WOCAT

World Overview of Conservation Approaches and Technologies

CIAT

International Center for Tropical Agriculture
Since 1967 / Science to cultivate change

WOCAT Symposium and
18th WOCAT Network Meeting
Cali, Colombia, 13-16 June 2017

Use of SLM Tools and Methods of WOCAT to Promote SLM Practices and Contribute to the Achievement of the SDGs: A Case in Cambodia

WOCAT

World Overview of Conservation Approaches and Technologies

u^b

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CENTRE FOR DEVELOPMENT AND ENVIRONMENT

Mr. Sophea Tim
Project Manager,
*Royal University of Agriculture, Cambodia*

Content

1. **Cambodia at a glance**

2. **Current context regarding LD and CC**

3. **What we do…**

4. **How these contribute to the SDG goals…**

5. **Conclusion**

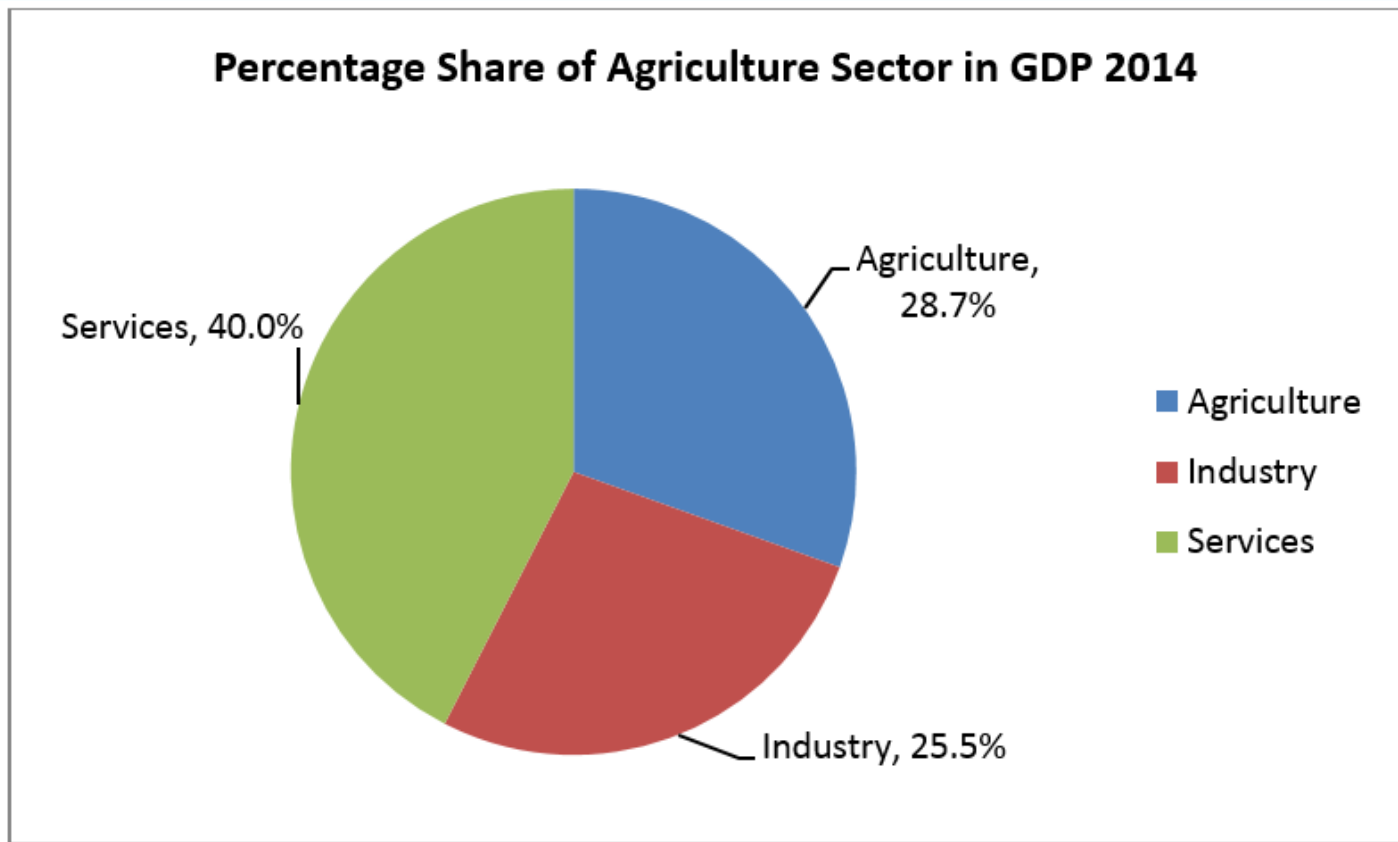# Cambodia (In Southeast Asia)

Key statistics:

- Territory area: **181,035 km²**
- Population: **15.3 millions**
- Annual pop. growth: **1.6%**
- HDI range of 187: **136**

(UNDP, 2016)

Key attractions:

The Angkor Wat

Tonle Sap life

Koh Rong Island, Cambodia
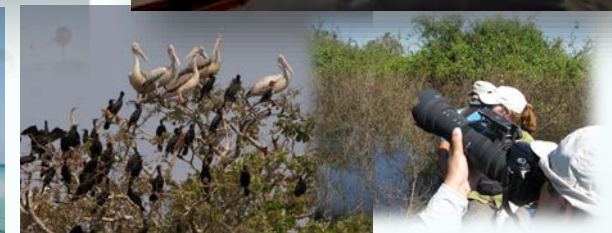
Cambodia's GDP

- The country has maintained its annual GDP growth rate of 6-7% for the last decade, and expected 7.1% and 7.2% in 2017 and 2018 respectively (ADB, 2017).
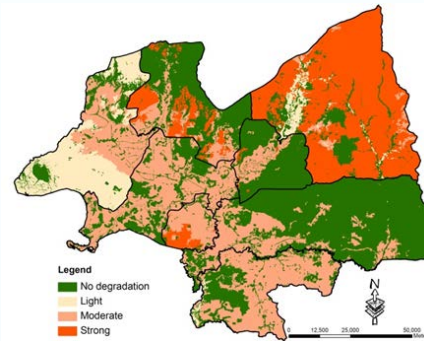
Percentage Share of Agriculture Sector in GDP 2014

