ISRIC
World Soil Information

FAIR soil data in support of sustainable land management

Global Symposium on Information and Data
25 September 2024

ISRIC Team,
presented by Fenny van Egmond

About us

ISRIC–World Soil Information is an independent science-based foundation with a mission to serve the international community as a custodian of global soil information.

Founded in 1966 at the recommendation of UNESCO, FAO, IUSS.
World Data Centre for Soils since 1989.

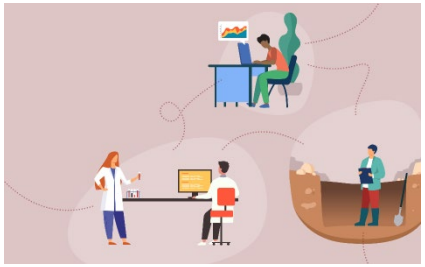
We support the development and use of soil information to address global challenges through capacity strengthening, awareness raising and direct cooperation with users and clients.

Our vision

A world where **reliable** and **relevant** soil data, information and knowledge is **freely available** and **properly used** to address global environmental and societal challenges.

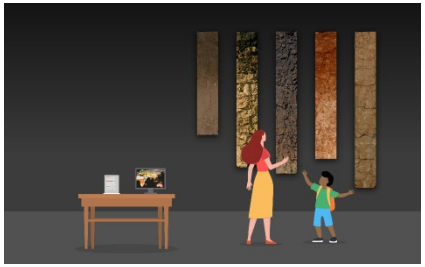
Our expertise

Provisioning of global and regional soil data and information



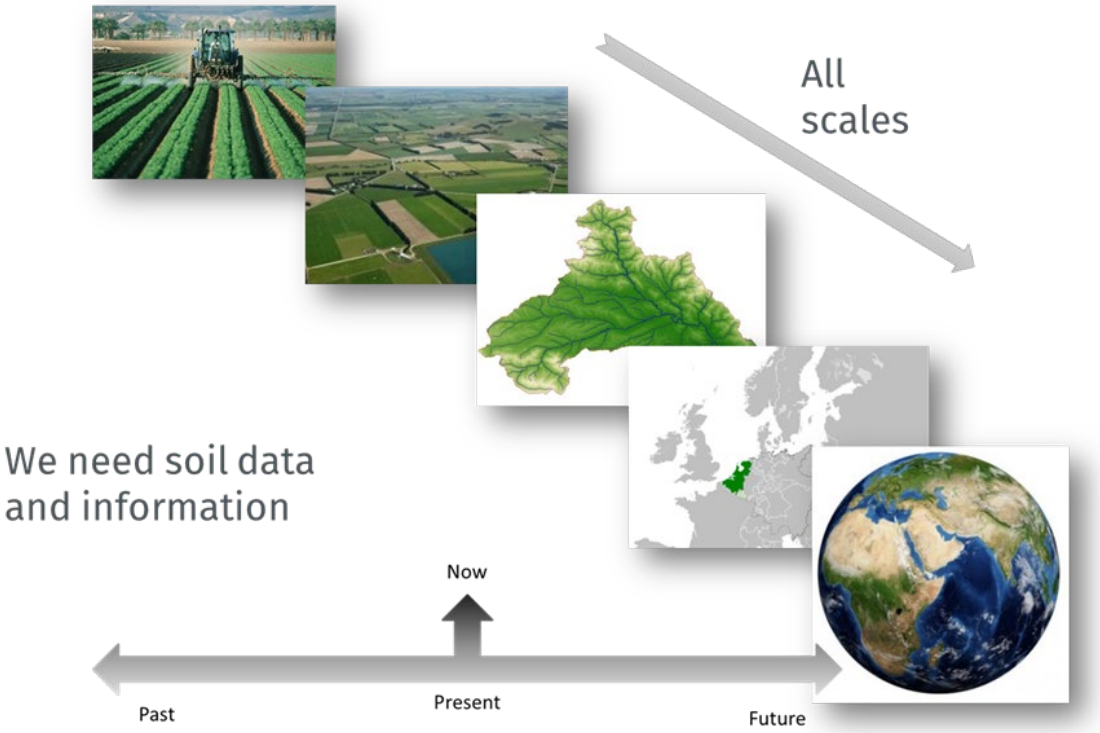
Supporting national-level soil information providers

