

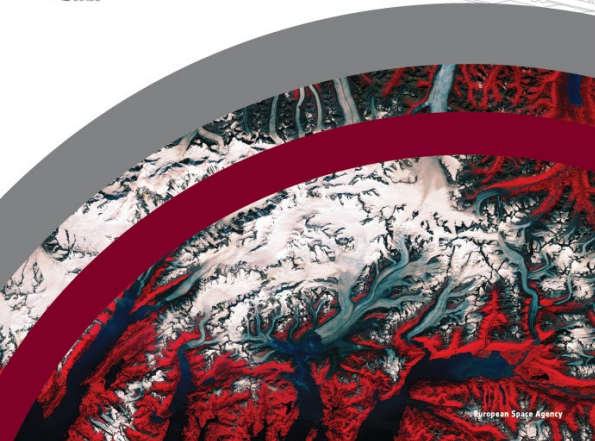
# → EARTH OBSERVATION FOR SUSTAINABLE DEVELOPMENT

## Climate Resilience

Using Earth Observations to inform climate-resilient investment decisions in International Financing Institutions client states

Dr Carlos Domenech (GMV)





## ■ Year 1: Stakeholder Engagement

- Engage IFI's and key stakeholders in IFI client states
- Define mechanisms for sustainable transfer of EO and define common actions to address issues across the project life-cycle
- Elaborate and prepare the EO demonstrations required

## ■ Years 2-3: Service Demonstration

- Develop EO service clusters, and execute/scale-up EO service demonstrations
- Connect to existing international networks and development support initiatives
- Implement cooperative training and capacity building, both within IFI (for project preparation) and IFI Client States (project implementation)
- Prepare the sustainable transfer of EO services into routine working practices of large scale ODA programmes and projects

## Highly experienced team combining competency in:

- Geospatial analysis
- Earth observation (EO) data
- Climate resilience and climate change adaptation
- Capacity Building



<https://eo4sd-climate.gmv.com>

## Main aim:

- Prove the potential of EO in support of climate resilience decision making at local, regional and national level and in collaboration with key IFIs and their client states.
- Financial framework for demonstrating the high impact of EO-based climate services



ACCLIMATISE  
building climate resilience



## Climate services portfolio

Provision of EO-based  
**Global climate indicators**



Provision of EO-based  
**Customized climate information solutions**

## Capacity Building

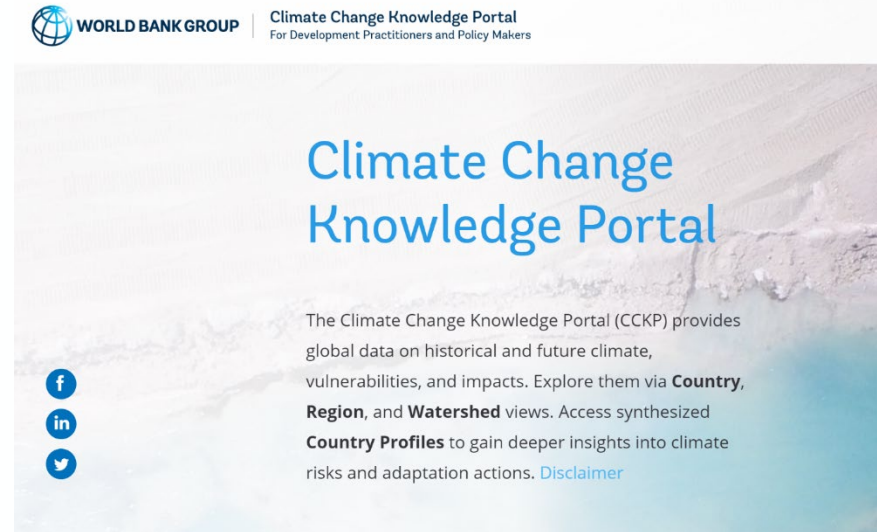


- Aims towards **self-sustainability of operations** that can be autonomously executed by local, regional and national bodies
- To be provided at two levels: to identified actors in CC (e.g., NMHSs) and to the IFIs to prepare both of them for **long-term exploitation of EO-based services** addressing climate adaptation solutions
- Provides the means to **autonomously conceive new services and products** customised to their needs

# EO-based Data Provision to Climate Portal

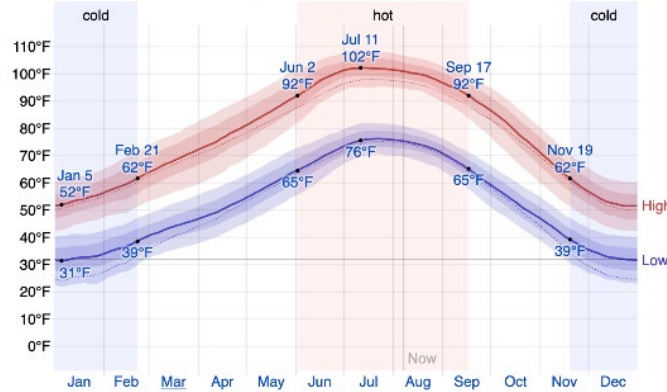


- Stakeholder: The World Bank – Climate Change group
- Project scope: Provide updated EO-based climate data (e.g., ESA and Copernicus services) to the Climate Change Knowledge Portal (CCKP)
- Provided service:
  - Updated **climate data and indicators** based on ESA CCI data and Copernicus Climate Change Service (C3S)
  - Dedicated APIs for spatial (e.g., country) and temporal (e.g., monthly) aggregation and anomalies computation
- Value added:
  - The provision of simple interfaces allows WB practitioners to combine EO-based climate data with climate projections for climate risk assessments