Agriculture, 28.7%

Services, 40.0%

Industry, 25.5%

- Agriculture
- Industry
- Services

Source: Ministry of Planning, 2014

Current context regarding Land Degradation and extension systems

- Recent pilot studies on LD in 2 provinces shows that there are existing (Koy Ra, MAFF)
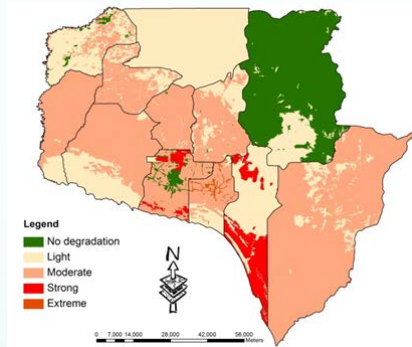
Siem Reap

Kampong Thom

- Major causes are associated with deforestation and unsustainable LM practices.

- **Farmers/land users:**
  - There are some existing good SLM practices by farmers, yet
  - Limited documentations
  - Farmers need to be educated for better SLM practices

- **Extension systems:**
  - Current extension systems are limited (human resources – quantity & quality –, materials, means etc.)
  - Extension officials and workers need capacity building

How we use WOCAT tools and methods…

1. Appraisal Phase Studies

- Desk review of existing relevant projects related to SLM and CCA

- Meeting with relevant stakeholders at community, sub-national and national levels

- Field surveys at the five-target provinces

- **Consultation workshop** "End of Appraisal Phase" on November 24, 2016, to show and discuss the results of the Appraisal Phase studies.

2. Adaptation of WOCAT tools and methods, and make them available in Khmer

- Selections and translation of the tools and methods (QT and QA, and Database)

3. Capacity building of extension workers on WOCAT tools and methods for SLM

- Training of trainers at national level

- Trainings of agricultural officials at provincial and district levels of 5 provinces

- Training of trainers on LD mapping

Presented by Sophea Tim,
Royal University of Agriculture, Cambodia

4. Documentations of SLM best practices by farmers/ land users

- Field data collections

- Data entry in WOCAT database

- Publish the documented SLM technologies and approaches both in Khmer & English on:
  - WOCAT global database and
  - Relevant national web-based portal

- Developments of SLM knowledge products
  - leaflets, posters, calendar
  - SLM tech & App booklets,
  - SLM general & instructional videos etc.
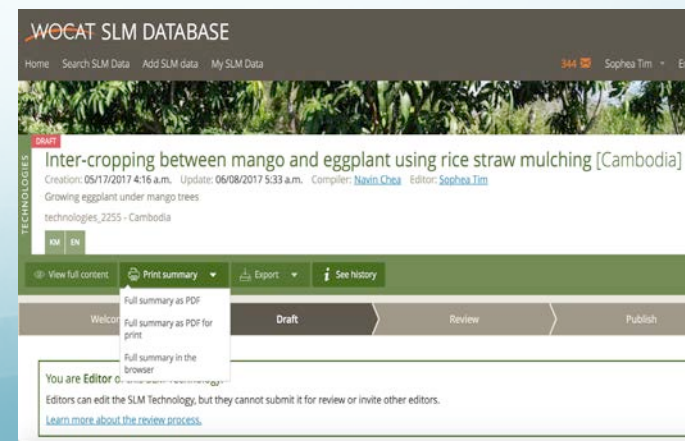
5. Planned activities

- Identification of agro-ecological zones and relevant stakeholders

- Training of trainers (ToTs) on WOCAT decision support tools

- Stakeholder workshops on WOCAT decision support tools at identified agro-ecological zones

- Set up on-farm demonstration at different agro-ecological zones

- Monitoring and evaluation of SLM practices

- Consultation workshop at national level for scaling-out of SLM technologies

- Enhancing policy frameworks and incentive structures for scaling up SLM

Contributions to the achievement of SDG goals

- **SDG target 2.4** "By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, help maintain ecosystems, strengthen capacity for adaptation to climate change, extreme weather, droughts, flooding and other disasters, and that progressively improve land and soil quality"

- **SDG target 15.3** "By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods and strive to achieve a land degradation-neutral world"

How…?

WOCAT Project Activities (Cambodia)
- Appraisal phase studies
- Adaptation of WOCAT tools & methods, and make them available in Khmer
- ToTs on SLM tools and methods for SLM
- Training agr. extension officials at various levels
- Documenting best SLM practices by farmers
- Develop SLM knowledge products (various formats) and increase accessibility globally and locally; etc.
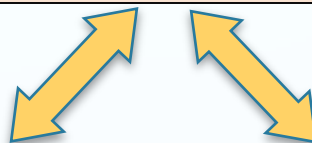
ASPIRE
(capacity buildings, extension products, etc.)

UNCCD Cambodia Focal Point
(UNCCD reporting, Land degradation mapping, best SLM practices, etc.)

Enhanced policy & incentive framework, consolidation and synthesis of SLM scale-up methodology, increased SLM and climate-resilient practices → **SDGs**

Conclusion

- The standardized tools and methods of WOCAT have been applied to scale up SLM practices in the country, with the capacity building of agricultural officials from national to local levels.

- Local accessibility to the extension products is increasing through the their availabilities in local language (Khmer) version. These undoubtedly contribute to the achievement of the SDG goals.

- However, it shows that the standardized tools, methods and products remain somehow complicated for extension workers at the lowest levels and farmers. Therefore, additional simplified products are indispensible to ensure the products are used by these respective people.

- This project is small compared to the ambitious goals to achieve the massive SDG targets, thereby broader impacts would require a concrete policy framework to be put into practice.

