



UNGEONOW 2024
首届联合国地信周



Breaking Barriers in Land and Water Resource Monitoring for Sustainable Food Systems: FAO geospatial systems for the SDGs

Livia Peiser, FAO

FAO plays a fundamental role in support to food security, monitoring natural resource, and provision of information for policy relevant solutions based on geospatial data, information and services.

FAO supports development plans, growth strategies and decision-making processes in member states through the transformation to **MORE efficient, inclusive, resilient** and **sustainable** agri-food systems for better production, better nutrition, a better environment, and a better life, *leaving no one behind*.



FAO is the custodian UN agency for 21 SDG indicators and is a contributing agency for a further 5, supporting countries' efforts in monitoring the 2030 Agenda.

Through earth observation/remote sensing data analysis, FAO works on:

- *standards and indicators for the regular monitoring,*
- *qualitative and quantitative assessments of natural resources,*
- *methodologies and tools that support governments and institutions.*

Design the right policies and
security and promote sustainable
world.



- **SDG 2 indicators:**
Custodian agency for 10 indicators

- **SDG 14 indicators:**
Custodian agency for 4 indicators
Contributing agency for 1 indicator

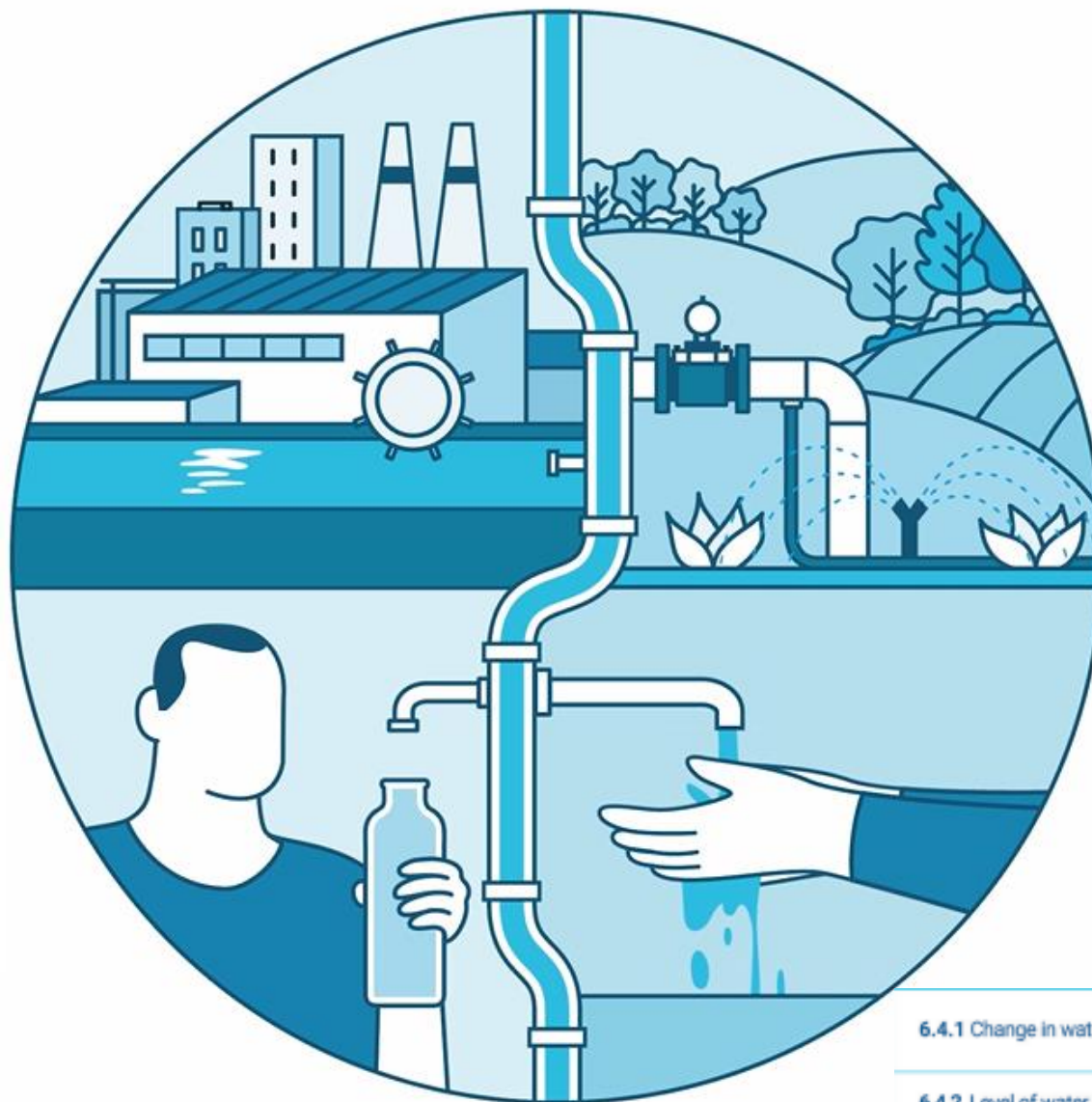
- **SDG 15 indicators:**
Custodian agency for 3 indicators
Contributing agency for 2 indicators