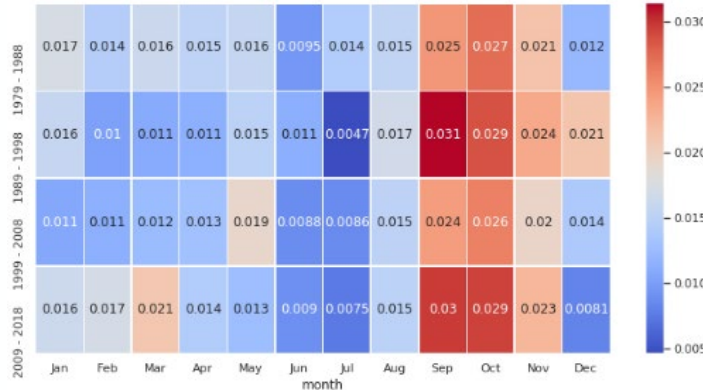
# EO-based Data Provision to Climate Portal

**API 1: Seasonality – Absolute Values**  
(min, max, average, ranges)

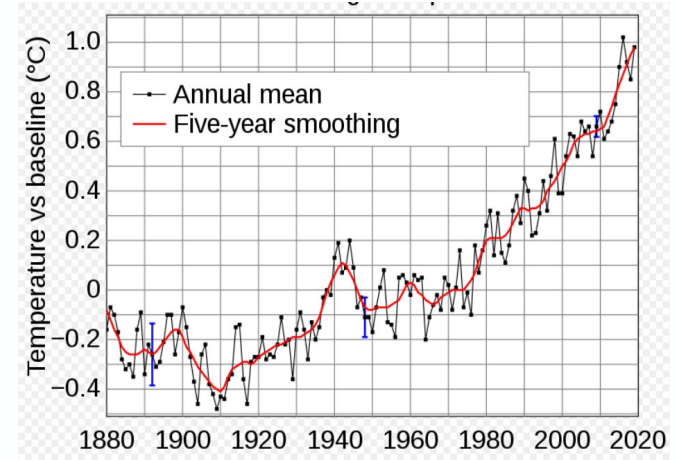


The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

**API 3: Heat maps**  
(decadal anomaly from baseline on a monthly basis)

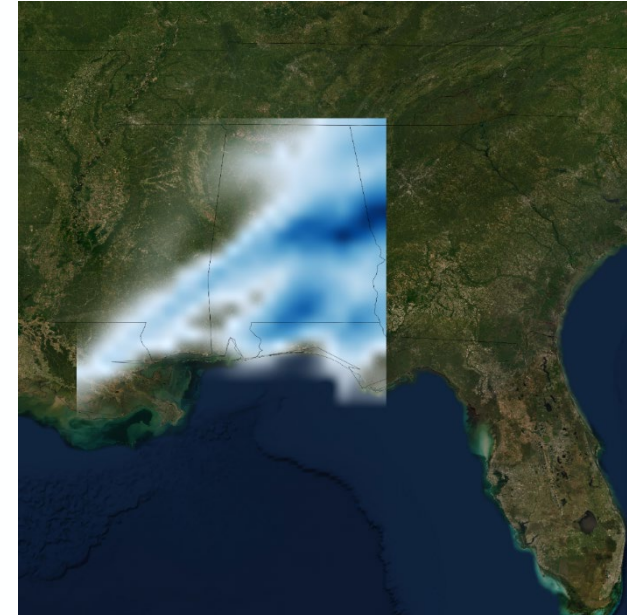


**API 2: Time Series – Anomaly from Baseline (1986-2005)**  
(yearly, 5-year smoothing)



# Supporting Climate Risk Screening

- Stakeholder: The International Finance Corporation (IFC) and the Multilateral Investment Guarantee Agency (MIGA)
- Objective: To integrate EO data into the stakeholder's climate risk screening tools and to develop interactive tools for analysis of extreme precipitation.
- Service: The EO4SD CR cluster provided extreme rainfall indicators using state-of-the-art EO and climate datasets to improve IFC's assessment of flood impact and its link to extreme precipitation. The EO-based extreme rainfall return levels were seamlessly integrated into IFC's existing climate risk tool. In addition, working with MIGA, the EO4SD CR cluster produced the **Rainfall Explorer**, a web-based tool that provides reliable insights into potential climate risks to existing and future investments.

