the period specified by the user for different years.

1. To select one or more climate parameter/s (e.g., rainfall, temperature) per location to be included/removed from the analysis, simply click on parameters in the legend area.



2. Users can click respective buttons for zooming in, zooming out, selecting zoom area, resetting zoom, and panning around the chart by clicking the respective buttons.
3. To download the chart, click on the *Menu* icon, and select data format (e.g., SVG, PNG, CSV)

4. A drill down of monthly data to daily data can be viewed on the ***Daily*** chart. This feature is useful for investigating unusually higher/lower than normal recording of monthly rainfall/temperature, particularly during extreme events.



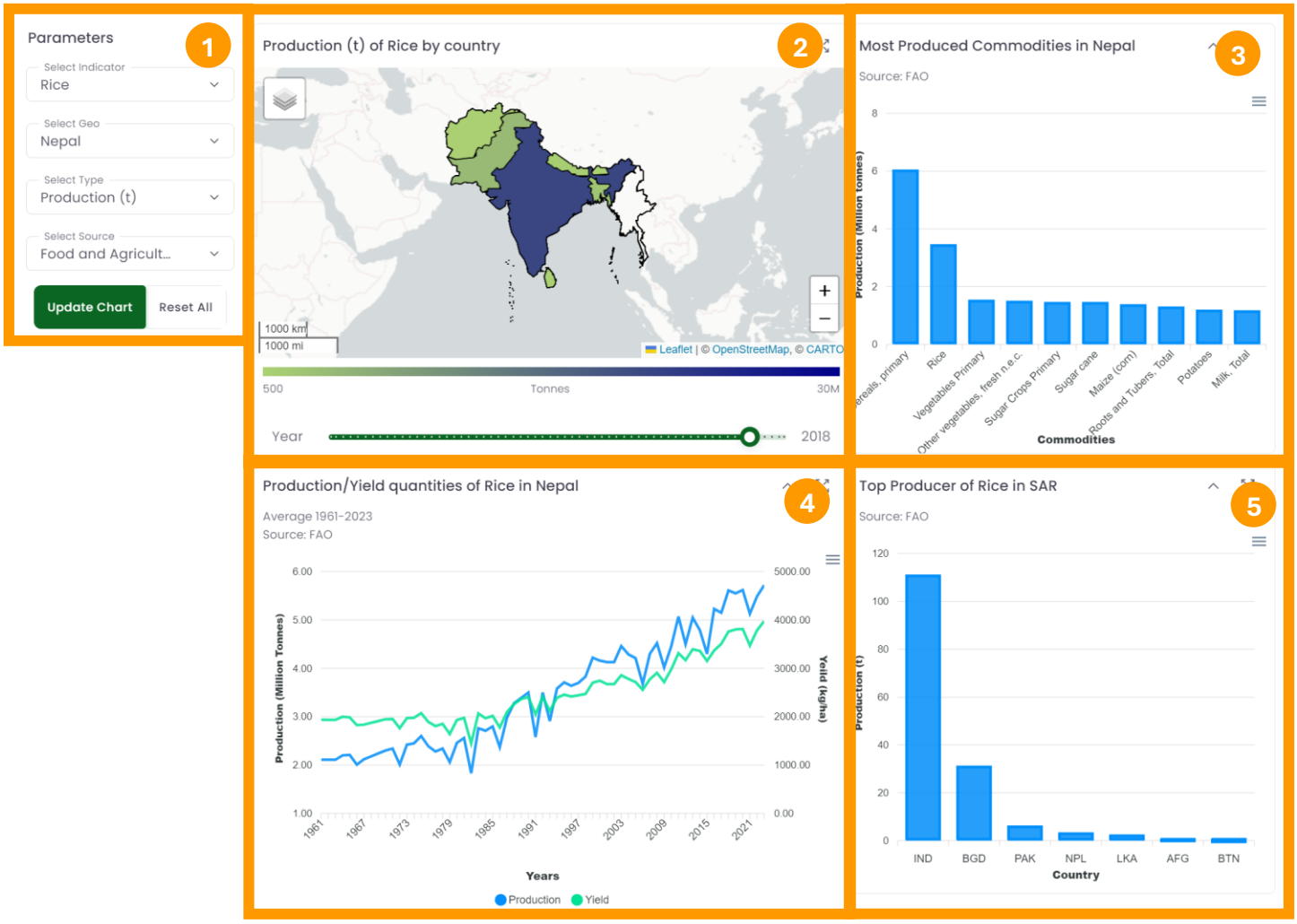
Data Tool 2: Agriculture Data

https://rdas.rimes.int/catalog/agriculture

This tool visualizes regional cro=- datasets of various spatial and timescales that can be downloaded, and used by stakeholders for a number of analyses, on its own or paired with other datasets.

The tool's user interface contains the following components/panels:

1. **Parameter List,** provides the list of required parameters needed to initiate the analysis, which includes:
    - Parameter
    - Country
    - Production
    - Data Source (e.g., MSWEP, ERA5, APHRODITE, CRU, CHIRPS, GPCC, IMD)
2. **Crop Production by Country Map,** provides country-wise crop production disaggregated by year in a map
3. **Most Produced Commodities per Country,** provides top 10 commodities per country
4. **Crop Production/Crop Yield per Country,** provides long-term time series crop production/crop yield per country
5. **Top Producer in SAR,** ranks the top producer of a specified crop in SAR

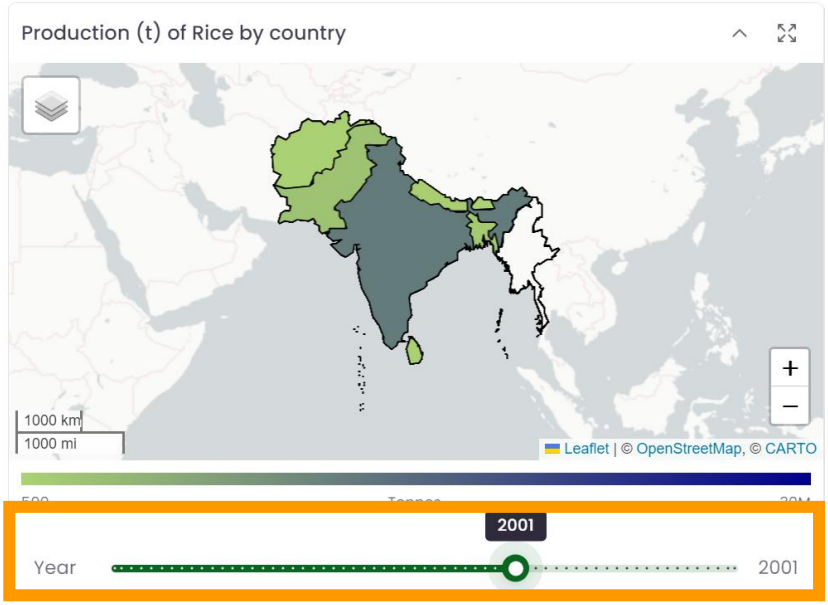


Setting up parameters for analysis

1. In the *Indicator* panel, select a crop to be analyzed.
2. Select the country to be analyzed under the *Geo* option.
3. Under the *Type* option, select parameter to be displayed on the map (production, area, yield)
4. Under the *Source* option, select preferred data source.
5. Once all parameters have been selected, click on the *Update Chart* button to generate the analyses, charts, and maps. To reset analyses/charts/maps, click on the *Reset All* button.

