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Leveraging Geospatial Technologies for Sustainable Agrifood Systems Transformation

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Food and Agriculture Organization of the United Nations

Why Location Matters in Agriculture ?

Geospatial = turning **'where'** into **actionable decisions**

01 **Spatial Nature**
Agriculture is inherently spatial

02 **Monitoring & Action**
Requires field based real-time monitoring

03 **Location-Based Variation**
Crops, soils, water, and risks vary by location

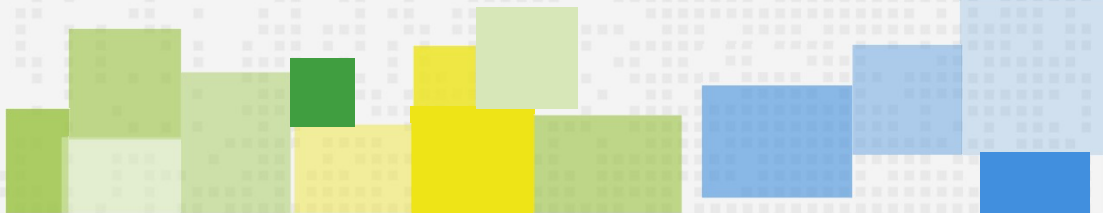
04 **Without Geospatial Insight**
Decisions are late, generic, or wrong

Strategic Problems (Policy Level)

Due to Missing Geospatial Data

National food security and resilience plans remain disconnected from reality.

- Crop balance & yield forecasting → Without crop maps → wrong import/export policies
- Land degradation & fertility loss → Surveys alone miss hotspots → misdirected restoration
- Climate & drought risk → Without spatial rainfall & soil moisture data → adaptation stays blind

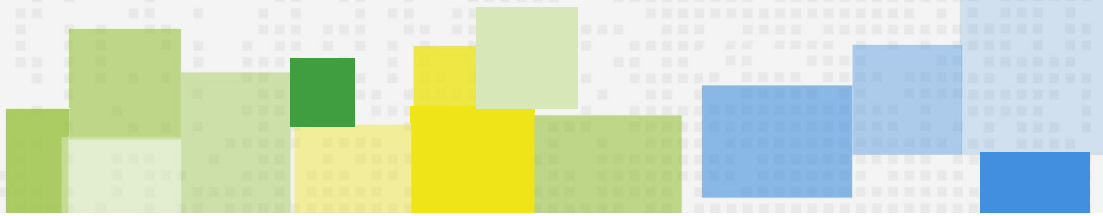


Tactical Problems (Sectoral Management)

Due to Missing Geospatial Data

Authorities and organizationscannot manage resources effectively.

- Crop monitoring & yield forecasting → Without satellite + AI → no early warning for low yields
- Pest & disease outbreaks → Spread geographically → without mapping → slow responses
- Irrigation efficiency → Without consumption maps → water-saving actions cannot be targeted



Operational Problems (Farmer & Extension Level)

Due to Missing Geospatial Data

Problem: Farmers receive generic advice, not tailored to their reality.

- Planting calendars & crop rotation → Without local soil & climate data → Not efficient planning
- Disaster & drought response → Without rapid damage maps → aid arrives late, losses increase
- Extension services → Without location-based info → No remote sensing analysis can help

FAO’s Response

to the necessity of GeoSpatial Data

> *Make the invisible visible through geospatial data*

FAO promotes the use of geospatial information for agricultural transformation through three dimensions:

- Core Platforms
  FAO tools that integrate and deliver geospatial data (e.g. AgroInformatics, WaPOR).
- Applications & Evidence
  Country case studies that demonstrate how platforms support real policies and decisions.
- Innovation Frontier
  Future-ready integration of AI and advanced analytics to enhance geospatial applications.

AgroInformatics Platform

Turning diverse geospatial data into actionable insights for agriculture

Flagship geospatial tool that brings together diverse data sources to guide smarter agricultural policies and practices.