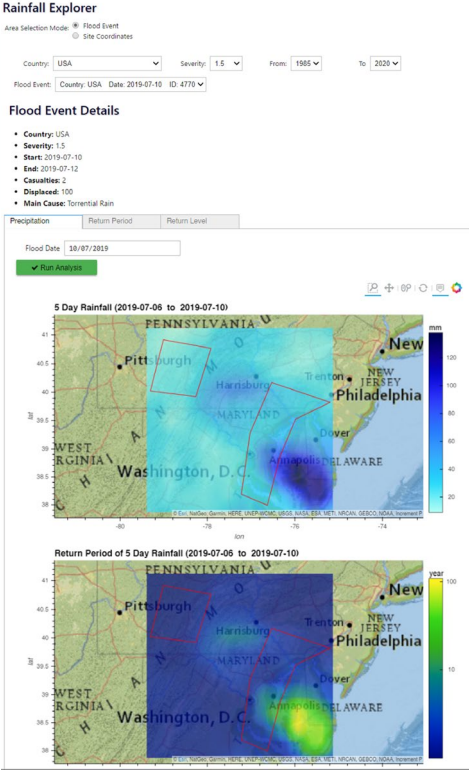


Example of the return level data for a flood event in the United States on Feb 2020.

# Supporting Climate Risk Screening



- Capacity Building: One webinar addressed to World Bank Group staff introducing and demonstrating the Rainfall Explorer tool through specific case studies (49 attendees)
- Impact/ Added Value: The Rainfall Explorer proved to be a powerful tool, as it allows the user to assess the statistical significance of historical and near-real time rainfall events. This means that the IFC and MIGA can understand the likelihood of flood risk associated with a particular level of rainfall, compared to historical events in the same area. Using the tools and datasets provided through this activity, the stakeholder could work out what size rain resulted in what sized flood and based on that they could develop some understanding of what the materiality would be of various shifts in precipitation data.



Snapshot of the Rainfall Explorer interface

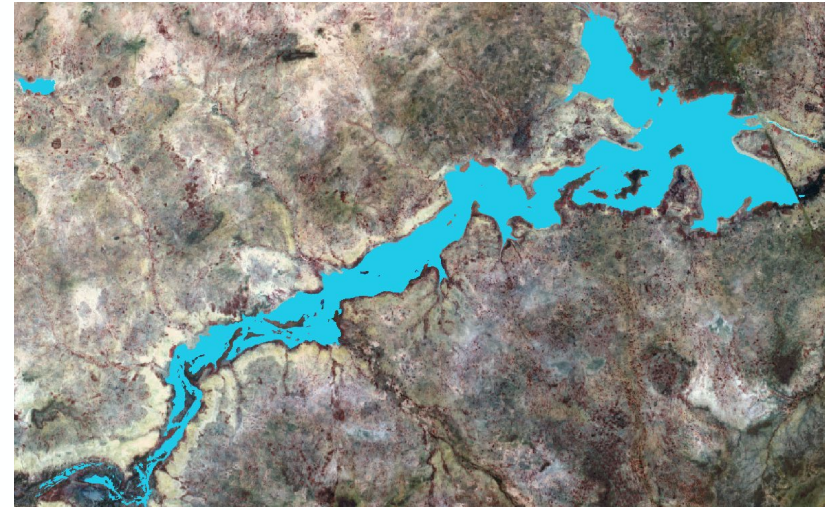




# Water Availability in West Africa



THE WORLD BANK



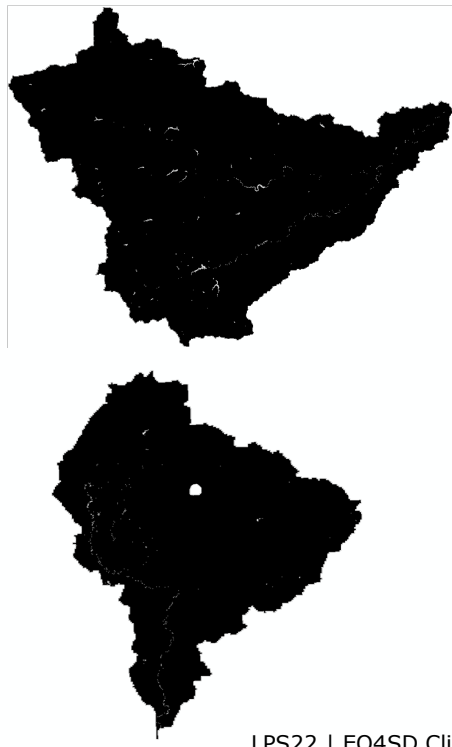
Example of a monthly water extent map (December 2018)

- Stakeholder: The World Bank and AGRHYMET (client beneficiary)
- Project: Food security investment project of West Africa programme (status: design phase)
- Objective: Support drought monitoring in West Africa through continuous observation of surface water dynamics allowing identification of climate related trends and short term changes.
- Service: The EO4SD CR cluster provided for Sirba and Pra basins:
  - 5-year time series of monthly surface water observations for two pilot areas to serve as a baseline to compare future observations against.
  - Comparison of currently monthly surface water observations against the 5-year baseline to assess each month and identify longer term trends in dryness/wetness.