Applying soil information for sustainable land management



Advocating and educating on the diversity and importance of soil

The importance of soil data

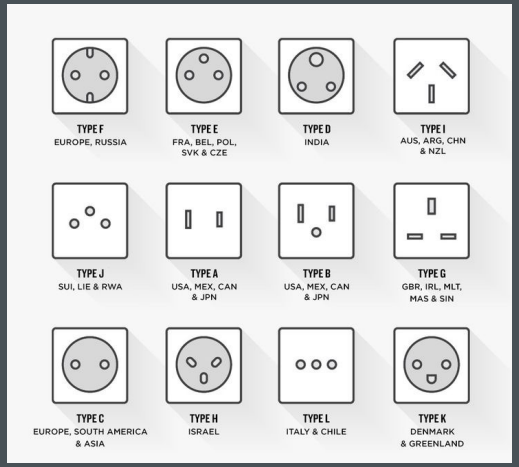


Picture: Peter Wilson

ISRIC
World Soil Information

Current challenges with soil data management

1. **Lack of standardized accessible data**
2. **Data Reusability**
3. **Fragmentation**
4. **Inefficiencies**



=

What is wrong with how we work with data now?

What problems are caused for actors in agricultural transformation by inadequate current data practices?

1. Billions of USD$ are invested in research on the **assumption it is adding to the knowledge base** and can be used to support pro-poor projects.

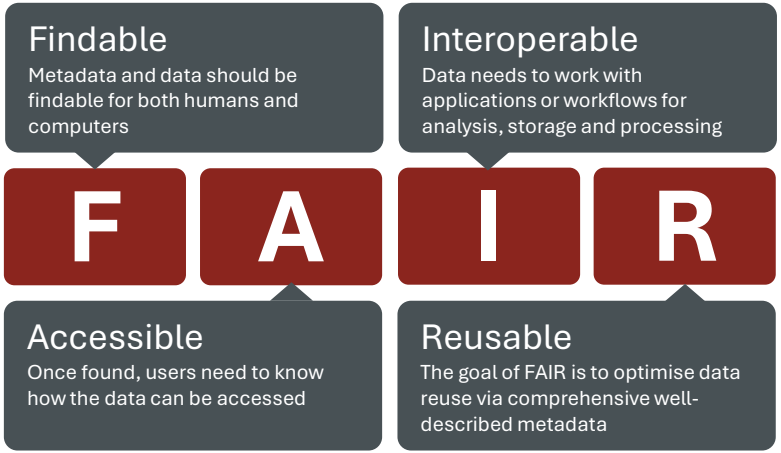
2. Research isn't used or built on beyond the lifetime of funded projects – **research is done over and over again** – wasting time and resources.

3. Donors and governments have made investments without necessarily requiring **good practice in data management and sharing** and too **little attention to the people dimension.**

4. **Digital and data policy is often not informed** by appropriate consultation and evidence.

What is FAIR

"FAIR data on soil and land help to improve Sustainable Land Management"



Benefits of FAIR data

Applying FAIR principles:

1. Increased efficiency
2. Increases innovation
3. Cost savings

£10.2B could be saved

EU: Implementing FAIR data principles could save a minimum of £10.2 billion annually by reducing inefficiencies.

$796.0B investment generated

Human Genome Project: A $3.8 billion investment in making available well-structured data generated $796 billion in economic impact and created approximately 310,000 jobs, driving the genomic revolution.

0.1-1.5% of GDP in socio-economic benefits

OECD: Data access and sharing can generate socio-economic benefits worth between 0.1% and 1.5% of GDP for public sector data and 1% to 2.5% for private sector data.