- **SDG 6 indicators:**
Custodian agency for 2 indicators

- **SDG 5 indicators:**
Custodian agency for 2 indicators

- **SDG 12 indicators:**
Custodian agency for 1 indicator

- **SDG 1 indicators:**
Contributing agency for 2 indicators



SUSTAINABLE DEVELOPMENT GOAL 6

Clean water and sanitation

Ensure availability and sustainable management of water and sanitation for all.

 SUMMARY TABLE

INDICATORS

6.4.1 6.4.2

- FAO Custodian Agency of 2 indicators: 6.4.1 and 6.4.2;
- Only 86 countries regularly report water use data since 2006, which allows for analysis of «decoupling» economic growth from water use;

The main challenge for this indicator is therefore obtaining enough information to demonstrate increases in value added per unit of water withdrawn, especially in the poorest regions.

6.4.1 Change in water-use efficiency over time

FAO

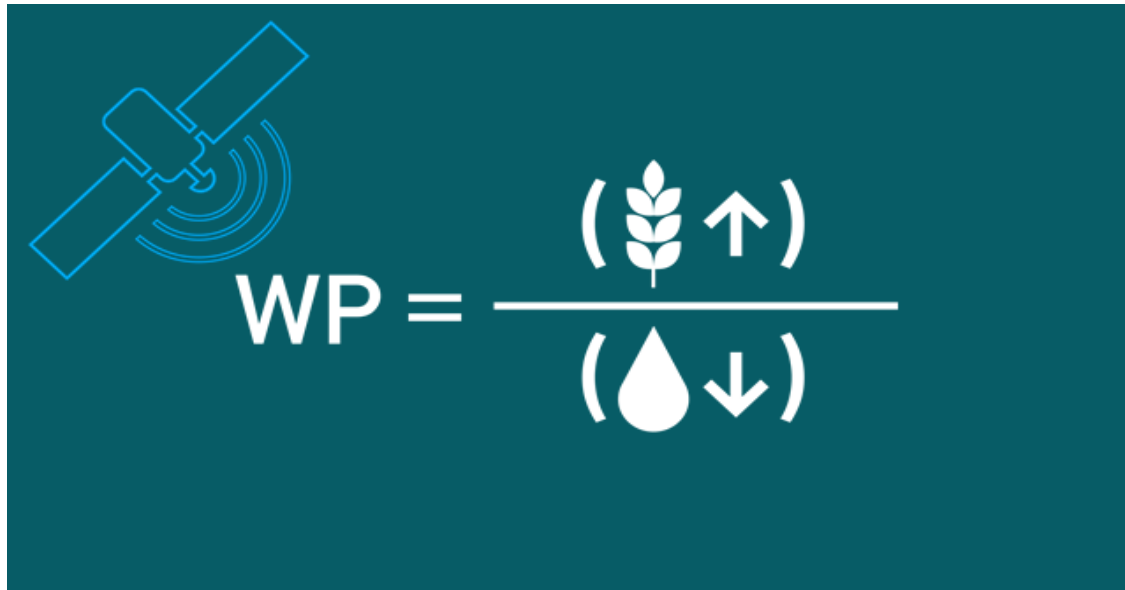
6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