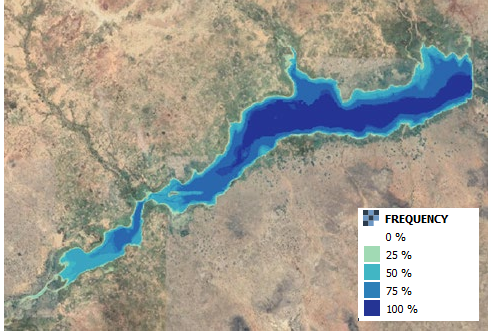
# Water Availability in West Africa

- Capacity Building: Training session to AGRHYMET’s GIS analysts showcasing results of the water monitoring service provided (4 attendees).
- Impact/ Added Value: Providing AGRHYMET the possibility to spatially and dynamically analyse water surface dynamics. The products serve as baseline for continuous monitoring and trend identification. The capacity building activity promoted the knowledge transfer in satellite technology.

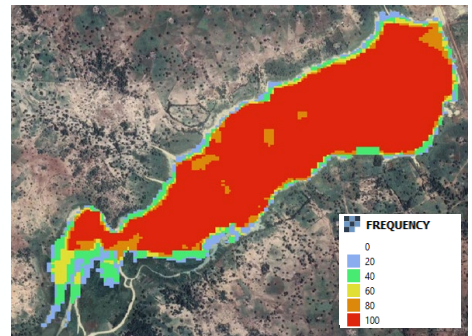
Monthly surface water extents



Annual water dynamics



Water dynamics by calendar month



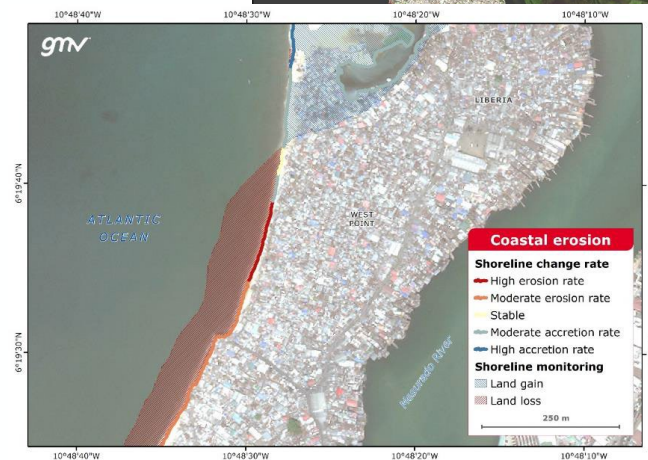
# Coastal Climate Hazards Assessment in Monrovia



THE WORLD BANK

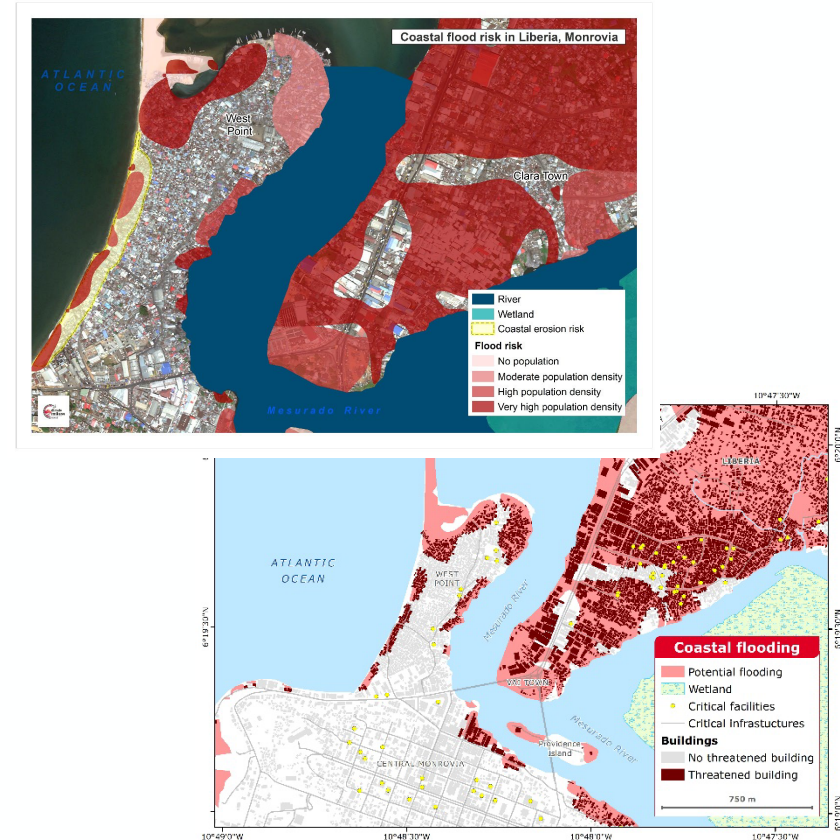


- Stakeholder: The World Bank
- Project: Monrovia Integrated Development Project (development project / status: pipeline)
- Objective: Provision of data and analytics to support the design of evidence-based policies and plans that improve the resilience of Monrovia metropolitan region (Liberia) to current and future climate risks
- Service: The EO4SD CR cluster analysed the coastal hazards through the analysis of the shoreline erosion (1984 -2019) and the geomorphologic analysis of the Monrovia's coast, and the exposure to coastal risks through the analysis of coastal flooding risk due to sea level rise and urban subsidence, the analysis population exposed and the analysis of critical infrastructures and residential areas exposed.