FAIR versus Open

- **FAIR** is not necessarily **open**
- **Open** is not necessarily **free** (for the data provider)

Considerations:

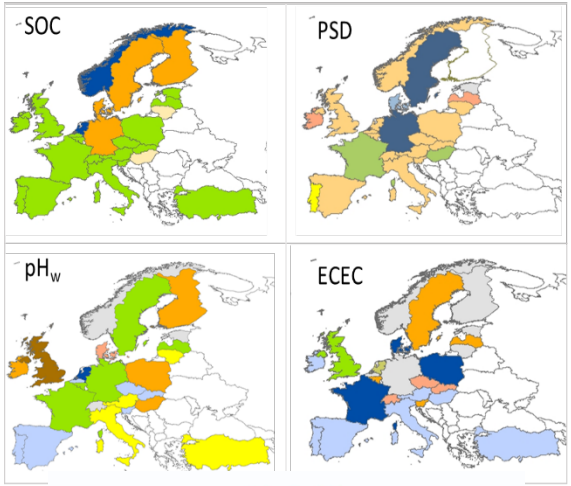
- Do you use (other) open data?
- Can you answer more and different questions in the same amount of time if you can use data from others (e.g. governments, research, business)?
- Soil data as a common good

Advantages of Open (Science/license) from **ISRIC's perspective**:

- Promotes transparency and reproducibility
- Fosters collaboration
- Quality guarantee (rigorousness through transparency, feedback)
- Empowers public engagement and outreach
- Increases impacts (of SoilGrids) with uptake in different use cases
- Allows us to use open data sources
- Fits our mission

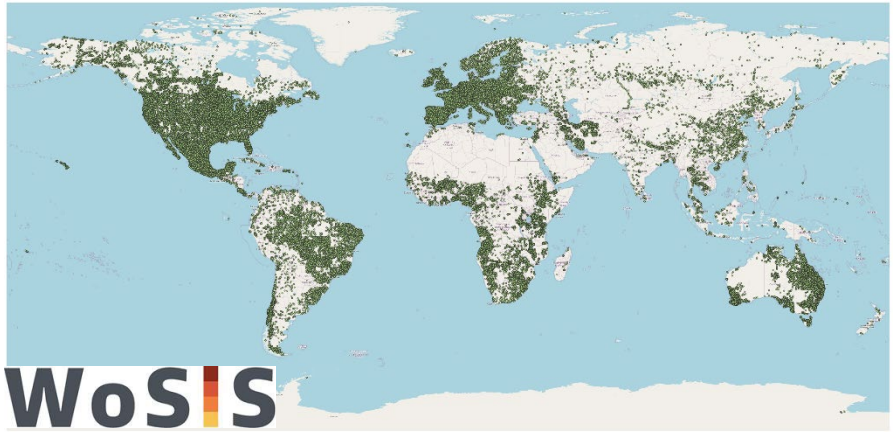
Standard development to enable FAIR

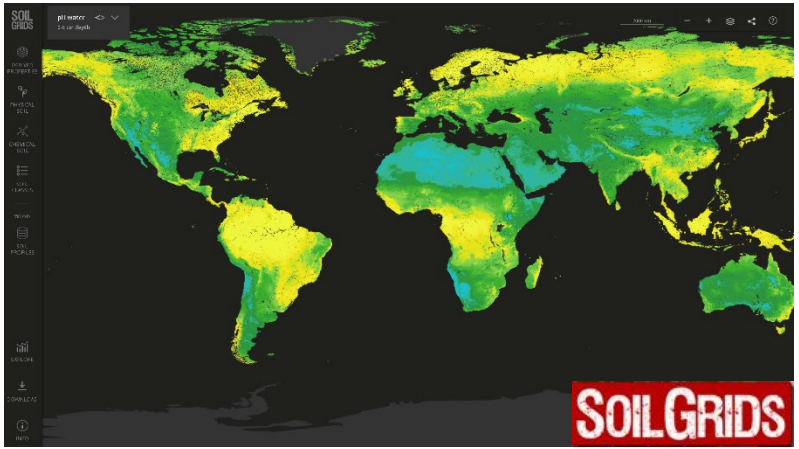
- Data sharing **licensing**: e.g. Creative Commons (CC)
- **(Meta)data standards**:
  - ISO 28258 Soil Quality – digital exchange of soil-related data
  - ISO 19115 Geographic information – metadata, Dublin Core, etc.
  - Implementation of **OGC** standards for serving geospatial information via the web.
- Development of soil data exchange standards (**ontologies**): GloSIS ontology (https://github.com/glosis-ld/glosis), vocabularies based on FAO Guidelines on Soil Description
- **Data model** based on ISO28258: https://iso28258.isric.org
- **Lab** methods standards and transfer functions: ISO and GLOSOLAN
- Soil **classification**: WRB, USDA, national
- **Guidance** available