FAO



FAO WaPOR: Remote sensing for water productivity

<https://www.fao.org/in-action/remote-sensing-for-water-productivity/>
Trainings programmes active in >10 African countries



300m resolution

global data



Ecosystem restoration and land degradation monitoring



Framework for Ecosystem Restoration Monitoring (FERM)

SDG
15.3.1

SDG
15.4.1/2

SDG
15.1.1/2



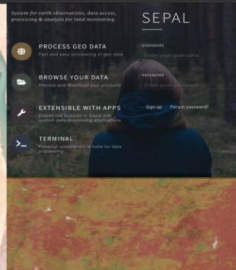
Food and Agriculture
Organization of the
United Nations

SEPAL module on SDG Indicator 15.3.1

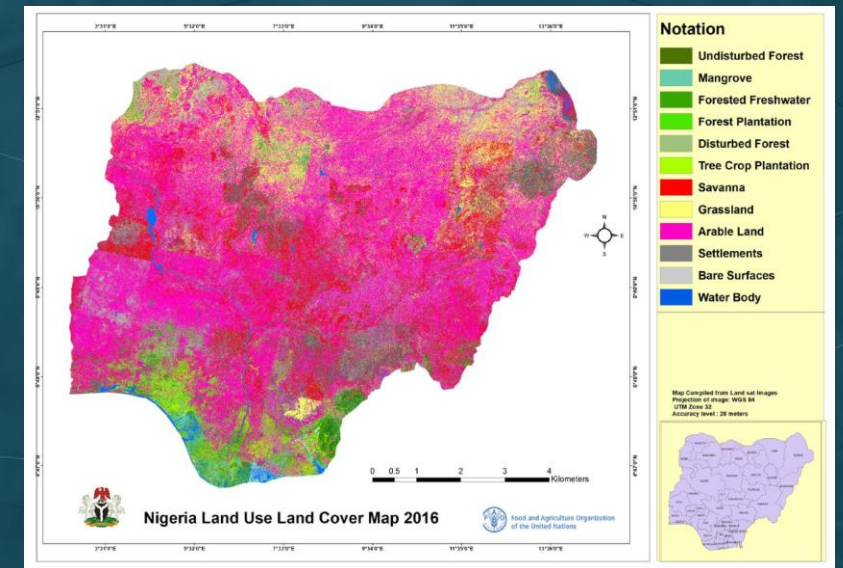
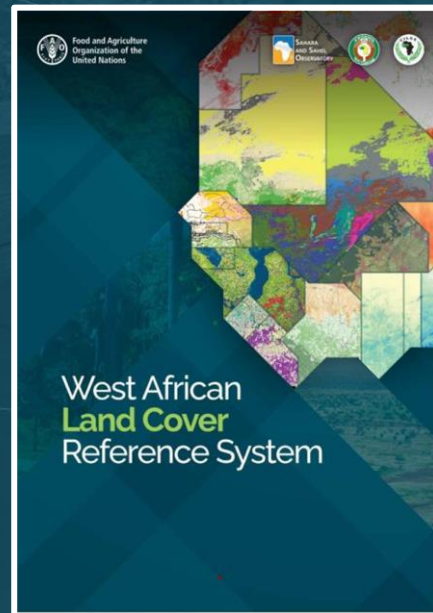
Monitoring land degradation neutrality
with the good practice guidance version 2 (GPG v2)

SEPAL is a cloud computing platform (<https://sepal.io>) for accessing, processing and analyzing geospatial data for land monitoring. A module for monitoring and reporting land degradation in support to Sustainable Development Goals (SDG) target 15.3 (combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world) is now available under SEPAL.