- Formerly the HiH Geospatial Platform
- Cloud-based hub integrating multiple datasets
- Enables country-level customization benefiting global data
- Supports evidence-based agricultural planning
- Integrates satellite, statistical, and socio-economic data in one hub
- Supports governments in:
  - Crop monitoring
  - Land use planning
  - Food security analysis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Search for locations
Explore Data
Upload
Map
UN Country Boundaries of the World
AEZ classification by climate, soil, terrain, land cover (57 classes) - GAEZ v4 (Global - about 1 km)
Zoom To Extent
About This Data
Split
Remove
Opacity: 100 %
Left
Both
Right
Time_period
TP_2010
0
Tropics, lowland; semi-arid, no soil/terrain limitations
Tropics, lowland; semi-arid, with soil/terrain limitations
Tropics, lowland; sub-humid, no soil/terrain limitations
Tropics, lowland; sub-humid, with soil/terrain limitations
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Tropics, highland; humid, no soil/terrain limitations
Tropics, highland; humid, with soil/terrain limitations
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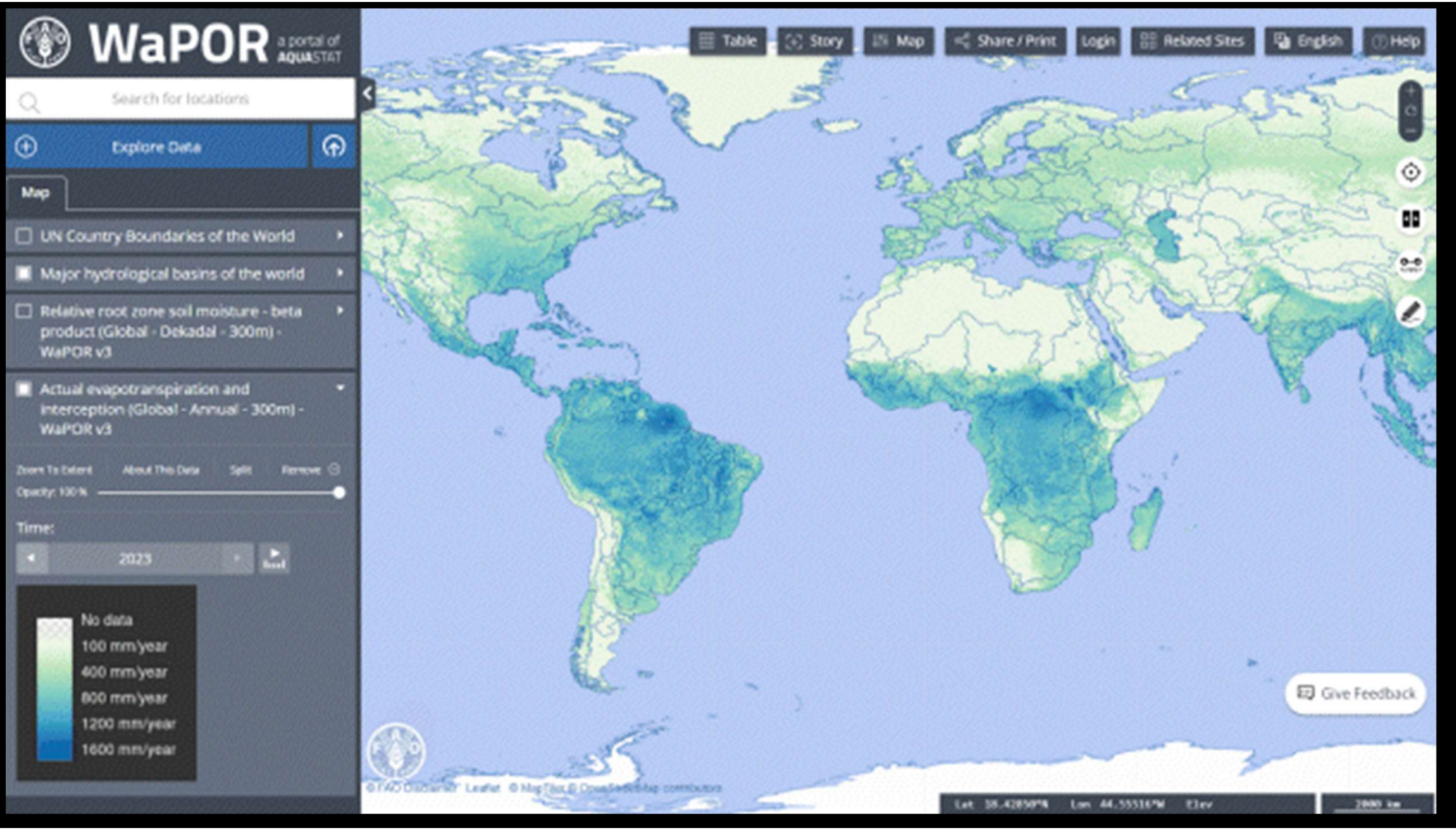
Lat 43.36595°N
Lon 58.05556°E
Elev 90±8773m