# Coastal Climate Hazards Assessment in Monrovia

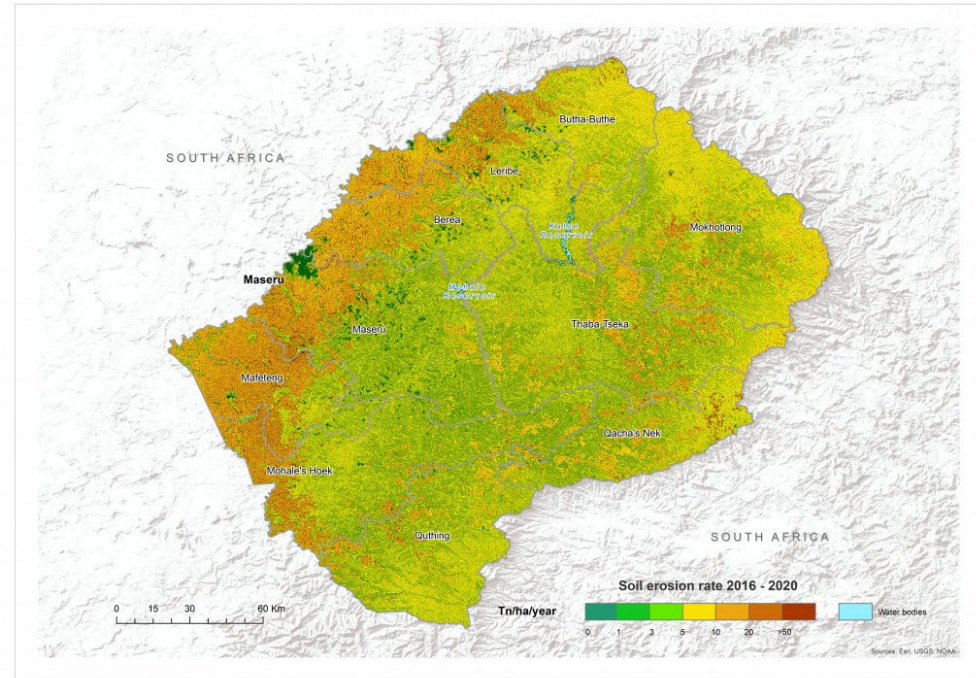
- Capacity Building: Addressed to local stakeholders. One training session on the EO-based services developed (Shoreline monitoring, Flood risks, Exposure of Assets). Two informative sessions about Climate Change, how to assess it and available tools to facilitate the assessment. One hands-on training session on EO4SD CR Platform & QGIS. (12 attendees)
- Impact/ Added Value: The analytical work conducted by the cluster was of great value for the Bank to complement and validate the coastal results of the hydrodynamic modelling of floods developed by the consultant's team.



# Wetland and land degradation monitoring for restoration and rehabilitation plans in Lesotho

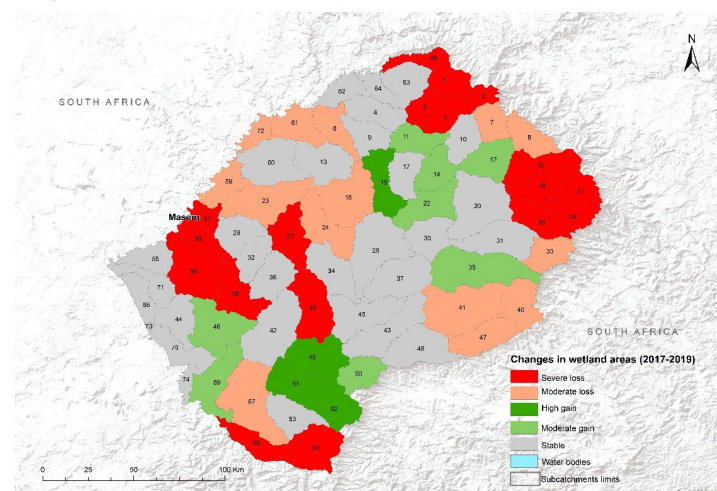
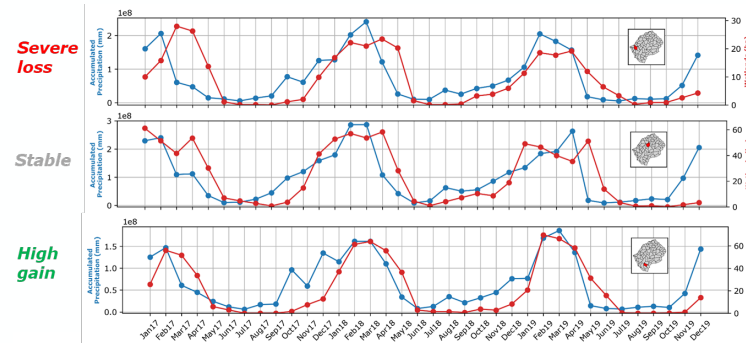


- Stakeholder: International Fund for Agricultural Development (IFAD)
- Project: Restoration of Landscapes and Livelihoods (status: planned)
- Objective: Lesotho suffers amongst the most severe soil erosion in the world. Land degradation as a result of soil erosion has been identified as one of the greatest environmental challenges facing Lesotho. The degradation is extended to its numerous wetlands, what is critical, as Lesotho depends on its water resources to create revenue for the country. The objective of the EO4SD CR cluster was to analyse annual soil loss changes over the last 20 years and to evaluate degradation of wetlands due to the climate variability.