The module calculates the indicator and sub-indicators based on the approach proposed in the second version of the Good Practice Guidance for indicator 15.3.1 under United Nations Convention to Combat Desertification (UNCCD). It provides various functions including:



Land Cover as a key input to SDG monitoring



Food and Agriculture
Organization of the
United Nations

FAO LAND & WATER DIVISION
WWW.FAO.ORG/LAND-WATER
@FAOLANDWATER

Geospatial unit in the Land and Water Division


- FAO's Geospatial Unit: providing geospatial data, information, and services
- Supporting food security and monitoring natural resource use
- Proposing policy-relevant solutions through remote sensing

Our Contributions

- Define standards and indicators for regular monitoring
- Conduct qualitative and quantitative assessment of natural resources
- Develop methodologies and tools for governments and institutions

Impact

- Supports development plans, growth strategies, and decision-making processes
- Key issues addressed: land cover mapping, crop monitoring, disaster risk reduction, food security mapping, spatial planning, and environmental sustainability



Geospatial information for sustainable food systems

Home Our work Projects News Events Resources

What we do

- Agricultural monitoring
- Climate change impact assessment
- Risk management
- Land cover assessment
- Natural resources and ecosystems monitoring

Partnerships

- Agriculture production
- Water governance
- Forests management

Geospatial activities in FAO

Geospatial technology plays a fundamental supporting role in the quest for food security by identifying and monitoring natural resource use and propose adequate information for policy relevant solutions.

Through remote sensing, we define:

- standards and indicators for the regular monitoring, qualitative and quantitative, of natural resources;
- methodologies and tools that support governments and institutions in the study and assessment of innovative and effective plans for production, management, safeguarding and building resilience of natural resources.

Our work supports development plans, growth strategies and decision-making processes in many countries, on issues such as:

Topics

LAND

- Soil Portals
- LADA
- SWALIM

WATER

- AquaStat
- Aquamaps
- Wapor Beta Portal

CLIMATE

- GIEWS
- Climpag

FORESTRY

- National Forests Monitoring System
- Global Forest Resources Assessment

FISHERY

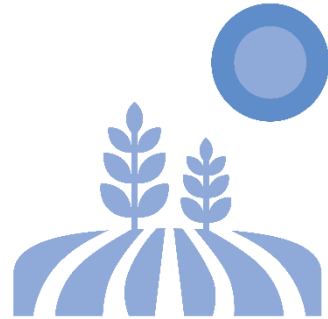
- Fisheries Resources Monitoring Systems (FIRMS)