WaPOR

Water Productivity through Open-access of Remotely sensed derived data.

WaPOR provides free, near real-time satellite data to monitor and improve water and crop productivity.

- Remote sensing-based, near real-time monitoring
- Free and open access for all
- Used by irrigation authorities, research institutes, and ministries
- What it provides ?
  - Actual evapotranspiration
  - Biomass production
  - Water productivity indicators
- Supports
  - Irrigation planning
  - Water accounting
  - Drought monitoring


WaPOR
a portal of AQUASTAT
Search for locations
Explore Data
Map
UN Country Boundaries of the World
Major hydrological basins of the world
Relative root zone soil moisture - beta product (Global - Dekadal - 300m) - WaPOR v3
Actual evapotranspiration and interception (Global - Annual - 300m) - WaPOR v3
Zoom To Extent
About This Data
Split
Remove
Opacity: 100 %
Time:
2023
No data
100 mm/year
400 mm/year
800 mm/year
1200 mm/year
1600 mm/year
Table
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LDN DSS – Türkiye Case

Land Degradation Neutrality Decision Support System

One of the first LDN projects funded by GEF and LDN DSS was first developed for Türkiye and extended to the region and other countries

- Interactive maps on:
  - Land degradation & productivity
  - Biodiversity & protected areas
  - Topography
- Helps identify hotspots, plan interventions, track SDG 15.3 progress
- Scaled to other countries in the region
- Promoted South-South knowledge transfer
- Example of a regional pilot becoming a global public good

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Search places

Google Earth Engine Apps

English

Choose a country from the list below or click on the map to get statistics. (*)

Turkey

Select province

AOI mask

Mask opacity 1

Select which layer you want to click on: (*)