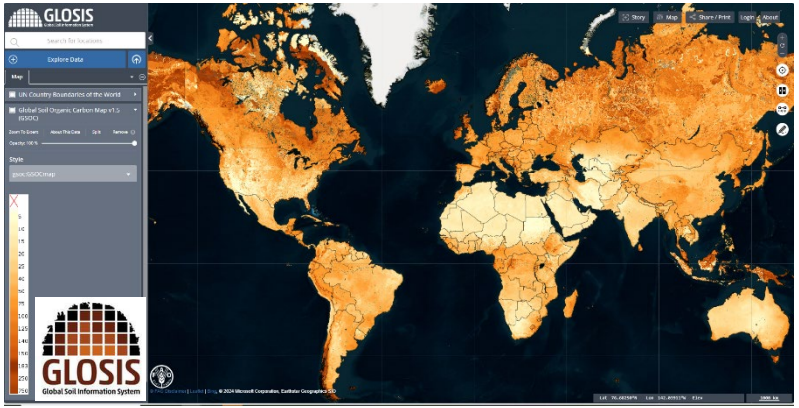


GLOSOLAN
GLOBAL SOIL LABORATORY NETWORK

FAIR on a global scale







Overview of SISs available:
https://www.isric.org/explore/soil-geographic-databases

For global applications

National institutes in the centre

WHY?