<https://www.fao.org/geospatial/our-work/what-we-do/en/>

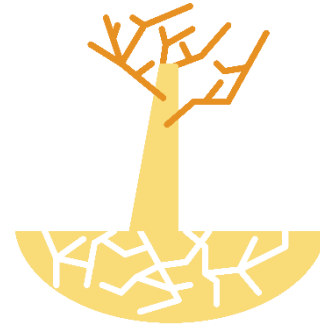
Geospatial unit areas



↙
Land cover
& Crop
monitoring



↙
Agro-ecological
zoning
& Land evaluation



↙
Ecosystem restoration
& Land degradation
monitoring



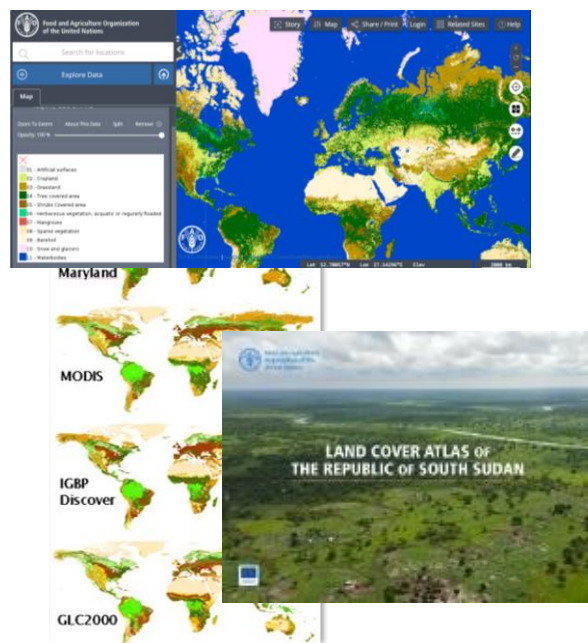
↙
Emergency
&
Resilience



Land cover and crop monitoring

- Land cover is fundamental data theme layer in UNGGIM.
- Accurate and comprehensive **land cover** and **land use information** is of paramount importance in effectively **addressing the challenges of rapid urbanization** and **climate stress in African cities**.
- Integrating land cover and land use strategies with **SDGs** enables cities to achieve positive outcomes by promoting equitable development, environmental conservation, and resource efficiency, while mitigating adverse social, economic, and environmental impacts.

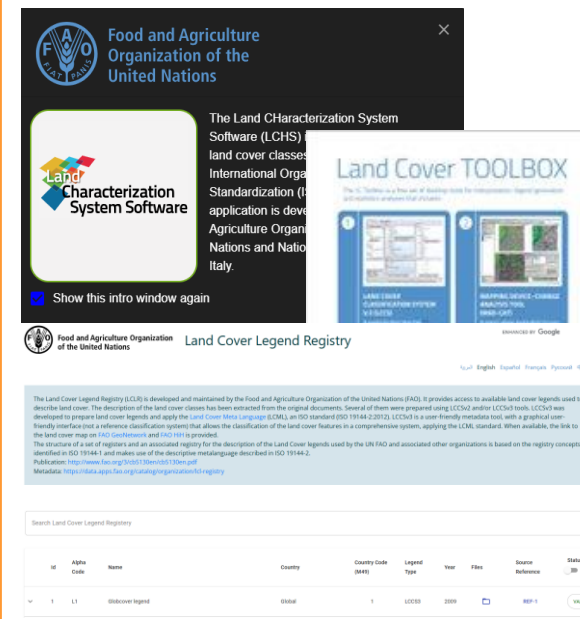
Land cover and land use products



Land cover classification system



Land cover and land use tools



<https://www.fao.org/geospatial/en/>

<https://lchs.fao.org/>

<https://data.apps.fao.org/lclr-tool/en/>

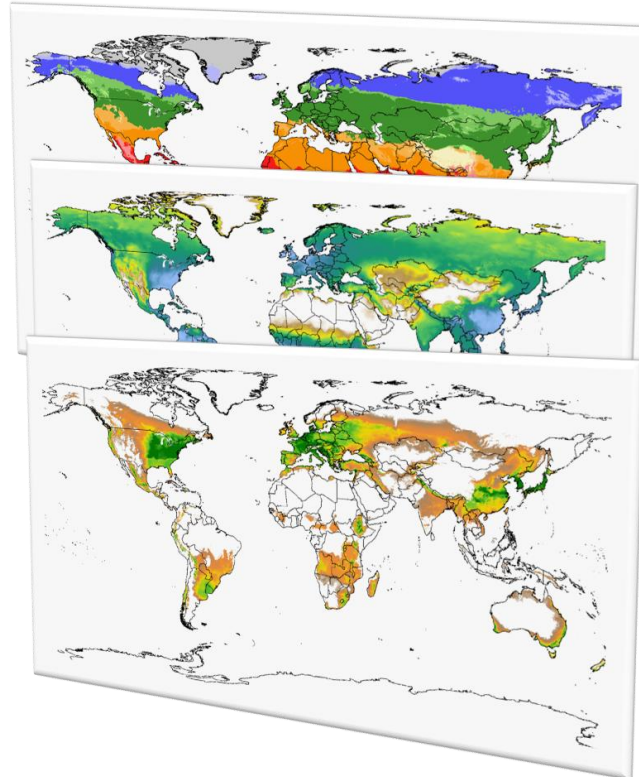


Agro-Ecological Zoning and land evaluation

- The Agro-Ecological Zones (AEZ) methodology was developed with the International Institute for Applied Systems Analysis (IIASA) and it is used for assessing agricultural resources and potential.
- The last Global AEZ assessment (GAEZ v4) was published in 2021 and it makes use of best available global spatial databases to estimate the biophysical crop production potential. The estimation procedures consecutively consider factors relevant for crop production over time and for different management conditions. The GAEZ Data Portal has been developed to make the database widely and easily accessible for users. It comprises a large volume of spatial natural resources indicators and results of agro-ecological crop analysis.