Visualizing crop production/area/yield in a map

To select a particular year to visualize the selected parameter, move the year slider across the years. The year selected will be displayed on the slider bar.



Navigating the charts

1. Users can *Expand* icon to zoom in on the chart.
2. To download the chart, click on the *Menu* icon, and select data format (e.g., SVG, PNG, CSV)

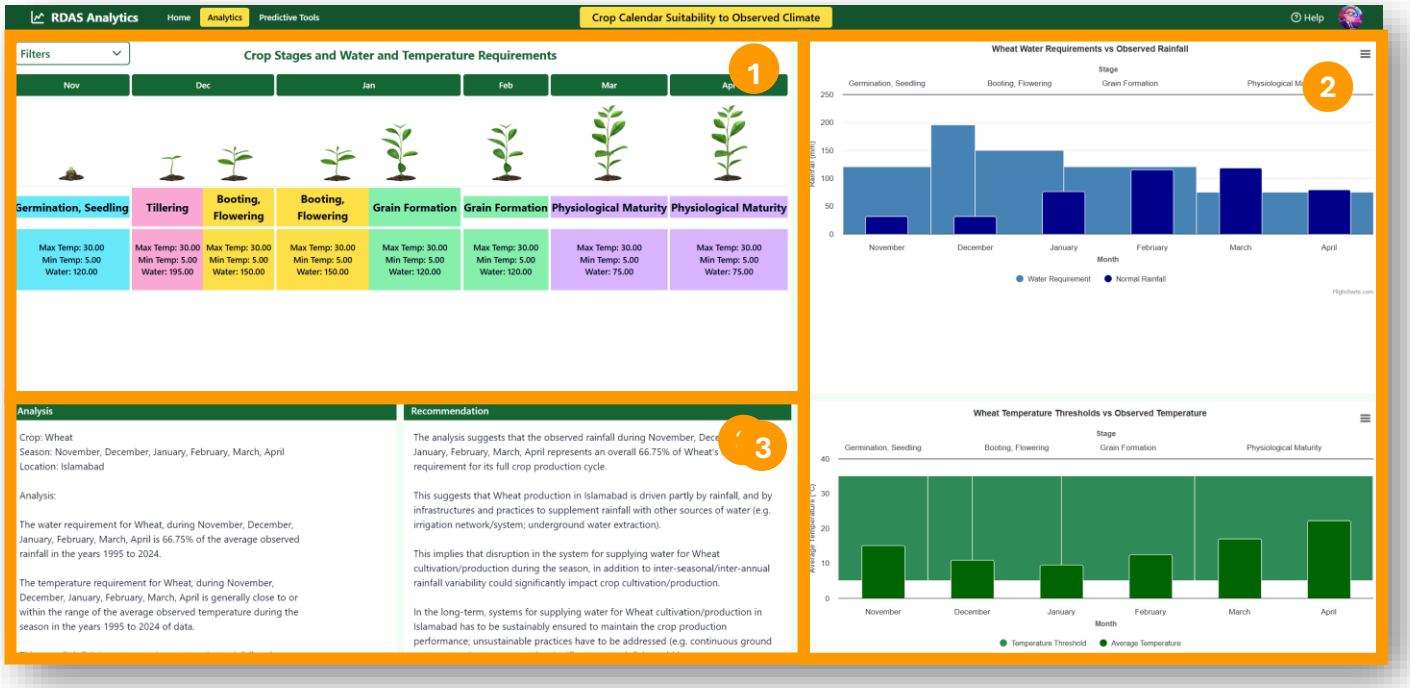
Analytics Tool 1: Cropping Calendar Suitability to Observed Climate

URL: https://analytics.rdas.live/analytics-crop

This tool provides analysis of inter-annual variability of a cropping calendar through identification of matches/ mismatches of behaviors of cropping calendar vs. observed monthly rainfall/temperature over 30 years, 20 years, 10 years, and 5 years, and potential seasonal adjustments to the cropping calendar per updated seasonal/monthly climate outlooks.

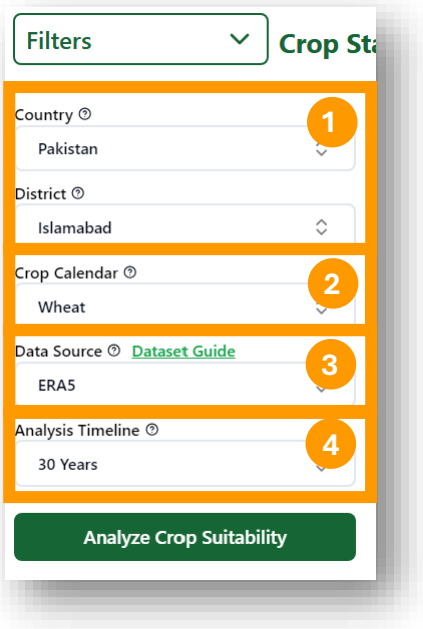
The tool's user interface contains the following components/panels:

1. **Crop Suitability Calendar,** provides crop-stage-wise thresholds for min/max temperature and water requirements
2. **Crop Requirements vs. Observed Rainfall/Temperature,** provides charts comparing crop-stage-wise requirements and monthly normal rainfall/temperature
3. **Analysis and Recommendation,** provides an analysis of the sufficiency of crop requirements for water and temperature and recommendations in case requirements are not sufficient

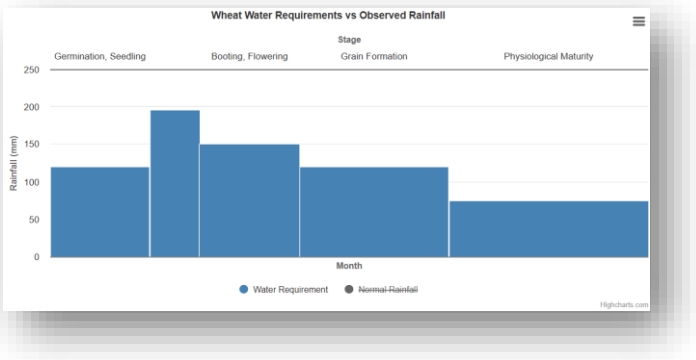


Setting up parameters for analysis

1. In the *Filters* panel, select the country and district to be analyzed under the *Country* and *District* options.
2. Under the *Crop* option, select one crop (e.g., wheat, rice, cotton, maize, groundnut, brassica) to be analyzed.
3. Under the *Data Source* option, select preferred data source (MSWEP, ERA5, APHRODITE, CRU, CHIRPS).
4. Select period (5 years, 10 years, 20 years, 30 years) for conducting the analysis under the *Analysis Timeline* option.
5. Once all parameters have been selected, click on the *Analyze Crop Suitability* button to generate the charts, analysis, and recommendation.