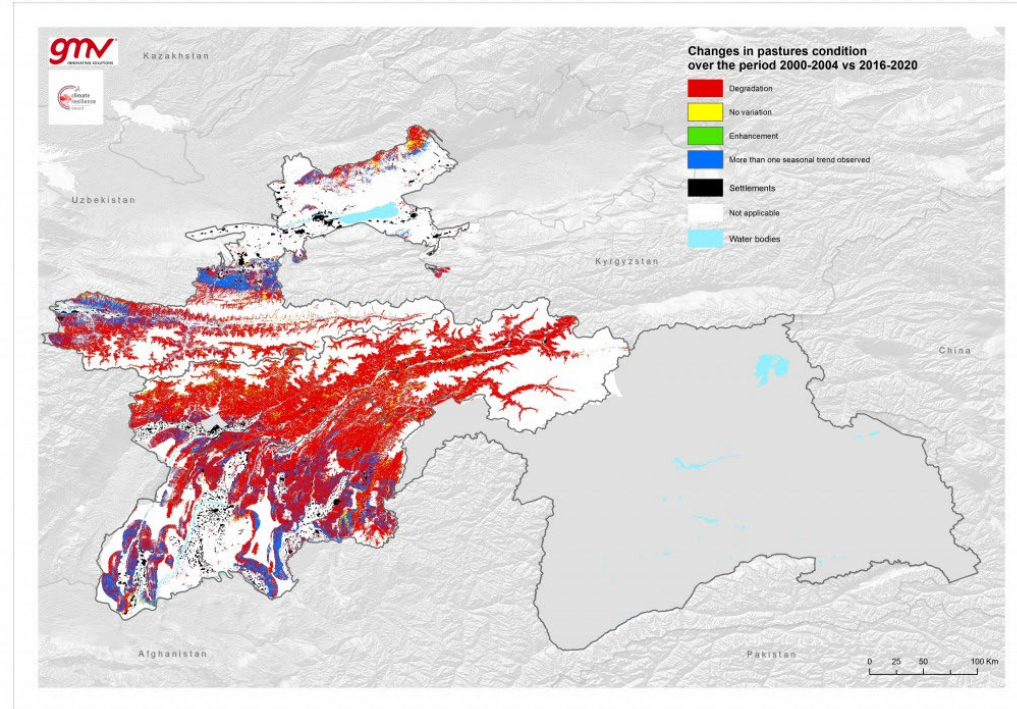
# Wetland and land degradation monitoring for restoration and rehabilitation plans in Lesotho

- Service: The EO4SD CR cluster derived soil loss rates due to water erosion (using EO-based rainfall, soil type, land cover and vegetation density as inputs for the Revised Universal Soil Loss Equation) to analyse annual soil erosion trends in different periods on a national scale. The service delivered also include the wetland identification and monthly monitoring of the wetlands extent on a national coverage. All products were aggregated at sub-catchment level to facilitate the identification of hot spots.
- Impact/ Added Value: The EO-based products provided evidence related to soil erosion and wetlands condition that supports the prioritization of catchment and sub-catchment areas for landscape and wetlands restoration and rehabilitation.



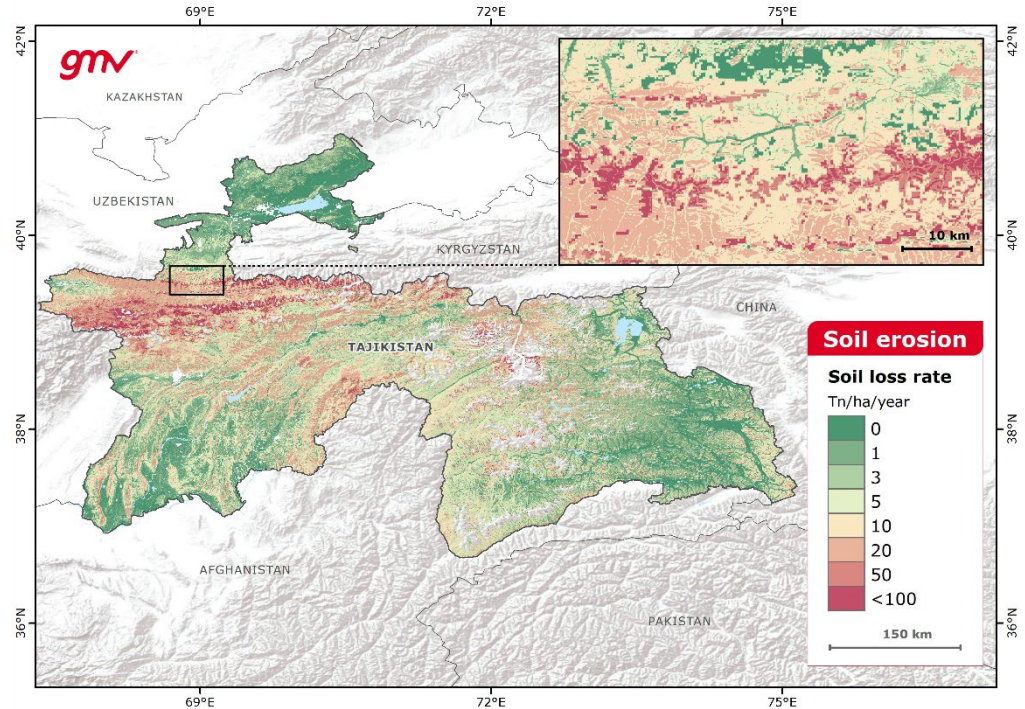
# Assessing rangelands degradation due to climate change in Tajikistan