An open-source, multi-scalar approach for monitoring and reporting on land degradation

Mariano Gonzalez-Roglich, Alex Zvoleff & Monica Noon

mgonzalez-roglich@conservation.org
06/13/2017 - WOCAT Symposium, Cali, Colombia

United Nations Convention to Combat Desertif ication

SO1: To improve the living conditions of affected populations

    I1: Trends in population living below the relative poverty line and/or income inequality in affected areas

    I2: Trends in access to safe drinking water in affected areas

SO2: To improve the condition of affected ecosystems

    I1: Trends in land cover

    I2: Trends in land productivity or functioning of the land

SO3: To generate global benefits through effective implementation of the UNCCD

    I1: Trends in carbon stocks above and below ground

    I2: Trends in abundance and distribution of selected species

UNCCD

Sustainable Development Goals

15.3. By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

15.3.1. Proportion of land that is degraded over total land area

Subindicator → Metric

Land Cover → Land cover change

Land Productivity → Net Primary Productivity
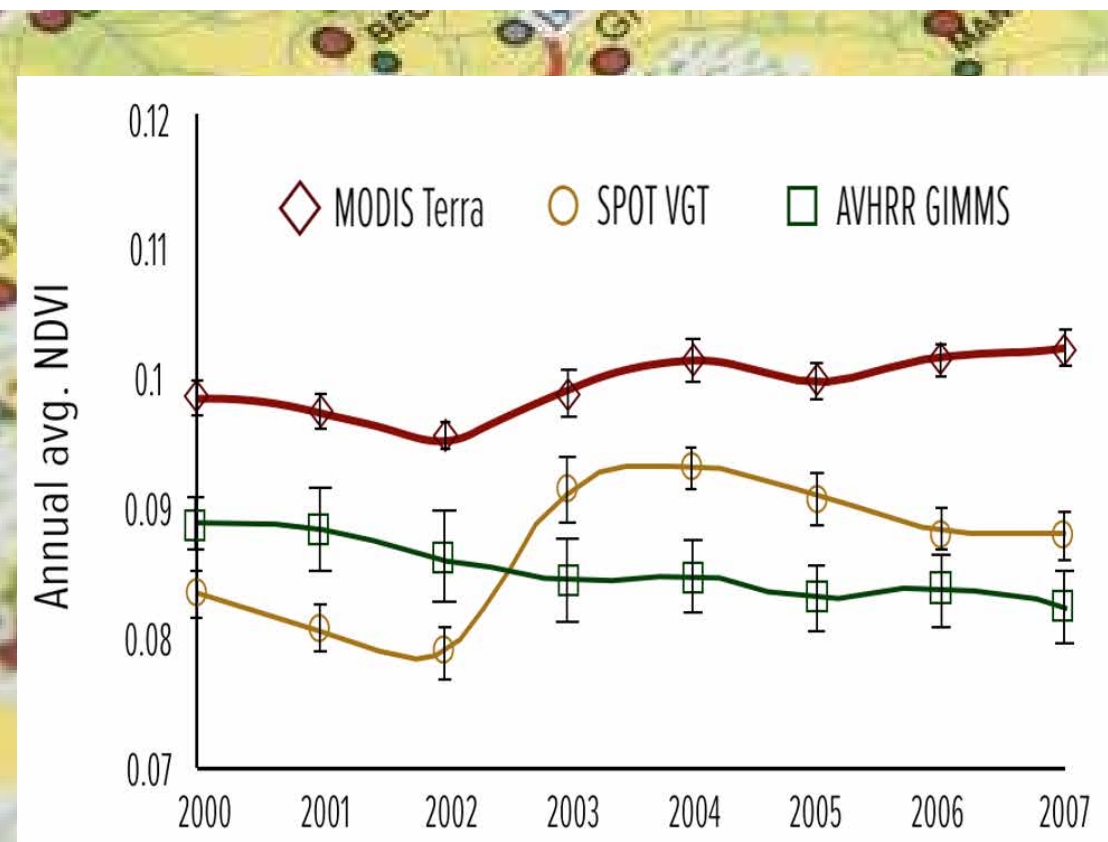
Carbon Stocks - Above and Below ground → Soil Organic Carbon Stocks
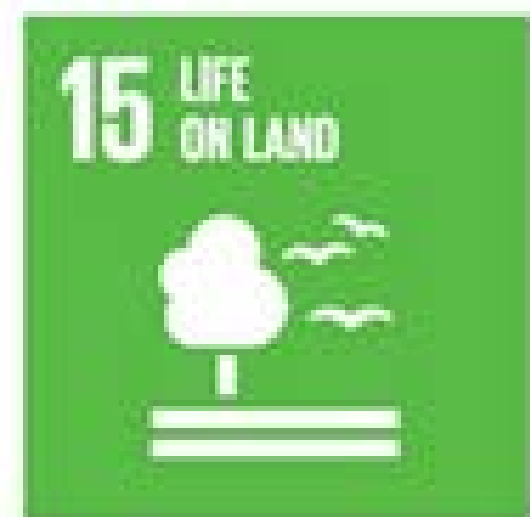
The challenge

Lack of robust methods, data, and
consistency in reporting to the UNCCD
and the GEF

Requested by the Global Environment Facility Scientific and Technical Advisory Panel (GEF-STAP)