- Developing soil information requires *in-depth knowledge of the soils*
- *Historic data* available
- They have *the mandate*
- Possibility to do *soil monitoring*

WHAT IS NEEDED?

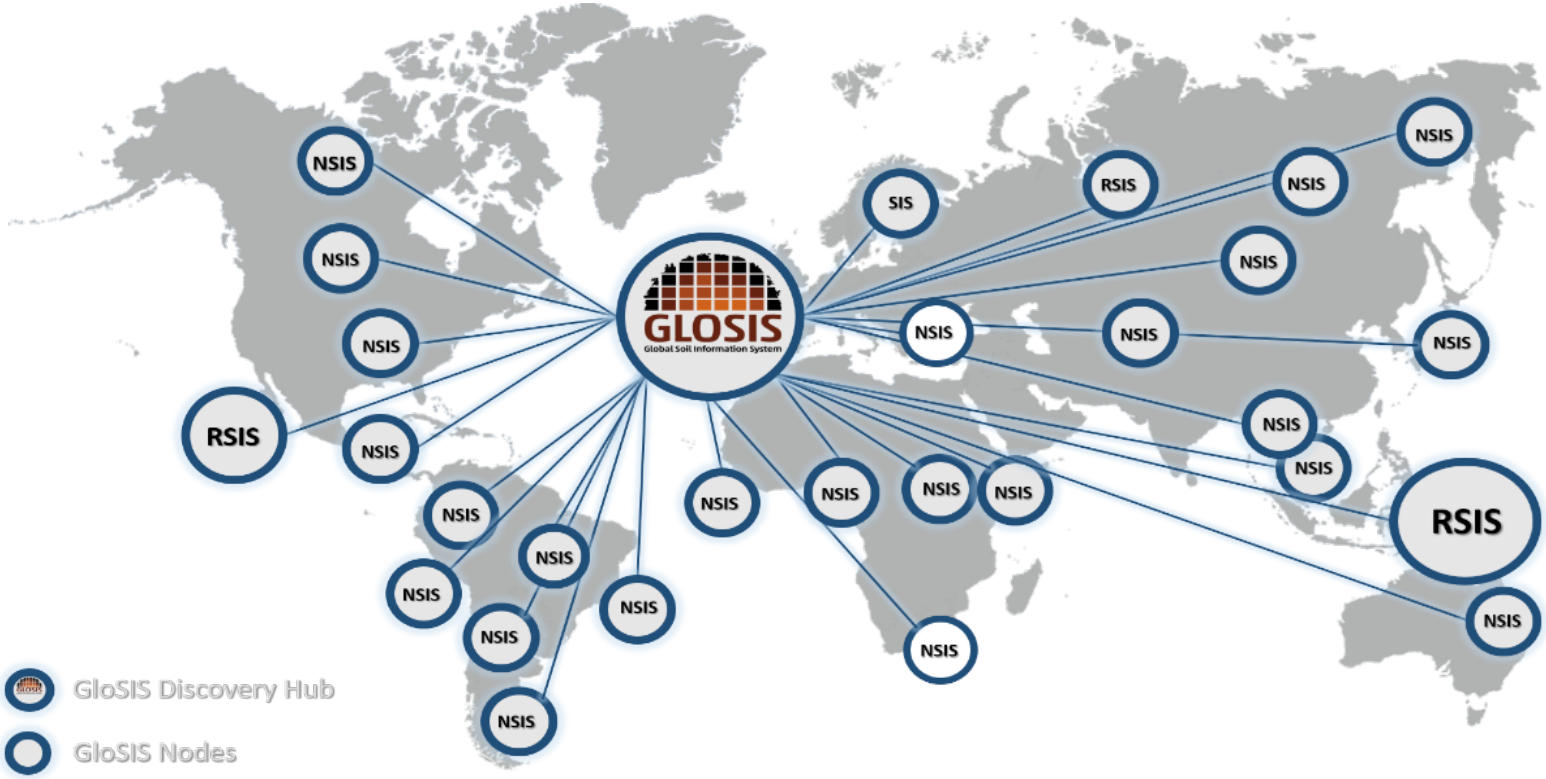
1. *Standards*
2. *Methods and tools*
3. *Capacity building*
4. *Business case*
5. *Finances*