Countries

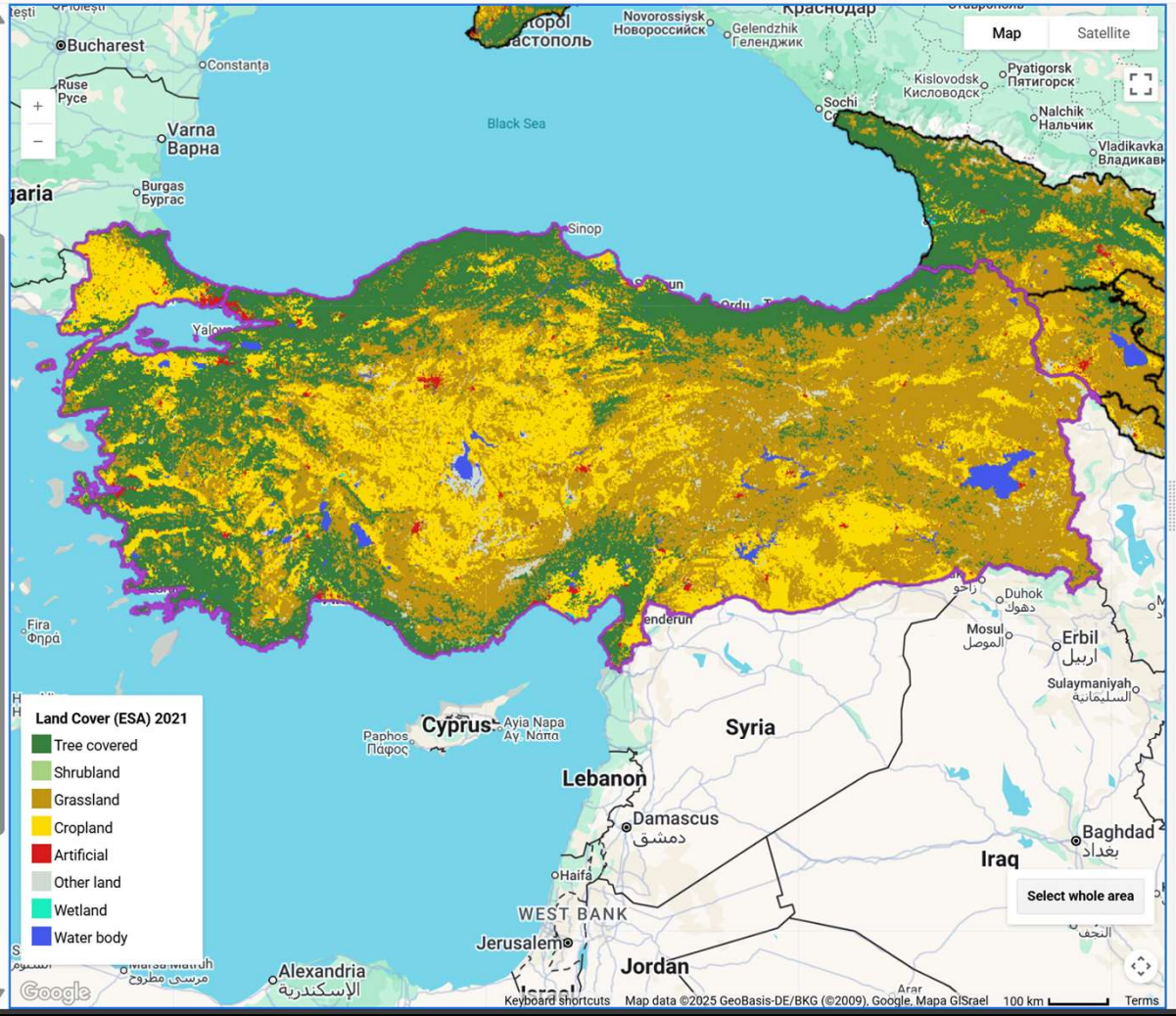
Layers

- ✓ Countries
- Provinces
- Basins (n=842)
- Sub-basins (n=8835)
- WOCAT SLM best practices
- Key Biodiversity Areas
- Protected Areas
- Topography
- ✓ Land Cover (ESA) 2021
- Land Productivity Dynamics 2001-2022
- Net Primary Productivity 2022
- Soil Organic Carbon
- Mountains
- Precipitation Trend 2011-2021
- Aridity index
- Fire index (Recurrence 2001-2021)
- Population density

Biodiversity layers

SDG 15.3.1 Comparison

Multi-Criteria Analysis



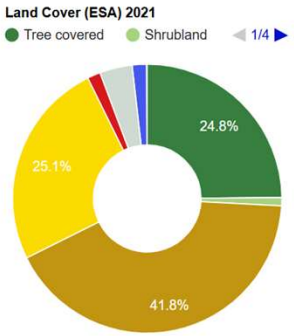
Land Key Biodiversity Area: 15,148,342.17 ha. (19.44%)

Mountain Coverage: 59,374,940.88 ha. (76.18%)