6. Parameters can be selected/deselected from the chart by clicking on the parameters on the legend.



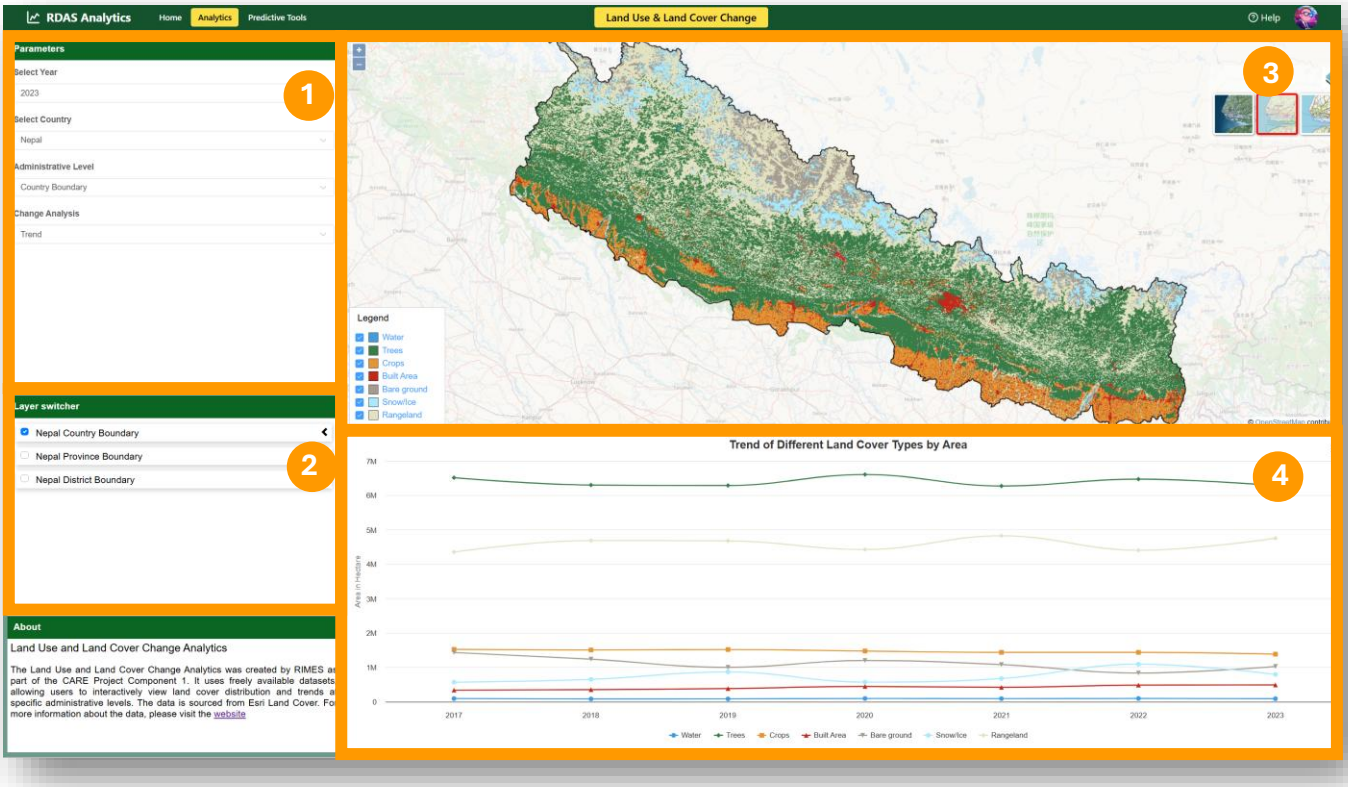
Analytics Tool 2: Land Use and Land Cover Change

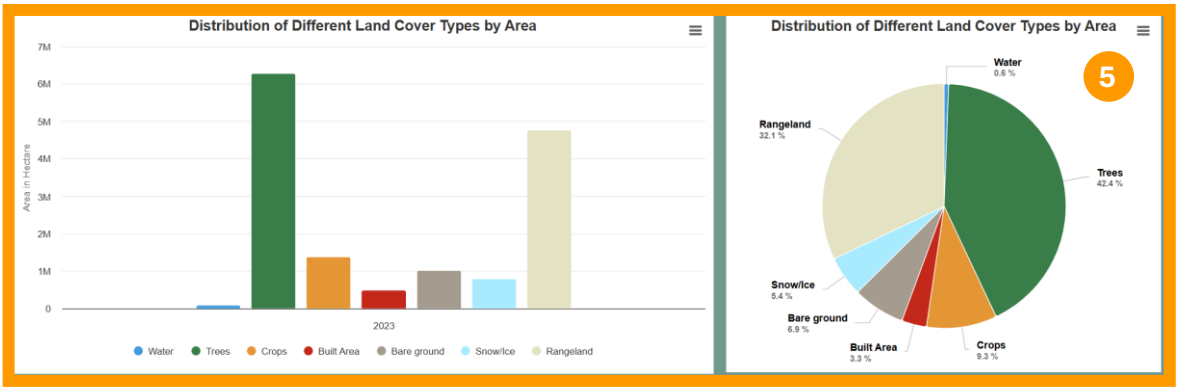
URL: https://analytics.rdas.live/analytics-land

This tool provides analysis of increasing/decreasing trends of different land cover/land use types (e.g., water, trees, rangeland, crops, built-up areas, barren ground, snow/ice) over a specified period. Land cover data is derived from the 10m resolution Sentinel dataset from ESRI.

The tool's user interface contains the following components/panels:

1. **Parameter List,** provides the list of required parameters needed to initiate the analysis, which includes:
    - Year
    - Country
    - Administrative Level
    - Visualization Type (e.g., distribution in hectares, distribution in percentage, trend)
2. **Layer Switcher,** provides a list of boundaries (e.g., country, province, district) that can be overlayed on the map
3. **Land Cover and Land Use Map,** spatial presentation of land cover and land use types
4. **Trends of Land Cover Types by Area Chart,** provides trends in changes in land cover/land use types over a specific period
5. **Distribution of Different Land Cover Types by Area Chart,** statistical presentation of land use and land cover type distribution, in terms of hectares and percentage



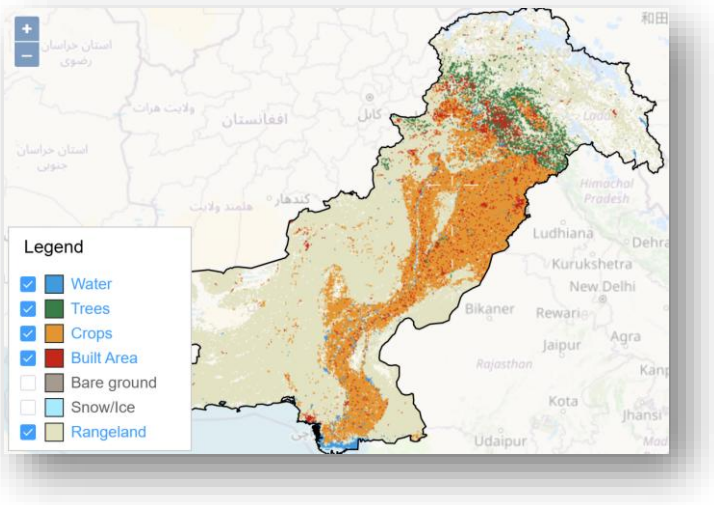


Setting up parameters for analysis

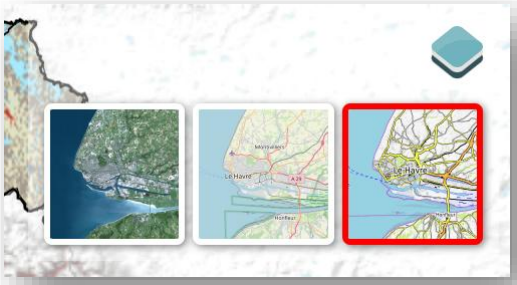
1. In the *Parameters* panel, under the *Select Year* option, select year to be analyzed.
2. Select the country and administrative level to be analyzed under the *Select Country* and *Administrative Level* options.
3. Under the *Change Analysis* option, select preferred type of visualization analyzing change in land use & land cover.