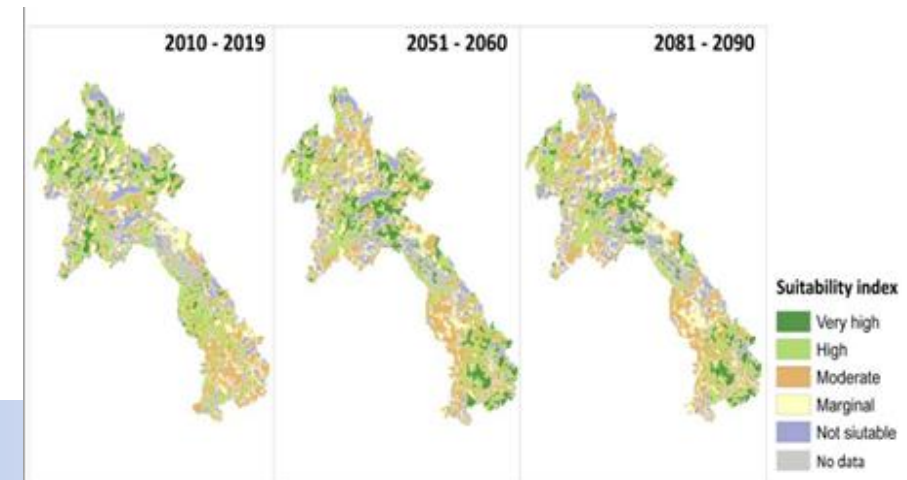
GAEZ Data Portal

- Comprises a large volume of spatial natural resources indicators and results of agro-ecological crop analysis
- Provides access to more than 180 variables organized hierarchically into 6 main themes and 25 sub-themes
- Fully documented (Data model, User's Manual, GAEZ definitions, FAQ, limitations, and hints available)
- Compliant with FAO definitions, classifications and standards



AEZ at national scale

- PyAEZ is a Python package consisted of many algorithms related to AEZ framework, developed in collaboration with the Asian Institute of Technology (AIT) to support AEZ implementation at the national level
- It is an innovative free and open-source application used to strengthen the in-country capacities to undertake AEZ analysis using local data and a free and open-source tool