Fensholt, R., et al. 2009. Remote Sensing of Environment 113,

The objectives

1. Methods for assessing and monitoring status and trends in land degradation

2. Demonstration of methods and platforms to enable widespread adoption

3. Gender appropriate capacity building

Senegal

Uganda

Kenya

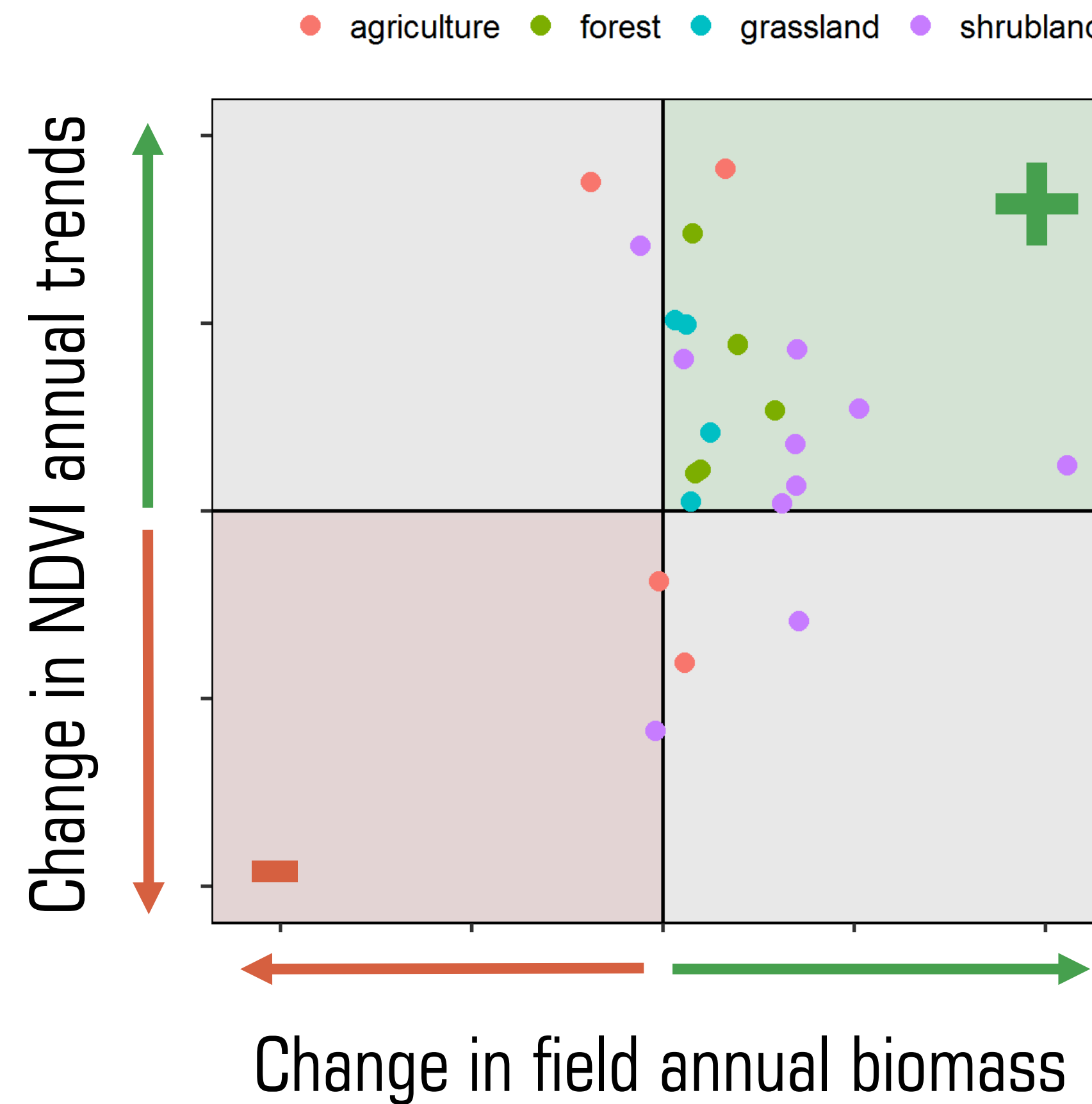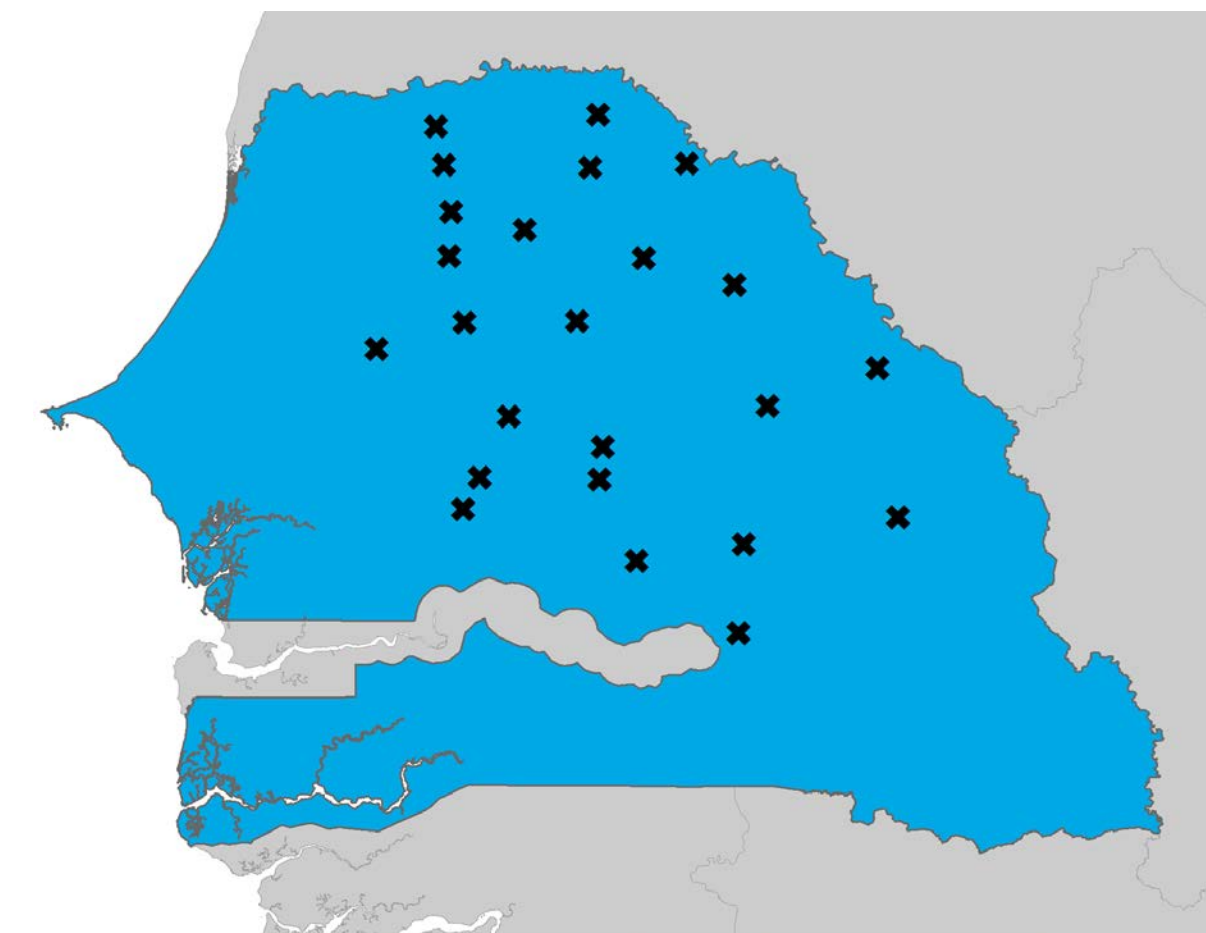Tanzania