Visualizing layers on the map

1. In the *Layer Switcher* panel, users can select/deselect boundaries (country, province, district) to overlay on the map
2. On the map view, users can select/deselect land use/land cover types to render on the map.



3. Basemap layers can be changed on the fly by clicking on preferred icons: *Satellite, OpenStreetMap (OSM),* and *Open Topo Map.*



Analyzing land cover and land use distribution and trends

1. Users can change the analyses (i.e., maps, charts, analysis, recommendation) on the fly by switching preferences under the *Change Analysis Type* option any time, that is, *Distribution (in Hectares), Distribution (in Percentage),* and *Trend* to view charts of the *Distribution of Different Land Cover Types by Area*, either in terms of hectares and percentage, and *Trend of Different Land Cover Types by Area*, respectively

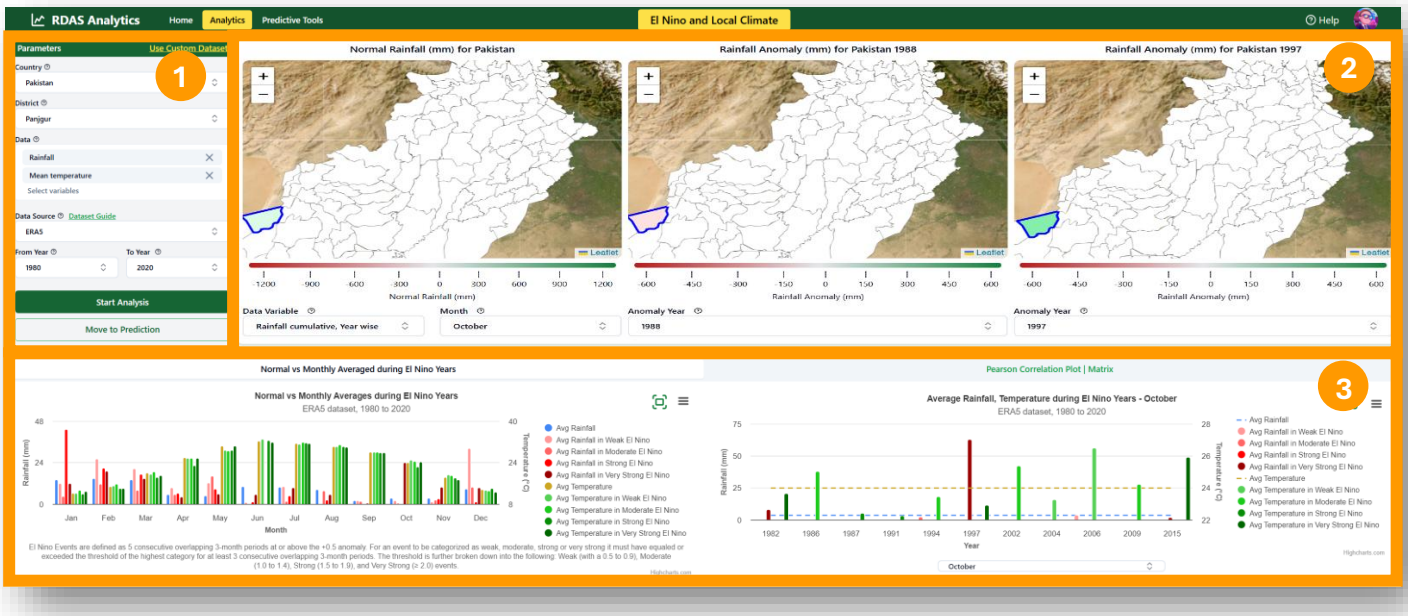
Analytics Tool 3: El Nino/La Nina and Local Climate

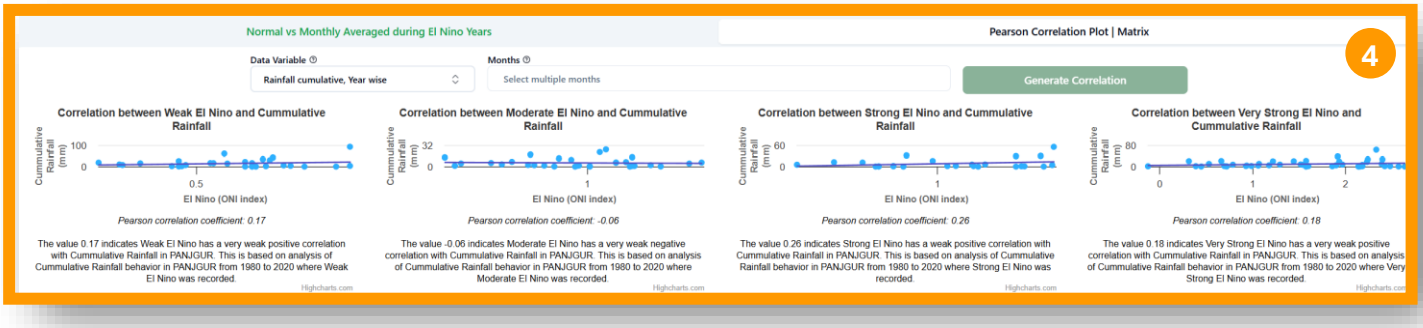
URL for **El Nino**: https://analytics.rdas.live/elnino-analytics
URL for **La Nina**: https://analytics.rdas.live/lanina-analytics

This tool provides analysis of the correlation between El Nino/La Nina years of different intensities (weak, moderate, strong, very strong) using the Oceanic Nino Index (ONI) and observed climate parameters such as rainfall/temperature data, for a minimum of 30 years, disaggregated month-wise, district-wise. The tool also provides rainfall/temperature anomaly maps.

The tool's user interface contains the following components/panels:

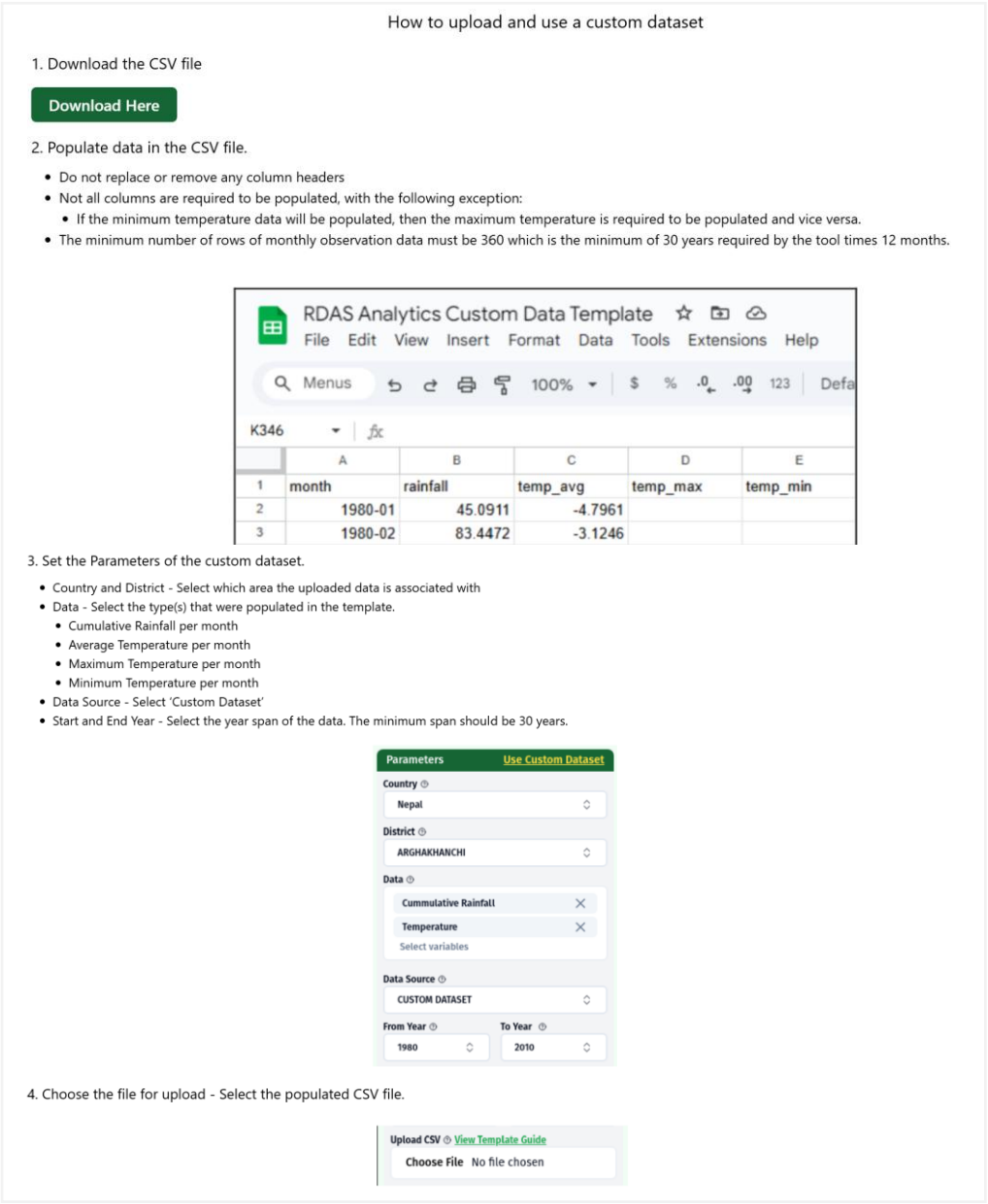
1. **Parameter List,** provides the list of required parameters needed to initiate the analysis, which includes:
    - Country
    - District
    - Climate parameter (e.g., rainfall, max/min/mean temperature)
    - Data source (e.g., MSWEP, ERA5, APHRODITE, CRU, CHIRPS, GPCC, custom dataset)
    - Period of analysis (start year, end year)
2. **Rainfall/Temperature Anomaly Maps,** presents the monthly normal rainfall/temperature maps against observed rainfall for particular year/s
3. **Normal vs Monthly Averages during El Nino Years,** shows charts of monthly normal rainfall/ temperature against monthly averages per El Nino/La Nina years of different intensities: weak, moderate, strong, very strong, using the Oceanic Nino Index (ONI) viz.:
    - Weak (El Nino: 0.5 to 0.9 / La Nina:-0.5 to-0.9)
    - Moderate (1.0 to 1. /; La Nina:-1.0 to-1.4)
    - Strong (1.5 to 1.9 / La Nina:-1.5 to-1.9)
    - Very Strong (≥ 2.0 / La Nina: ≤-2.0)
4. **Correlation Plot,** generates scatterplots and Pearson coefficients to determine the correlation between monthly accumulated rainfall/average temperature and El Nino/La Nina intensities using the ONI





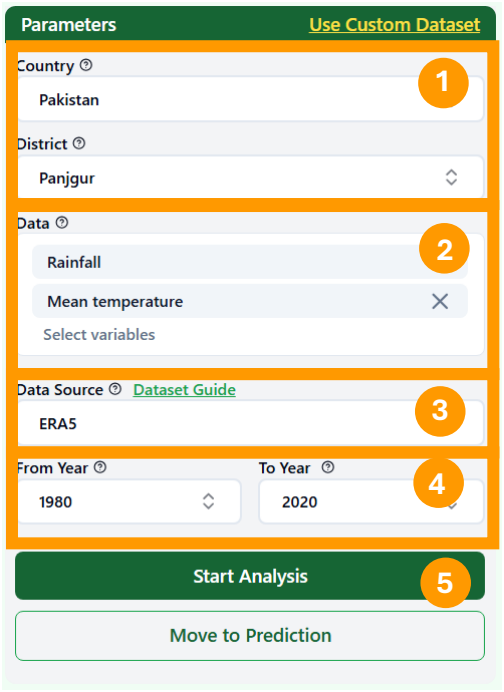
Setting up parameters for analysis

1. In the *Parameter* panel, select the country and district to be analyzed under the *County* and *District* options.
2. Under the *Data* option, select one or two climate parameters (e.g., rainfall, temperature) to be analyzed.
3. Under the *Data Source* option, select preferred data source. Brief description of data sources can be accessed by clicking on the *Dataset Guide* icon Data Source Dataset Guide.
   To upload custom datasets, click on *Custom Dataset* option, then click on *View Template Guide* button Upload CSV View Template Guide and follow the guide for uploading.



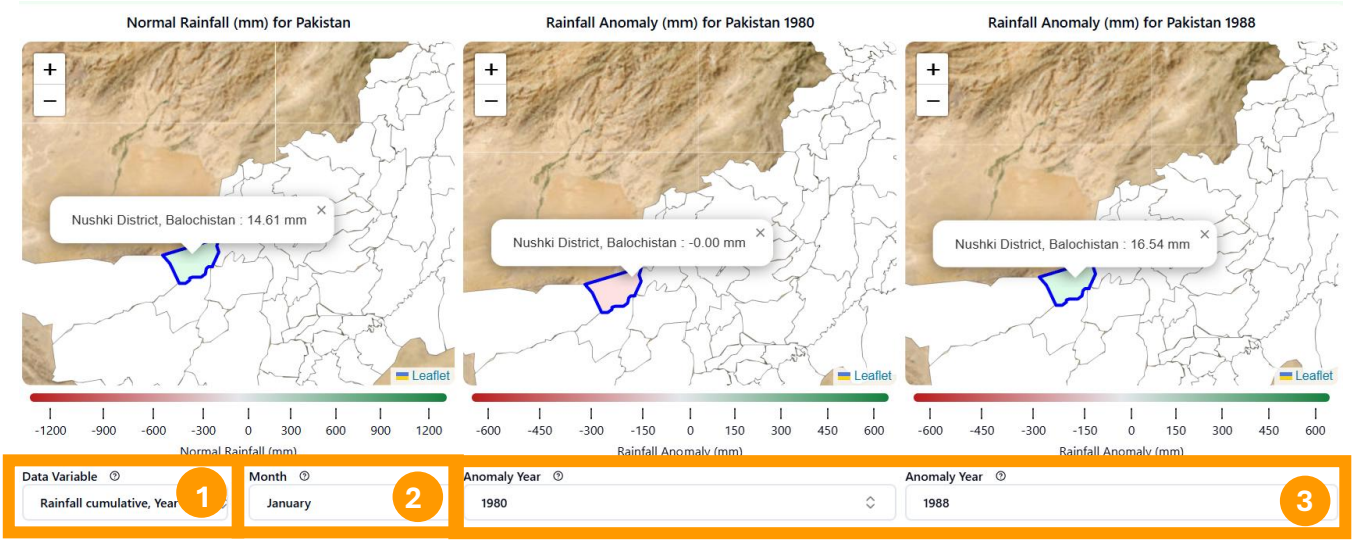
4. Select the start and end years for the analysis under the *From Year* and *To Year* options.