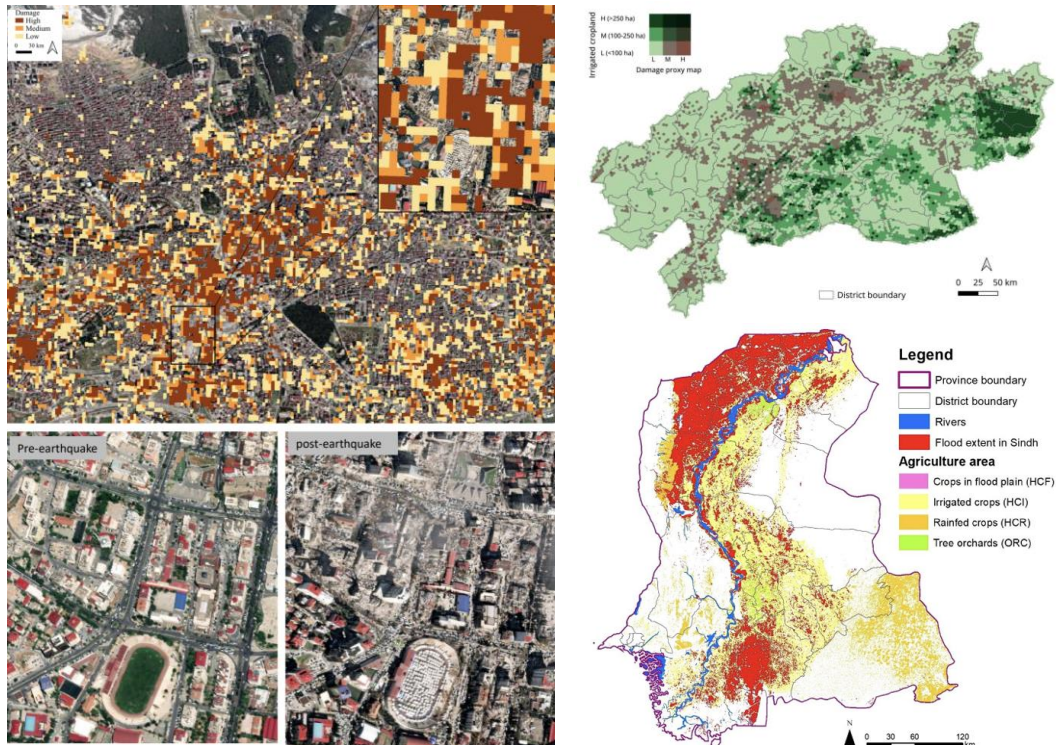




Emergency and Resilience

- Geo-informatics and data science/management is used in combination of hydrology, meteorology, geology, and seismology to quantify the likelihood and intensity of emergency scenarios and estimate their impact to assets, people, and the environment.
- Leveraging advanced geospatial analysis and remote sensing technologies, the unit **rapidly assesses the extent of damage to agriculture, food security, and livelihoods when disasters strike.**
- In parallel, the unit works closely with national institutions, government agencies, and local communities in to **build their capacity in using geospatial technologies and spatial information for various aspects of emergency risk management activities.**

Geospatial Information for Emergency Preparedness, Mitigation and Management



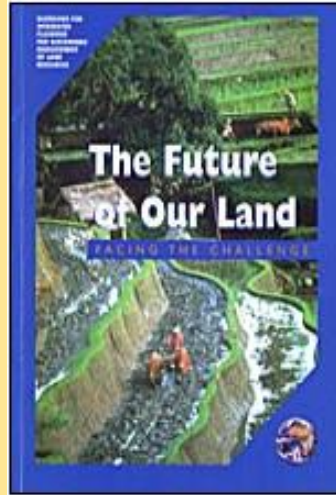
Examples of Rapid impact assessment



Integrated Land Use Planning Guideline - An Update



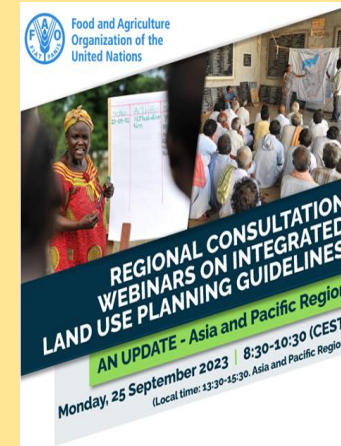
1993



1999



2017



2024

What is the function of Integrated land use planning?

Land use planning means the systematic assessment of **physical**, **social** and **economic** factors to **encourage** and **assist** land users in selecting **options** that:

- Increase their productivity,
- Are sustainable,
- Support resilient livelihoods, and,
- Meet the needs of society





Integrated Land Use Planning in 9 recommended steps

- Implementation of land cover standards
- Capacity development on geospatial tools for the implementation of the Digital Land Cadastre. FAO Land Tenure team promotes DLC in several countries, in the context of VGGT
- Crop mapping and field boundaries delineation, including through the use of AI
- Land evaluation and crop suitability assessment under different management and climatic conditions (GAEZ and pyAEZ framework)
- Water accounting water balance assessment at the hydrological scale is a key, and often neglected, key input in territorial planning



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THANK YOU