Assessment of methods and datasets

Led by

- Comparison of vegetation indices

- Vegetation indices and chlorophyll fluorescence

- Comparing NDVI trends from different sensors and spatial scales

- Comparing NDVI trends methods: NDVI trends, P-RESTREND and S-RESTREND
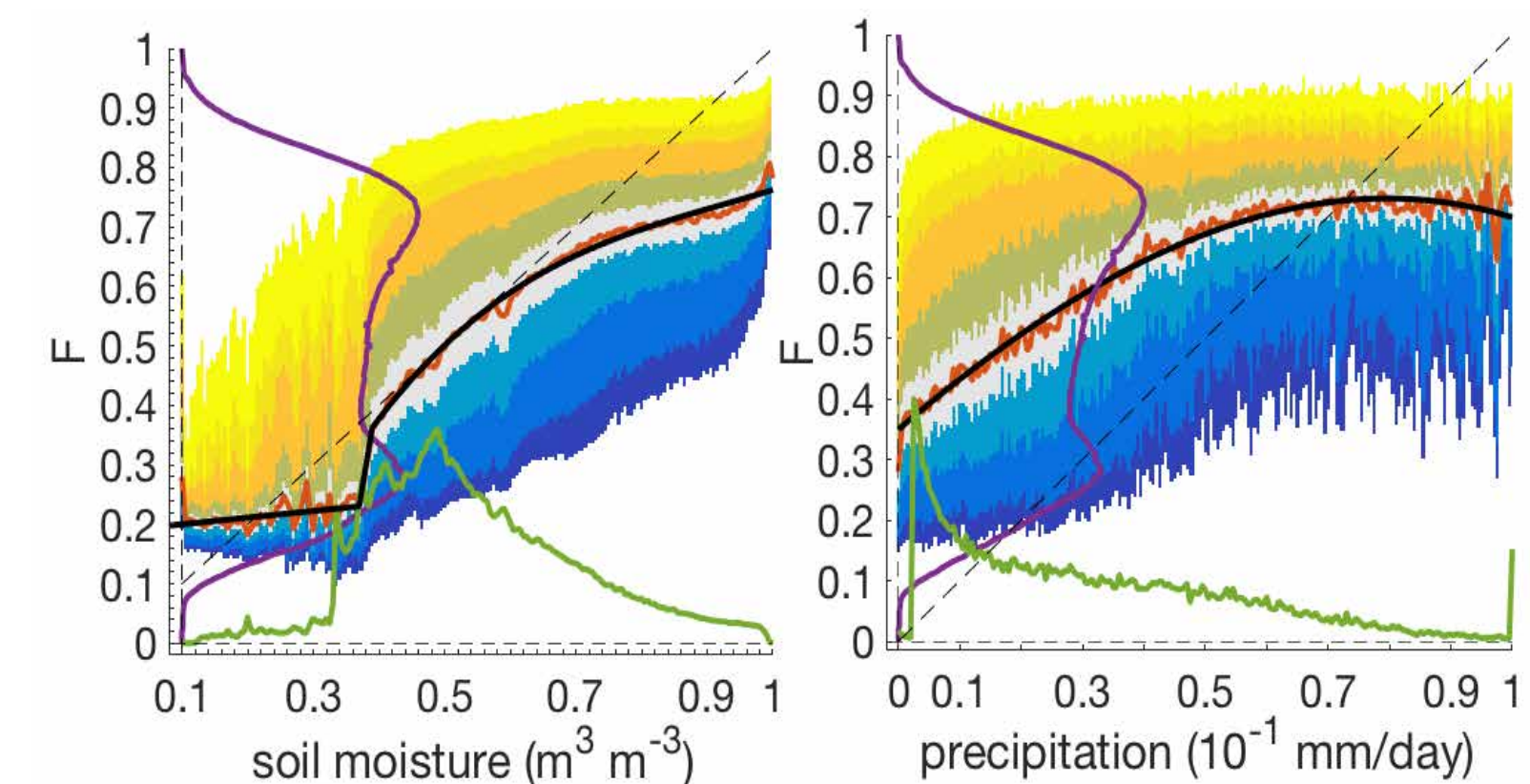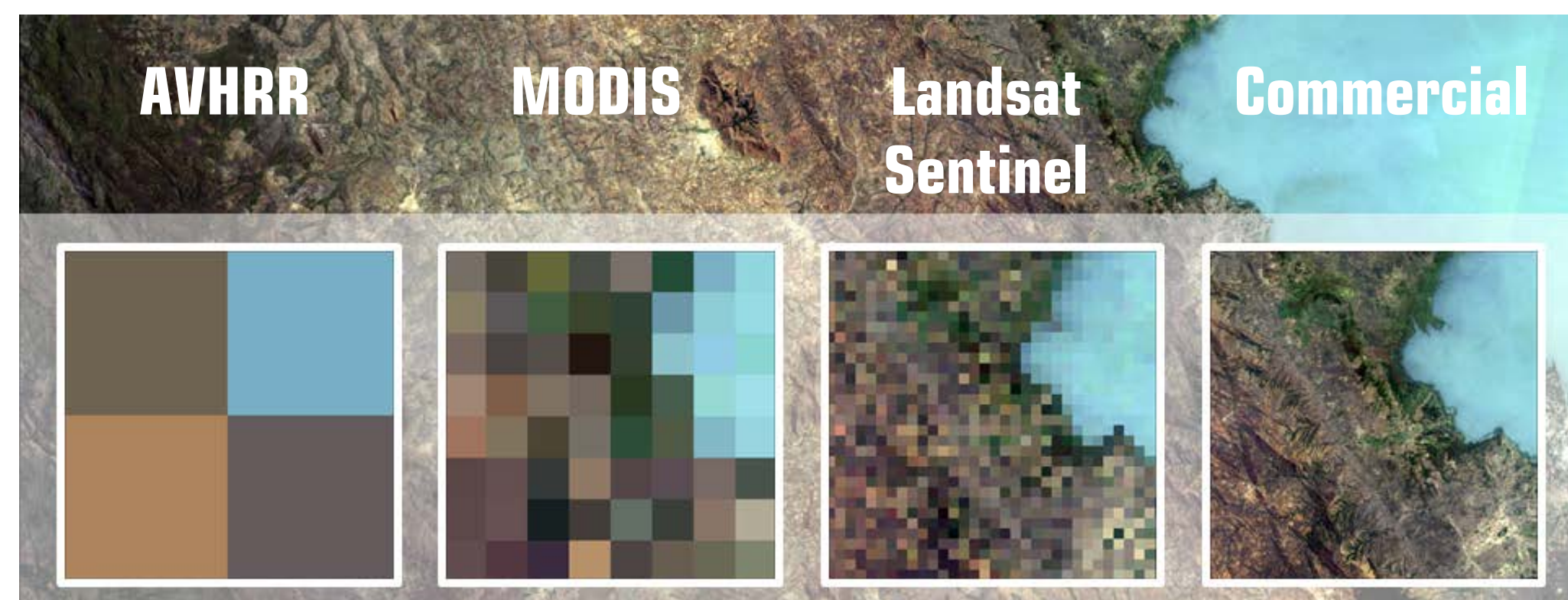
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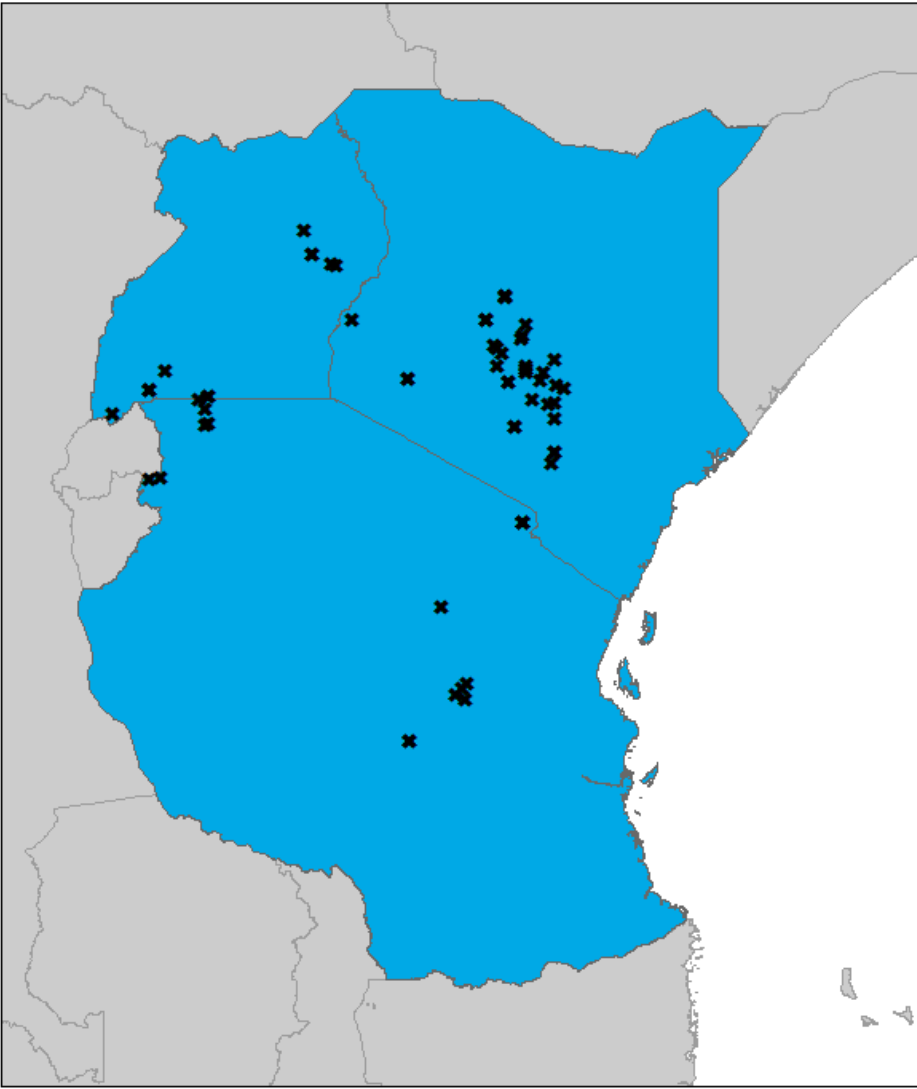