- Stakeholder: International Fund for Agricultural Development (IFAD)
- Project: Community-Based Agricultural Support Project-2 (status: project proposal)
- Objective: IFAD's project objective is to stimulate inclusive economic growth and poverty reduction in Tajikistan poor rural communities by improving access to productive infrastructure and services that are expected to lead to sustainable agricultural production and equitable returns. The EO4SD CR cluster collaborates with the Food and Agriculture Organization (FAO) and IFAD to jointly identify climate vulnerable pastoral communities and analyse the rangelands degradation.



# Assessing rangelands degradation due to climate change in Tajikistan

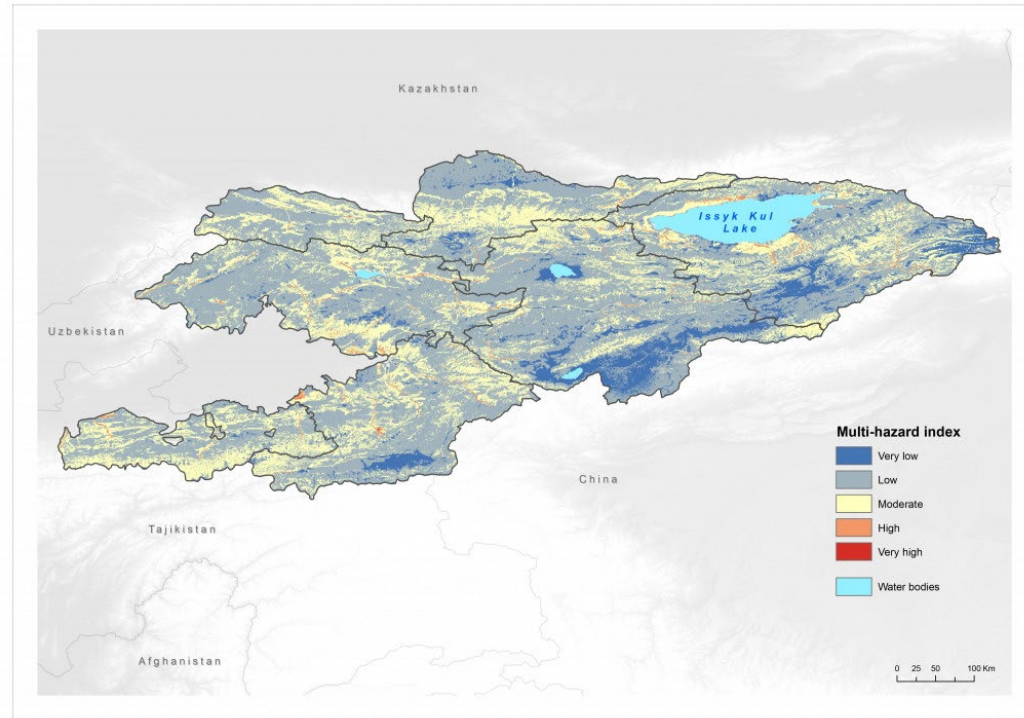
- Service: The EO4SD CR cluster provided EO-based rangeland condition changes over the period 2000-2020 per grazing season and aggregated at district level, climate indicators over the degraded pastures to assess the climate change impact and soil erosion rates to determine land degradation over Tajikistan. In-situ information gathered by local consultants was used to localised methodologies to the country's grazing practices.
- Impact/ Added Value: The rangeland and climate products supported the climate rationale for IFAD to solicit co-funding from the Green Climate Fund.