NPP 2022 (total): 330,185,524.48 tC

Additional info	
LDN Factsheet	Link
Link to National DSS	Link
WOCAT SLM Database	Link
# of SLM registered at WOCAT	9
UNCCD country profile	Link
National PRAIS3 Report	Link
National PRAIS4 Report	Link
PRAIS4 2010-2015 degradation	14.30%
PRAIS4 2015-2019 degradation	13.40%
LDN Targets	true
Target Setting Report	Link
National Drought Plan	
National World Bank Stats	Link

General Charts



Land Productivity Dynamics 2001-2022

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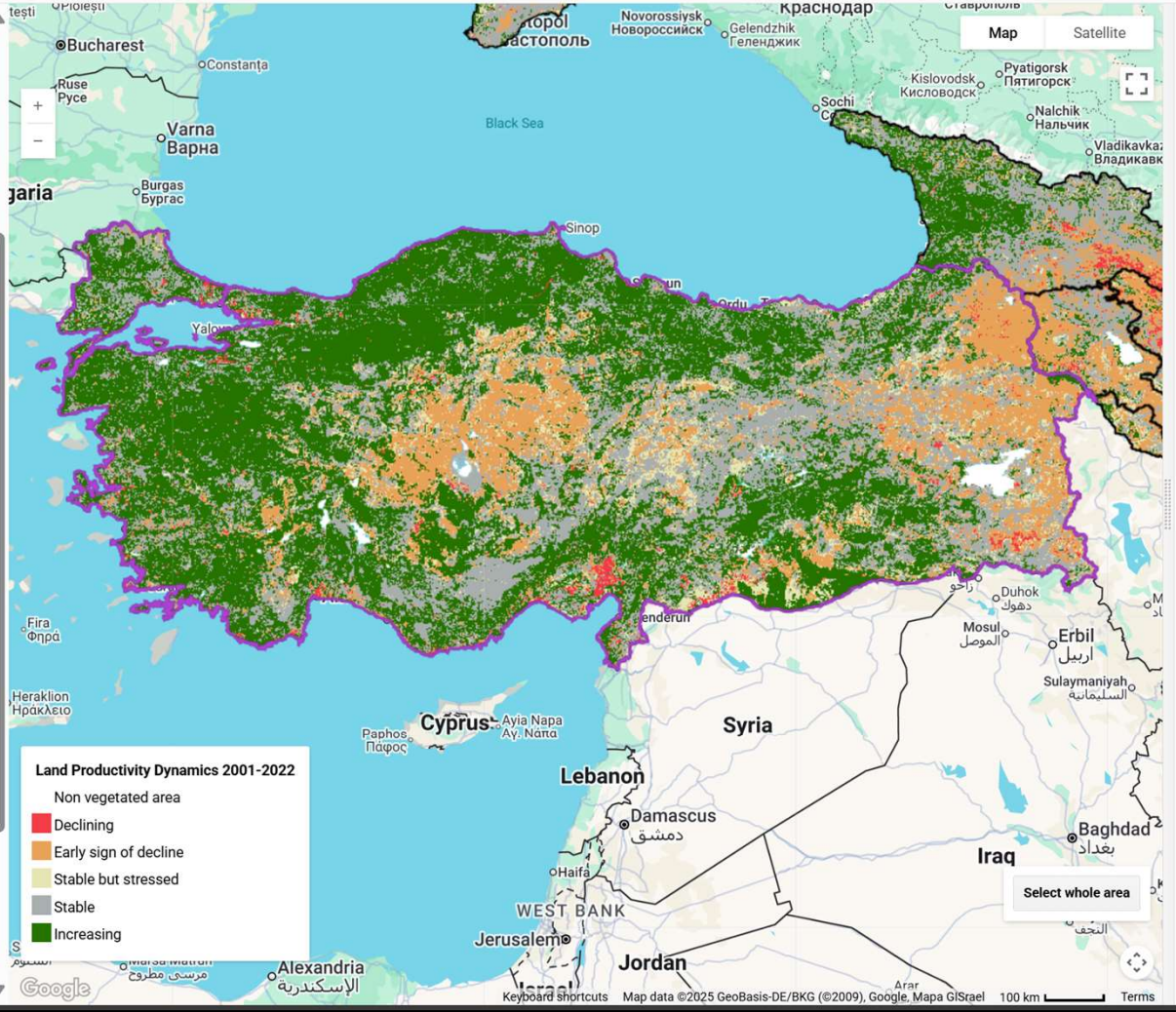
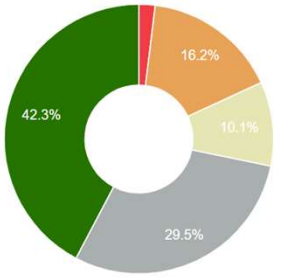