5. Once all parameters have been selected, click on the *Start Analysis* button to generate the analyses, charts, and maps.



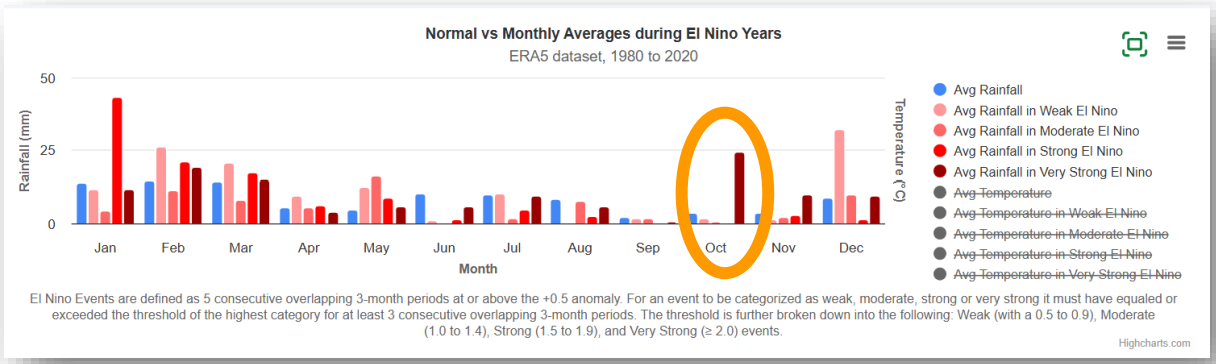
Comparing rainfall/temperature anomalies

1. Under the *Data Variable* option, select one climate parameter (e.g., rainfall, temperature) to be analyzed.
2. Under the *Month* option, select the month for comparison.
3. Under the *Anomaly Year* option, select the year/s to be compared.

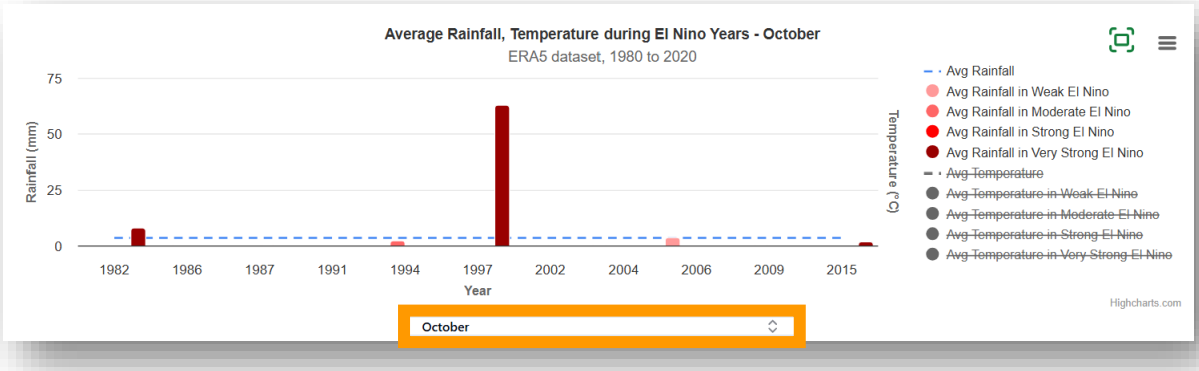


Comparing monthly normal rainfall/temperature against monthly averages per El Nino/La Nina years of different intensities

1. The chart on the left provides a comparison of monthly normal rainfall/temperature and monthly averages per El Nino/La Nina years of different intensities (weak, moderate, strong, very strong). Parameters can be selected/deselected from the chart by clicking on the parameters on the legend. Moreover, clicking on the *Expand* icon provides a zoomed version of the chart.

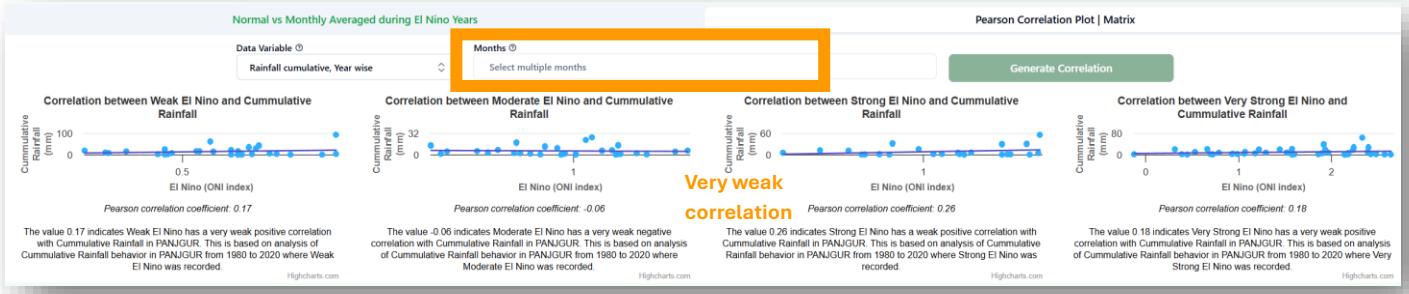


2. Outliers, such as the significantly higher than average rainfall during very strong El Nino years in October, can be further investigated using the chart on the right. It can be seen from the chart that the high average is driven by the extreme rainfall event in 1997. Users can select any month to conduct more detailed analysis.



3. To generate the correlation plots per El Nino/La Nina intensity, click on the *Pearson Correlation Plot* tab.
4. Under the *Data Variable* option, select a climate parameter (e.g., rainfall, temperature).
5. Under the *Months* option, users can specify months to use for the analysis. If users do not select any month, the default will utilize all 12 months in the analysis. This feature is useful for analyzing a specific period, e.g., winter/monsoon seasons, etc., and for removing outlier months in the analysis.

   Below example shows very weak correlation if all months are considered but indicates very strong positive correlation if only the months of January to March were considered in the analysis of Strong El Nino events.