HOW AND WHY LINK TO GLOBAL?

1. *Standards*
2. *Trust*
3. *Federated systems*
4. *Added value*

This structure can work at subnational, national, regional, global level. ANSIS is a good example: https://ansis.net/

Working together, facilitating dedicated national systems

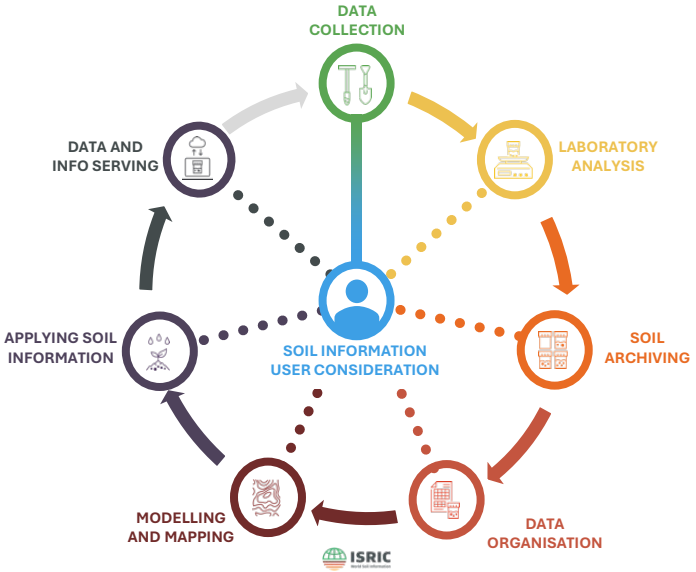


GLOBAL SOIL PARTNERSHIP

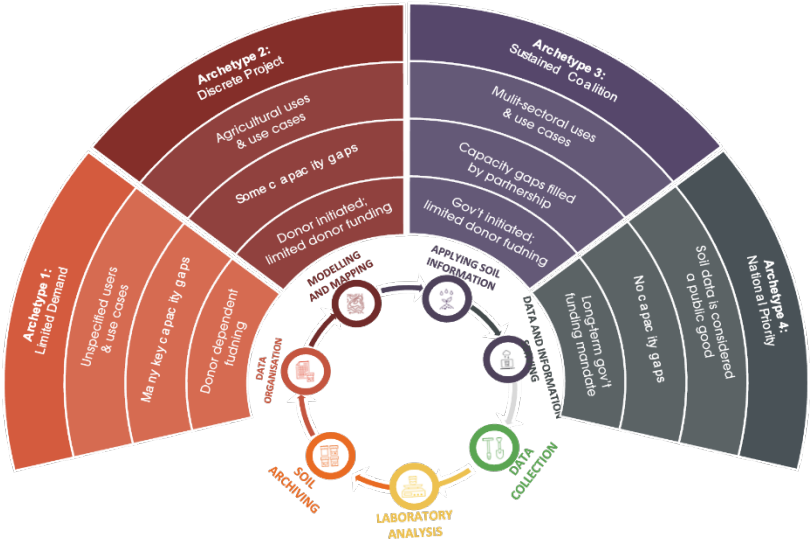
ISRIC World Soil Information

Building blocks of a SIS, national differences

Soil Information Workflow



SIS Design framework



Case studies: applying soil information

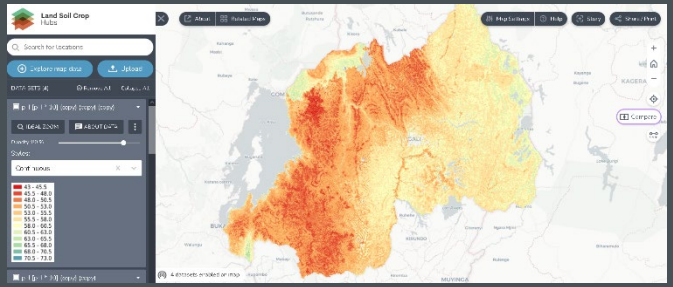
LSC-IS

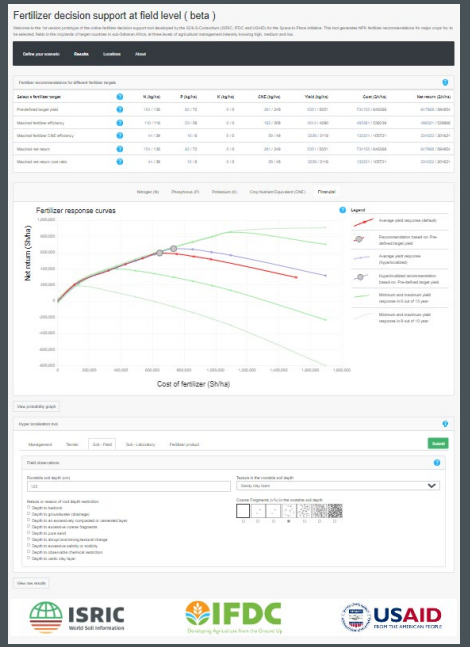
Develop sustainable land, soil, and crop information hubs in national agricultural research organisations.

Space2Place

Develop a decision-support tool to enhance fertilizer use efficiency among small-holder farmers in Sub-Saharan Africa.