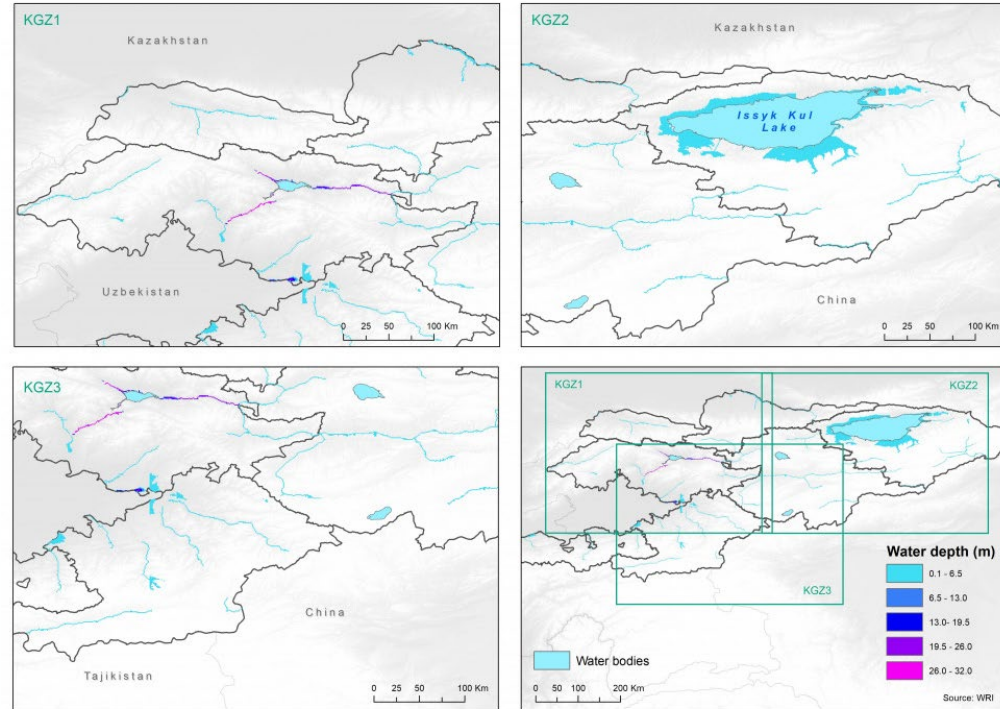
# Analysing climate risks faced by pastoralism in Kyrgyzstan

- Stakeholder: International Fund for Agricultural Development (IFAD)
- Project: Regional Resilient Pastoral Communities Project (status: project proposal)
- Objective: IFAD's project aims to contribute to rural poverty alleviation in Kyrgyzstan through increased resilience, incomes and enhanced economic growth in rural farming communities. To identify measures for improved livestock and pasture health and productivity, and enhancement of climate resilience of pastoral communities is necessary to determine the risks posed by the climate change in the country. The EO4SD CR cluster supported the climate rationale of the project providing information about the hazards and climate changes.



# Analysing climate risks faced by pastoralism in Kyrgyzstan

- Service: The EO4SD CR cluster provided EO-based climate indicators and natural hazard information, such as related to landslides, floods, droughts, vegetation deterioration, and land degradation to produce up-to-date multi-hazard maps that highlight pasturelands exposed to the most severe overall levels of climate-related hazard.
- Impact/ Added Value: This information helps to both identify key degraded areas exposed increasing hazard, and prioritise areas with the greatest potential to benefit from climate resilience investments. Results from the cluster were used by IFAD to build the case for climate resilience investment in a co-funding proposal to Adaptation Fund.



## Massive open online courses



- Free Webinar Series exploiting use of EO to support climate-resilient decision making
- Seven weekly webinars
- More than 300 attendees
- Topics Covered:

*Earth Observation in Climate resilience decision making*

*EO data and services to manage key climate risks.*

*Enhance practical skills on accessing and using EO data tools and platforms.*

## Online Courses for Mainstreaming Climate Change in Governance

- Collaboration with World Bank Group and Singapore-ETH Center
- Supporting World Bank's "Disruptive Technologies for Public Assets Governance (DT4PAG)"
- **Scope:** Mainstream use of EO data and services as key solutions to align people, processes and technologies into tangible applications
- **Roadmap of twelve 5-7min modules to be hosted in Open Learning Campus | World Bank Group**

# THE VALUE OF OUR INTERVENTIONS



- **Accuracy Integrated:** Global, high-resolution extreme rainfall statistics seamlessly integrated into corporate risk screening tools increase the accuracy of investment risk management (e.g. IFC Climate Risk Management Tool).
- **Accessible Insight:** Removal of barriers to IFIs being able to visualise and use high-quality rainfall statistics to fill gaps in risk models related to global assets' exposure to rainfall-related hazards (e.g. Rainfall Explorer).
- **Model Validation and New Indices:** Improved targeting of parametric natural catastrophe insurance through use of Earth Observation to calibrate natural hazard models (e.g. African Risk Capacity's African Flood Extent Depiction Model, NGDI).
- **Our Climate Present:** Easy access to timely, global, high-quality data through transformational EO-driven upgrades to climate data portals, including the world's most trafficked public-facing climate portal, the World Bank Climate Change Knowledge Portal, and African Risk View, UR-SCAPE, and EO4SD CR Platform.

# THE VALUE OF OUR INTERVENTIONS



- **Building the Investment Case:** High-resolution, county-scale climate, ecosystem (e.g. pastureland), and soil condition data fill data large gaps, enabling IFIs and beneficiaries to harness the evidence required to unlock and channel climate finance for maximum resilience impact (e.g., IFAD Kyrgyzstan, Tajikistan).
- **Monitoring and Management:** Enhanced management of river catchments and risks to food security through deployment of high-resolution EO-driven monitoring of surface water, wetlands, and soil moisture (e.g., AGRHYMET West Africa and Lake Victoria Basin Commission).
- **Visualising and Managing Risk:** Efficient, high-resolution urban risk indices and hotspot maps leveraging EO-driven hazard (e.g., shoreline erosion and riverine flood) and non-hazard (e.g., land use and asset location) data (e.g., World Bank Monrovia)