Normal vs Monthly Averaged during El Nino Years
Pearson Correlation Plot | Matrix
Data Variable
Rainfall cumulative, Year wise
Months
January
February
March
Select multiple months
Generate Correlation
Correlation between Weak El Nino and Cummulative Rainfall
Cummulative Rainfall (mm)
80
0
0.5
El Nino (ONI index)
Pearson correlation coefficient: 0.15
The value 0.15 indicates Weak El Nino has a very weak positive correlation with Cummulative Rainfall in PANJGUR. This is based on analysis of Cummulative Rainfall behavior in PANJGUR from 1980 to 2020 where Weak El Nino was recorded.
Highcharts.com
Correlation between Moderate El Nino and Cummulative Rainfall
Cummulative Rainfall (mm)
24
0
1
El Nino (ONI index)
Pearson correlation coefficient: 0.02
The value 0.02 indicates Moderate El Nino has a very weak positive correlation with Cummulative Rainfall in PANJGUR. This is based on analysis of Cummulative Rainfall behavior in PANJGUR from 1980 to 2020 where Moderate El Nino was recorded.
Highcharts.com
Very strong correlation
Correlation between Strong El Nino and Cummulative Rainfall
60
0
1
El Nino (ONI index)
Pearson correlation coefficient: 0.84
The value 0.84 indicates Strong El Nino has a very strong positive correlation with Cummulative Rainfall in PANJGUR. This is based on analysis of Cummulative Rainfall behavior in PANJGUR from 1980 to 2020 where Strong El Nino was recorded.
Highcharts.com
Correlation between Very Strong El Nino and Cummulative Rainfall
Cummulative Rainfall (mm)
40
0
1
2
El Nino (ONI index)
Pearson correlation coefficient: -0.07
The value -0.07 indicates Very Strong El Nino has a very weak negative correlation with Cummulative Rainfall in PANJGUR. This is based on analysis of Cummulative Rainfall behavior in PANJGUR from 1980 to 2020 where Very Strong El Nino was recorded.
Highcharts.com

Predictive Tool 1: El Nino/La Nina Impacts

URL for **El Nino**: https://analytics.rdas.live/predictive-tools
URL for **La Nina**: https://analytics.rdas.live/lanina-predictive-tools

This tool provides potential impacts of El Nino events of different intensities (weak, moderate, strong, very strong) on rainfall/temperature based on a minimum of 30 years historical/observed rainfall/temperature dataset, disaggregated month-wise, district-wise.

The tool's user interface contains the following components/panels:

1. **Parameter List,** provides the list of required parameters needed to initiate the analysis, which includes:
   - Country
   - District
   - Climate parameter (e.g., rainfall, max/min/mean temperature)
   - Data source (e.g., MSWEP, ERA5, APHRODITE, CRU, CHIRPS, GPCC, custom dataset)
   - Period of analysis (start year, end year)
2. **Table of Prediction,** shows a list of potential impacts on rainfall/temperature per El Nino/La Nina category: weak, moderate, strong, very strong, using the Oceanic Nino Index (ONI) viz.:
   - Weak (0.5 to 0.9 / La Nina:-0.5 to-0.9)
   - Moderate (1.0 to 1.4 / La Nina:-1.0 to-1.4)
   - Strong (1.5 to 1.9 / La Nina:-1.5 to-1.9)
   - Very Strong (≥ 2.0 / La Nina: ≤-2.0)
3. **Narrative Guidance,** generates scatterplots of accumulated rainfall per El Nino/La Nina category and provides a narrative guidance on the likelihood of accumulated rainfall/temperature occurring within the predicted range (also refer to *Table of Prediction*).

Setting up parameters for analysis

1. In the *Parameter* panel, select the country and district to be analyzed under the *County* and *District* options.
2. Under the *Data* option, select one or two climate parameters (e.g., rainfall, temperature) to be analyzed.
3. Under the *Data Source* option, select preferred data source. Brief description of data sources can be accessed by clicking on the *Dataset Guide* icon Data Source Dataset Guide.
4. To upload custom datasets, click on *Custom Dataset* option, then click on *View Template Guide* button Upload CSV View Template Guide and follow the guide for uploading.
5. Select the start and end years for the analysis under the *From Year* and *To Year* options.
6. Select the months to be included in the analysis under the *Months* options.
7. Under the *Event Status* options, select either *Upcoming,* for a forecasted El Nino event or *Persisting,* if the El Nino event has been going on for a long period of time.

8. Once all parameters have been selected, click on the *Generate Predictive Model* button to generate the table, chart, and analyses of potential range of accumulated rainfall per El Nino category.
9. In the *Table of Prediction* panel, select the variable (rainfall/temperature) to predict.

Predictive Tool 2: Temperature Sensitivity Alert System

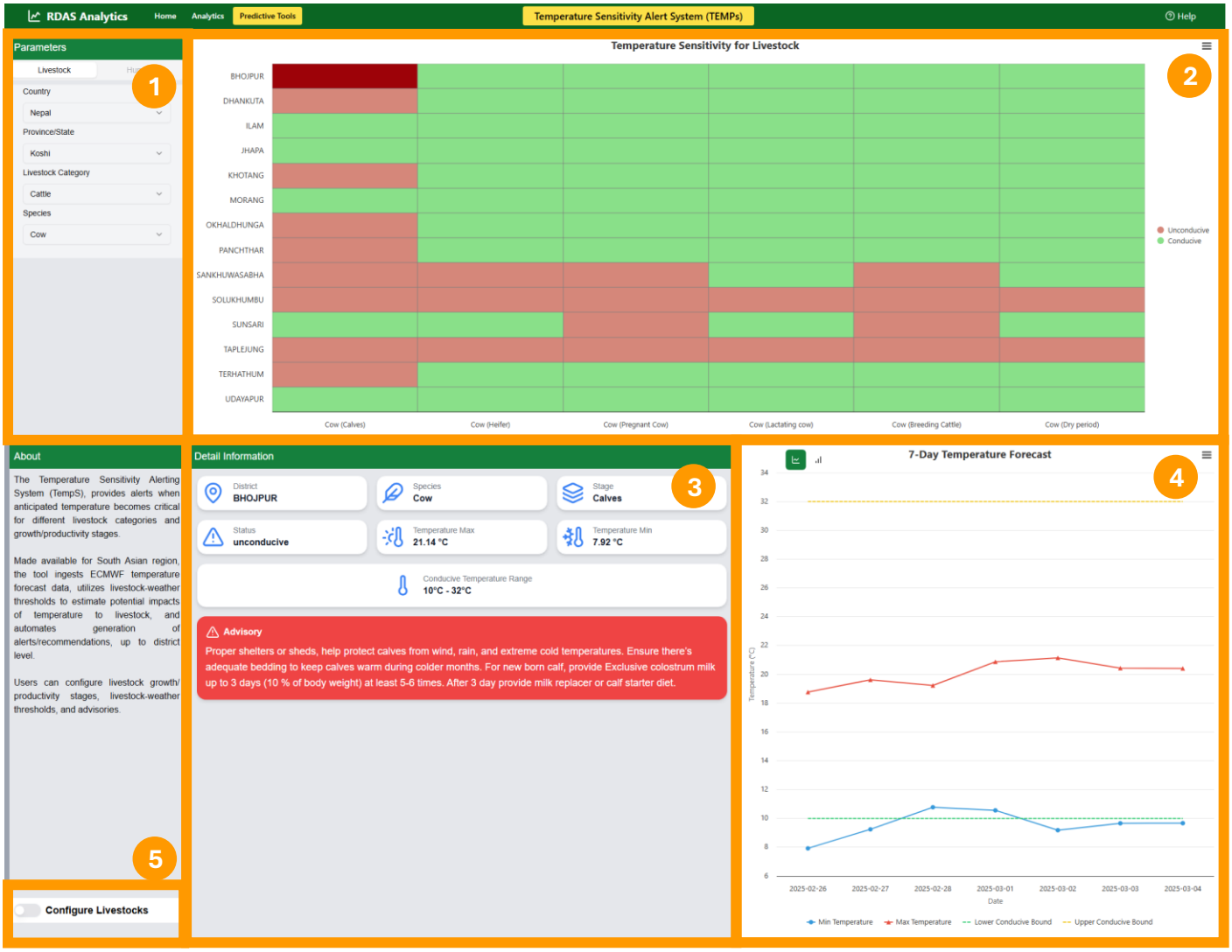
URL: https://analytics.rdas.live/predictive-temps