Fitness for intended use





Challenges to SIS development in practice

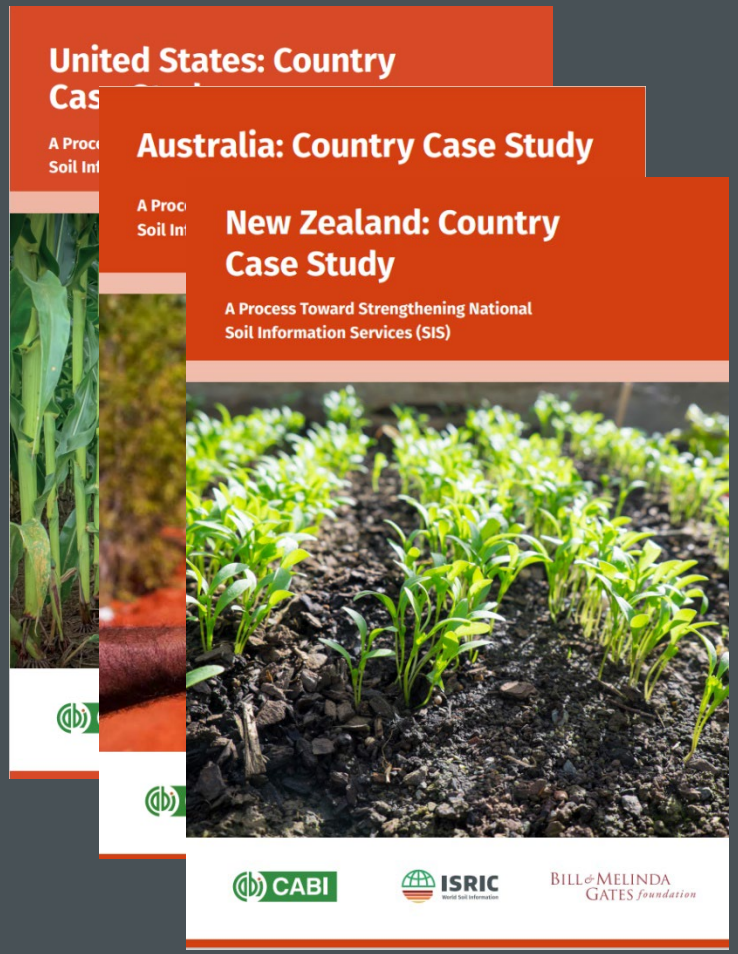
1. Lack of institutional support
2. Technical limitations (infrastructure)
3. Gaps in capacity building

Sustainable Soil Information Systems

1. Understand the **enabling environment** for developing soil information services
2. Build an **evidence base** that clarifies: What works? What needs improvement?
3. Establish clear guidance on the **technical options** for developing soil data assets
4. Develop an evidence-based **framework** for improved SIS intervention design
5. Test and refine framework by SIS **roadmaps** with two target countries
6. Communicate and discuss with the global **soil data community**

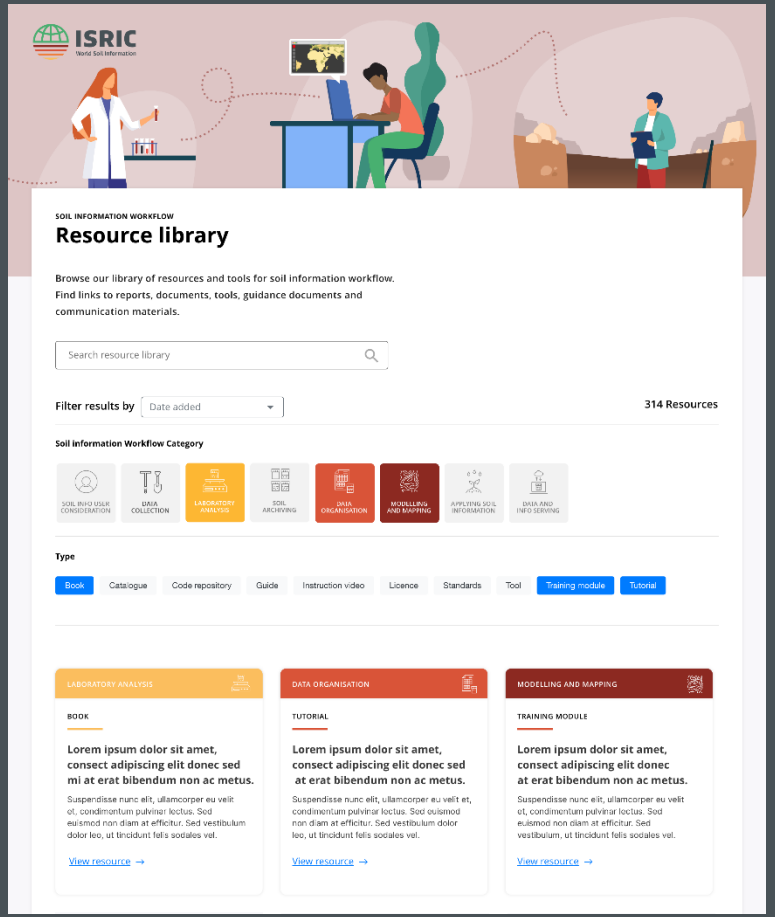
Soil data as a common good

1. Government agencies' use of the SIS promotes implementation
2. Third party applications indicate large user base beyond government and can sustain (additional) funding
3. Legal mandate helps
4. Build by people that know soils for people that value soils
5. Strong collaborations within country