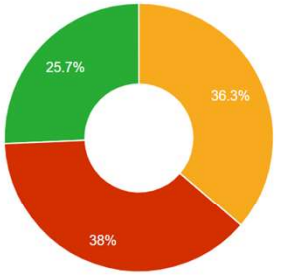
Land Productivity Dynamics 2001-2022

Declining · Early sign of… · 1/3



Aridity index

Semi-arid · Dry Subhu… · 1/2



Protection of KBAs

KBA non protected · Other

NIP- Tajikistan

National Investment Plan Atlas for Tajikistan

Geospatial platform that supports evidence-based agricultural planning and targeting in Tajikistan.

- Developed under National Investment Plan (2021–2030)
- Supported by FAO, hosted on Google Earth Engine
- ~70 datasets (2009–2021): agriculture, socio-economics, poverty, food security, remote sensing
- What it enables ?
  - Evidence-based targeting of agricultural interventions
  - Integration of donor activity and value chain mapping
  - Cross-sectoral analysis

Google Earth Engine Apps

Search places

Atlas of the National Investment Plan of Tajikistan

Language: English

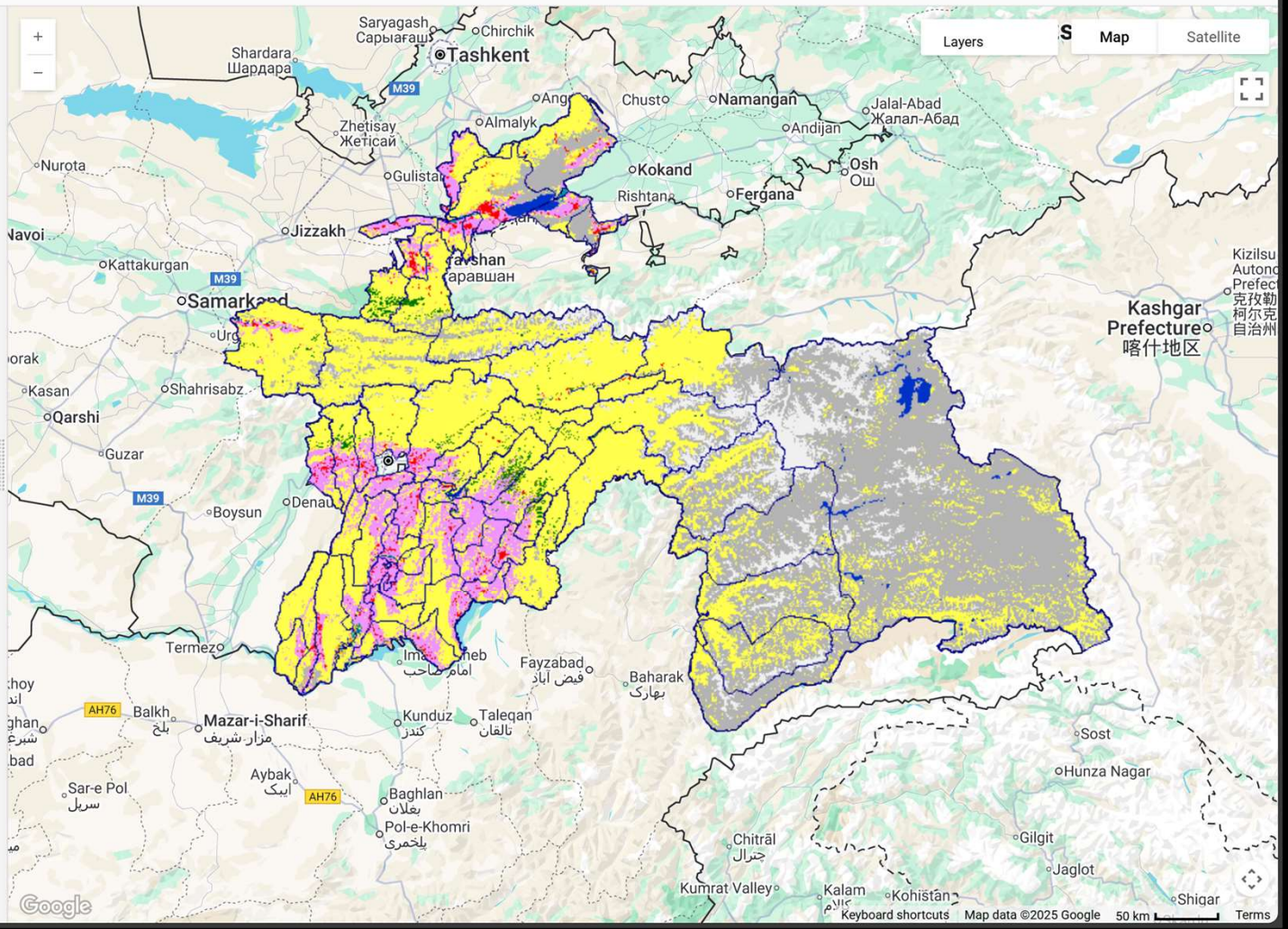
Sections: Remote sensing data

Indicators: Land Cover (Copernicus, resolution 100 m)

Land Cover (Copernicus, resolution 100 m)

- Shrubs (area 80381 ha, change from 2015 188 ha)
- Herbaceous vegetation (area 6219390 ha, change from 2015 -13009 ha)
- Cropland (area 1303268 ha, change from 2015 5124 ha)
- Urban (area 155422 ha, change from 2015 514 ha)
- Bare / sparse vegetation (area 4814210 ha, change from 2015 -87066 ha)
- Snow and ice (area 1135520 ha, change from 2015 75397 ha)
- Permanent water bodies (area 151841 ha, change from 2015 10833 ha)
- Herbaceous wetland (area 18776 ha, change from 2015 9004 ha)
- Moss and lichen (area 26 ha, change from 2015 0 ha)
- Closed forest, evergreen needle leaf (area 2764 ha, change from 2015 0 ha)
- Closed forest, deciduous needle leaf (area 737 ha, change from 2015 0 ha)
- Closed forest, deciduous broad leaf (area 3 ha, change from 2015 0 ha)
- Closed forest (area 106230 ha, change from 2015 -380 ha)
- Open forest, evergreen needle leaf (area 1 ha, change from 2015 0 ha)
- Open forest, deciduous needle leaf (area 10 ha, change from 2015 0 ha)
- Open forest (area 86518 ha, change from 2015 -604 ha)