This tool provides alerts when anticipated temperature becomes critical for different variables, to include primarily:

- Humans (health and survival), to be categorized per levels of vulnerability, i.e., babies, old population, those without heating systems, etc.
- Livestock (productivity and survival), to be categorized per kind, per productivity stage and per levels of vulnerability

The tool's user interface contains the following components/panels:

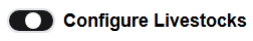
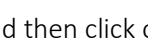
1. **Parameter List,** provides the list of required parameters needed to initiate the analysis, which includes:
    - Country
    - Province/State
    - Livestock Category (e.g., cattle, buffalo, sheep, goat, pig, poultry)
    - Species
    - Livestock Category,
2. Alerts, provides district-wise alerts per livestock species in table format
3. Detailed Information Chart, provides district-wise detailed information on livestock (i.e., stage, species), status (i.e., conducive, unconducive), min/max temperature, conducive temperature range, and advisory
4. 7-day Temperature Forecast, provides district-wise 7-day temperature forecast overlaid with upper and lower bound/thresholds to indicate the range of conducive conditions per livestock species
5. Configure Livestock, ability to add new species, customize thresholds for setting the alerts, and advisories

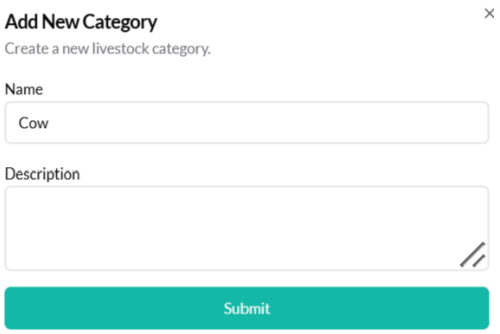


Navigating the charts

Clicking on the *Menu* icon ☰, users can view charts in full screen, print charts, and download in various data formats (e.g., PNG, JPEG, SVG).

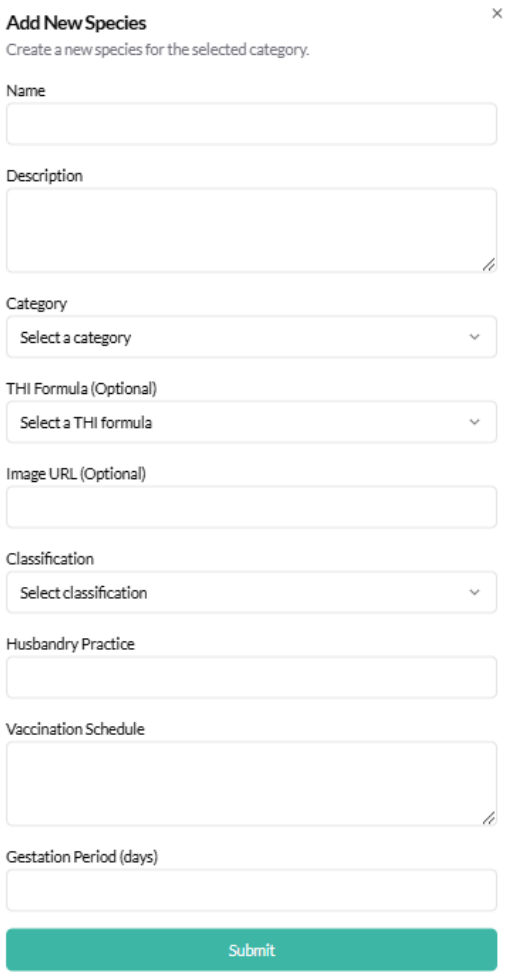
Setting up the livestock phases, thresholds, advisories, husbandry practices, formula

1. Select the *Configure Livestock* button  to initiate settings configuration.
2. In the *Species Management* panel, add a new category by clicking on the  button.
   Fill-in category name and description in the dialog box that will appear and then click on the *Submit* button.

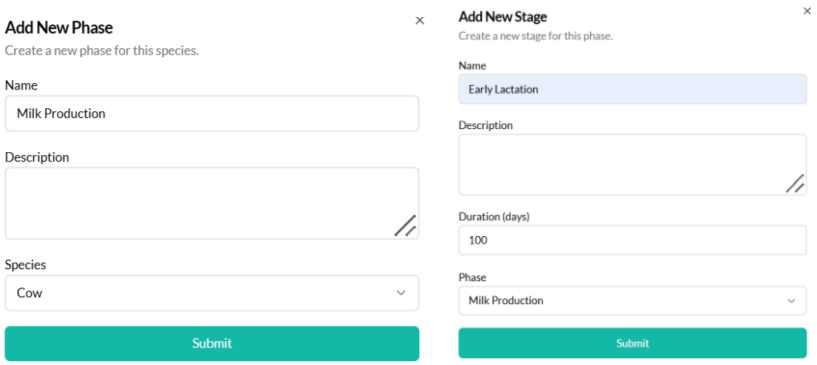


3. To add a new species, click on the  button and fill-in species name and description, select category and THI formula to use, URL of the image of the animal, classification (e.g., Hybrid/Exotic, Indigenous/Local),

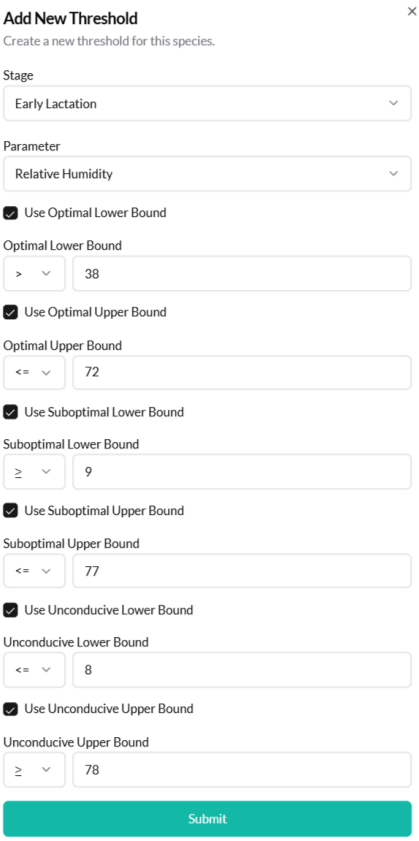
husbandry practice, vaccination schedule, and gestation period in the dialog box that will appear. Click on the *Submit* button when done.



4. To edit or delete species, click on the  buttons, respectively.
5. To customize details for each livestock, select the animal type to configure in the *Categories* drop-down menu. There are 3 tabs to setup: *Phases, Thresholds,* and *Advisories.* First select *Phases* tab, click on the + Add Phase button and fill-up the name of the phase, description (optional) and select the species. Click on the *Submit* button when done. Then select the + Add Stage button, enter the stage name, description (optional), and select the phase. Click on the *Submit* button when done.



6. To edit or delete stages, click on the  buttons, respectively.
7. To setup the threshold per livestock stage, select on the *Thresholds* tab, and click on the + Add Threshold button. Input the stage name, parameter to use (rainfall, relative humidity, temperature, THI), and threshold ranges. Once done, select the *Submit* button.



8. To setup the advisories template, select on the *Advisories* tab, and click on the + Add Advisory button. In the dialog box that will appear, select the threshold defined earlier and fill-in content/s for each threshold condition.