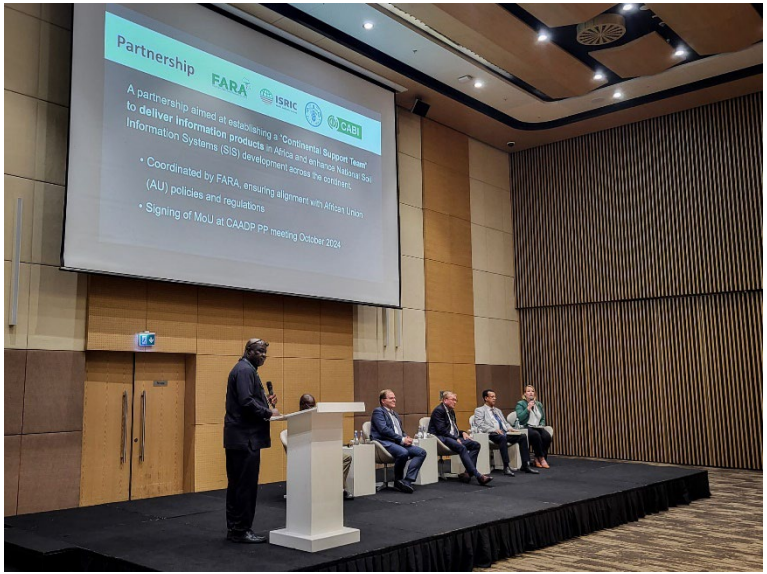
Our Solutions

1. Standards
2. Guidance, technical tools
3. Capacity strengthening
4. Examples
5. Global products
6. Collaboration



Towards a partnership

"A partnership aimed at establishing a "Continental Support Team" to deliver information products in Africa and enhance National Soil Information Systems (SIS) development across the continent."



- Coordinated by FARA, ensuring alignment with African Union (AU) policies and regulations
- Signing of MoU at CAADP PP meeting October 2024

Some SIS development resources:

SCAN ME

What is available to help national level actors to build a national level SIS:

- Resource library, https://resources.isric.org/
- SIS framework, https://resources.isric.org/sis-framework/
- Soil data assimilation wiki, https://ejpsoil.github.io/soildata-assimilation-guidance/
- Soil Geographic Databases, https://www.isric.org/explore/soil-geographic-databases
- WoSIS, https://www.isric.org/explore/wosis/faq-wosis
- SoilGrids, https://soilgrids.org/
- Seedling national level DSM workflow, https://doi.org/10.17027/ISRIC-FSX2-2691
- ISRIC data catalogue, https://data.isric.org/geonetwork/srv/eng/catalog.search#/home
- GloSIS ontology, https://github.com/glosis-ld/glosis and vocabularies, https://vocab.isric.org/
- World Soil Museum, https://www.isric.org/explore/world-soil-museum
- GloSIS.org, https://data.apps.fao.org/glosis/?lang=en
- GLOSOLAN, https://www.fao.org/global-soil-partnership/glosolan/en/
- ANSIS, https://ansis.net/
- *And many more*

seedling workflow

ISRIC World Soil Information

Take forward messages

1. What is needed now and in the future: Community and Trust
2. Guidance, building blocks, methods and tooling for entire SIS workflow and enabling environment are available
3. Standardisation helps FAIR: efficiency, less data loss, transparency, data quality
4. Fitness for use
5. Business cases, use cases, share examples! Include metrics in your system. Not all value can be expressed in monetary terms
6. Soil data as a common good
7. Knowledge and understanding (of soil) is still needed to interpret the information

Let’s stay connected!

Thank you for your time. We look forward to working with you!

info@isric.org,
fenny.vanegmond@isric.org
www.isric.org