To display data by districts, select districts



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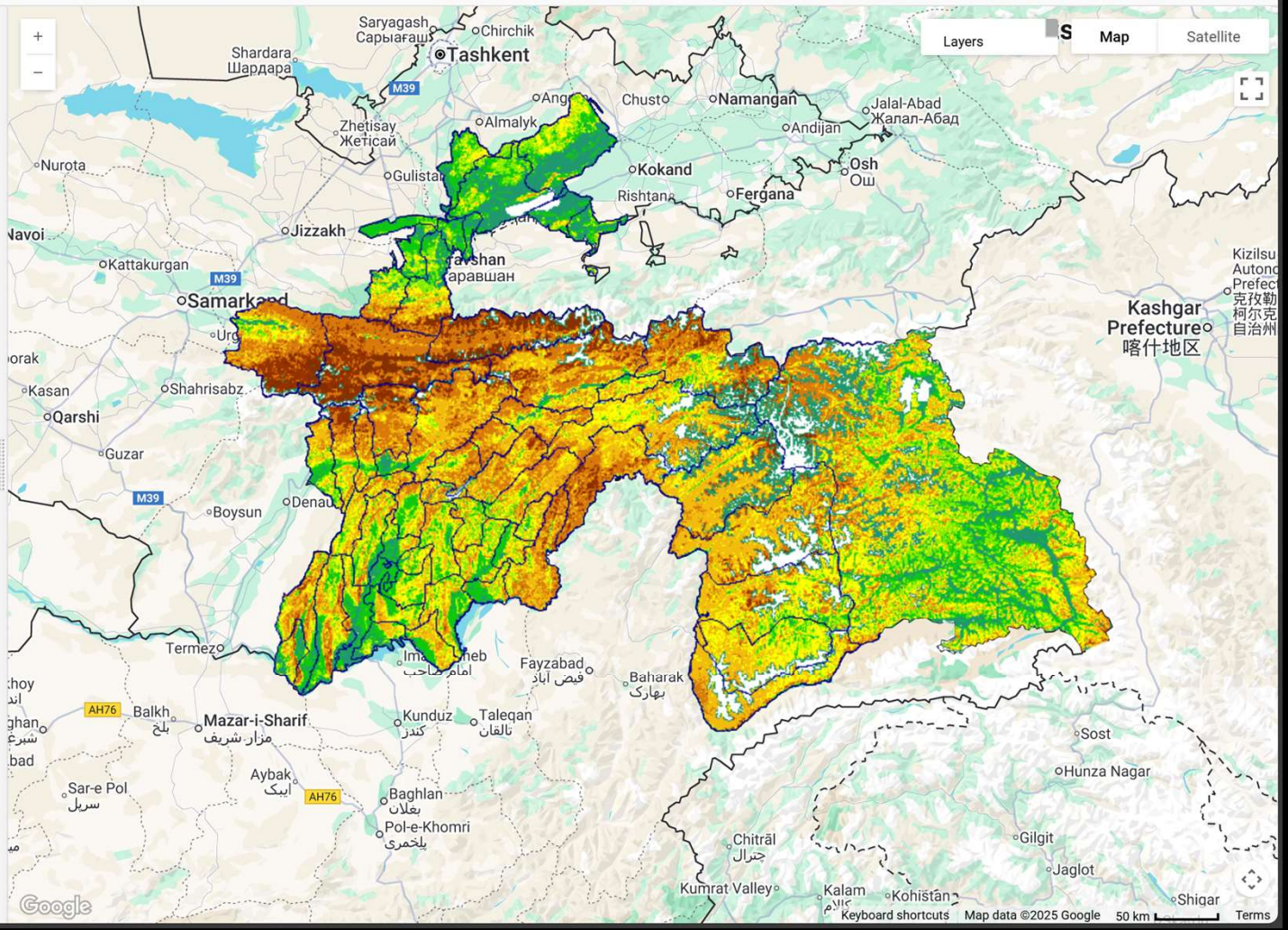
Indicators: Soil erosion rate at 200 m for 2015 - 2019, tonnes per hectare per year

Soil erosion rate at 200 m for 2015 - 2019, tonnes per hectare per year

- Не применимо
- 0 - 1
- 1 - 3
- 3 - 5
- 5 - 10
- 10 - 20
- 20 - 50
- 50 - 100
- >100

To display data by districts, select districts



Future Outlook

AI From monitoring crops to empowering farmers with intelligent insights

AI expands geospatial applications by enabling farm-level prediction, early warning, and personalized advisory services.

- **Crop identification**
  - AI + Sentinel-2 imagery → seasonal crop maps
  - Benefits:
    - Accurate agricultural statistics
    - Crop rotation monitoring
    - Compliance with land use policies
- **Yield forecasting**
  - Remote sensing, Weather data, Soil properties
  - Benefits:
    - Early warning for food security, Informs input allocation

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Thank you

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