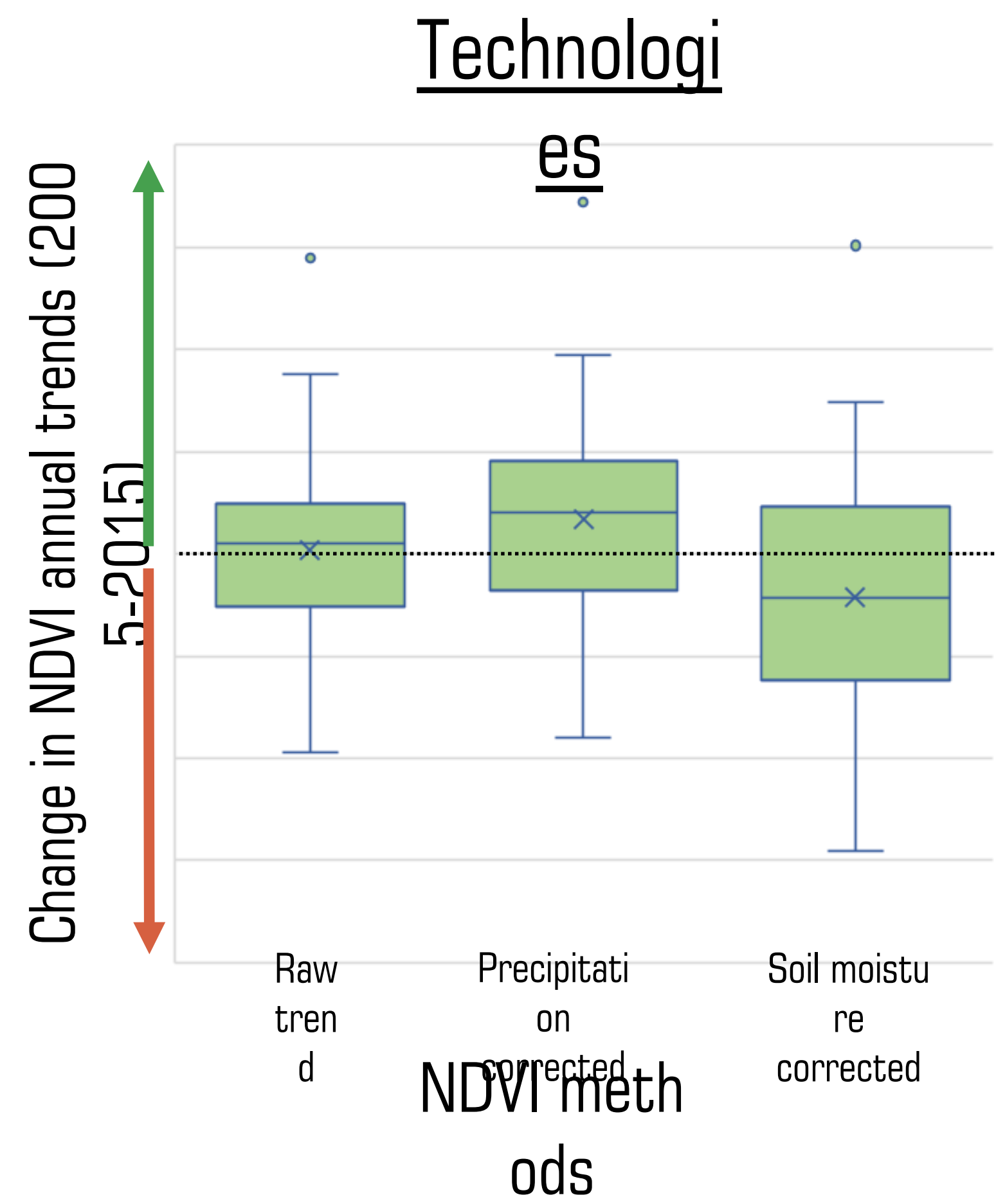• Comparing NDVI trends methods: NDVI trends, P-RESTREND and S-RESTREND
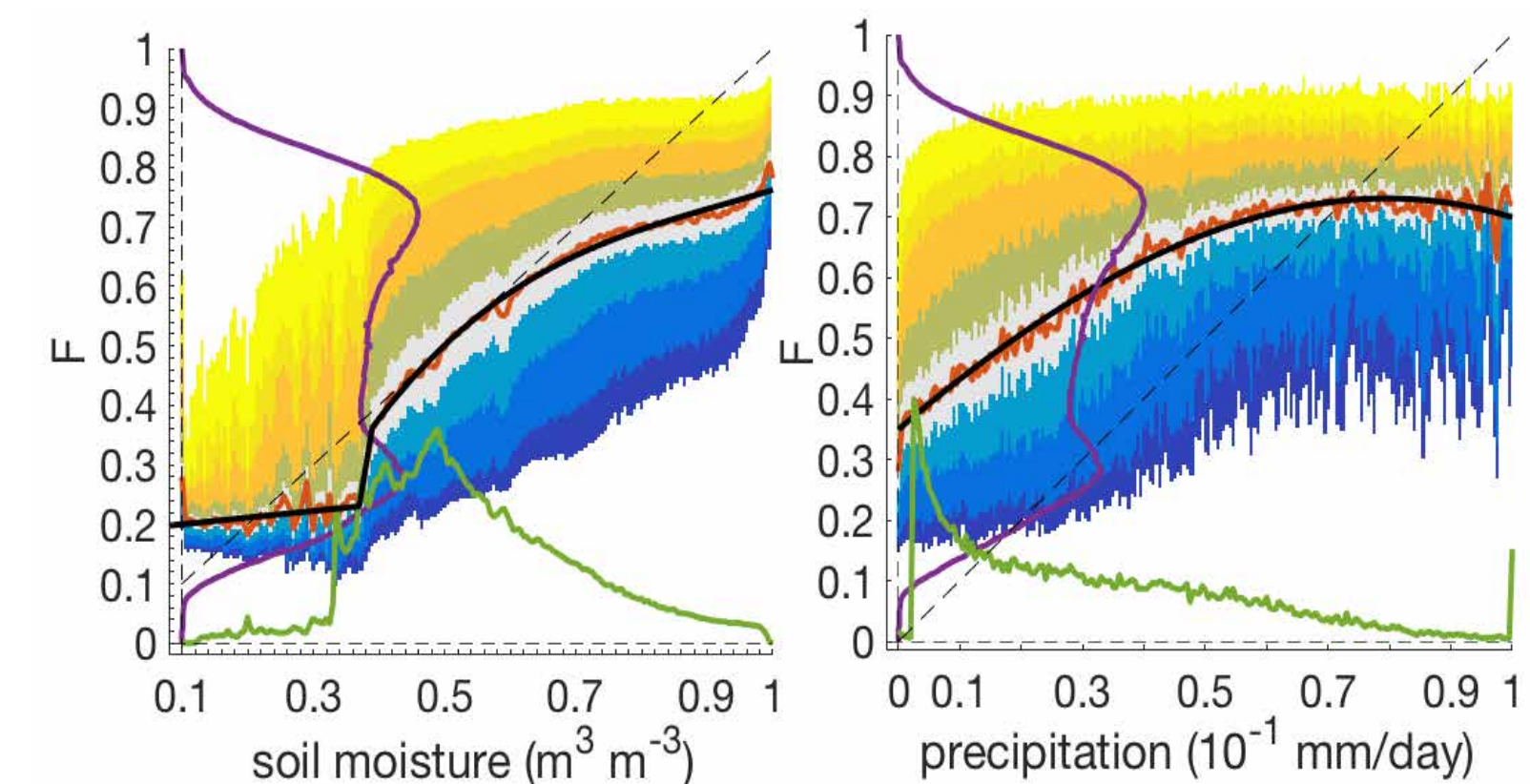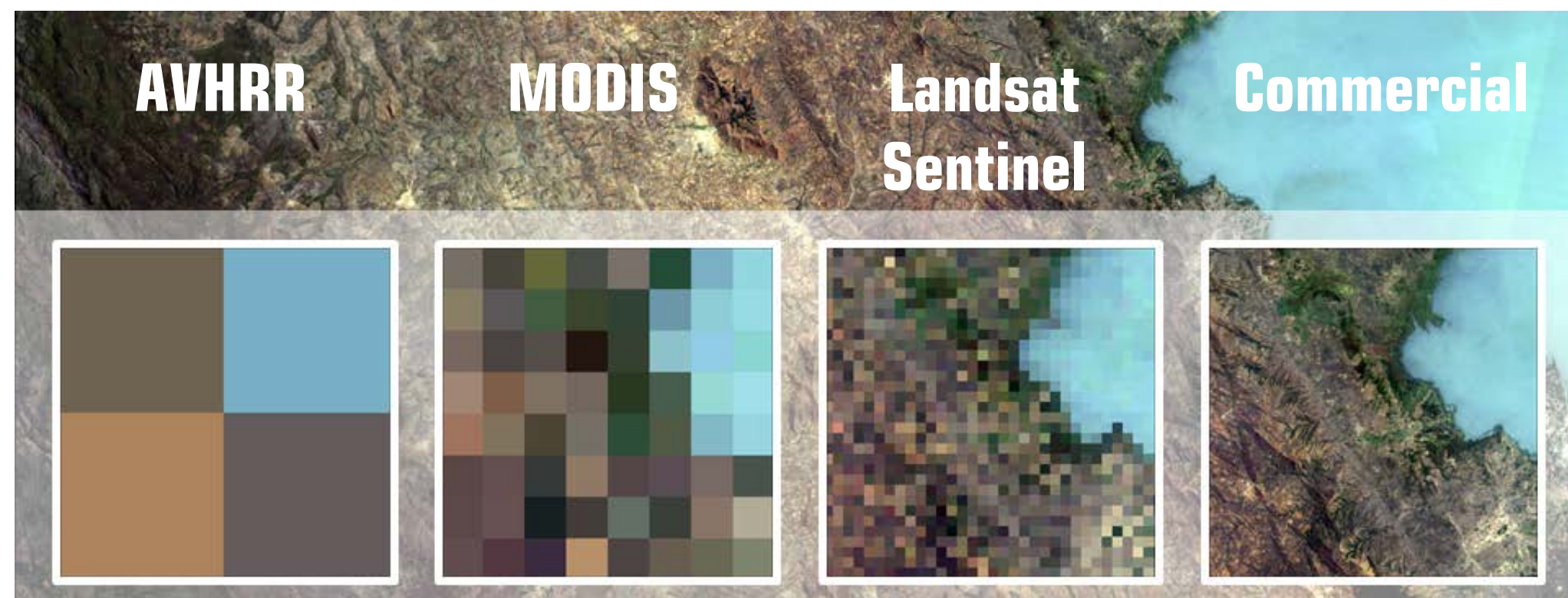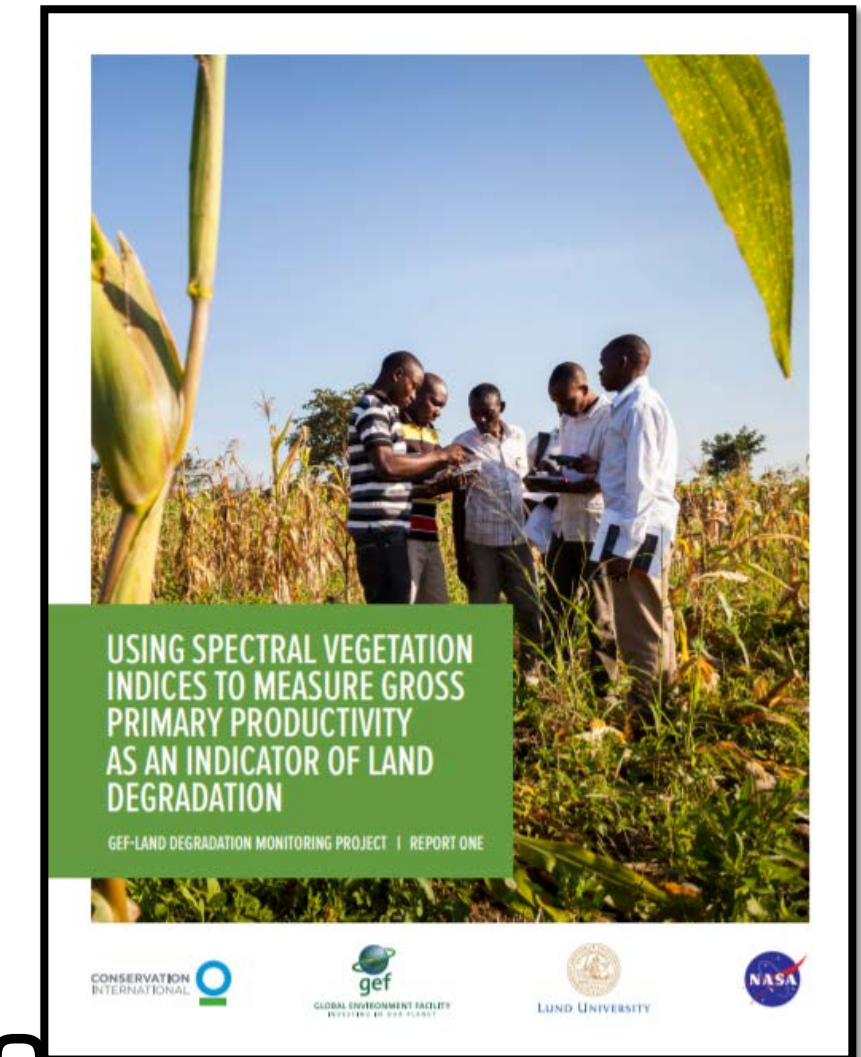
Field validation – CSE 2000-2015 annual surveys


83.3% agreement

Field validation – WOCAT

Technologies

Change in NDVI annual trends (2005-2015)

Raw trend

Precipitation corrected

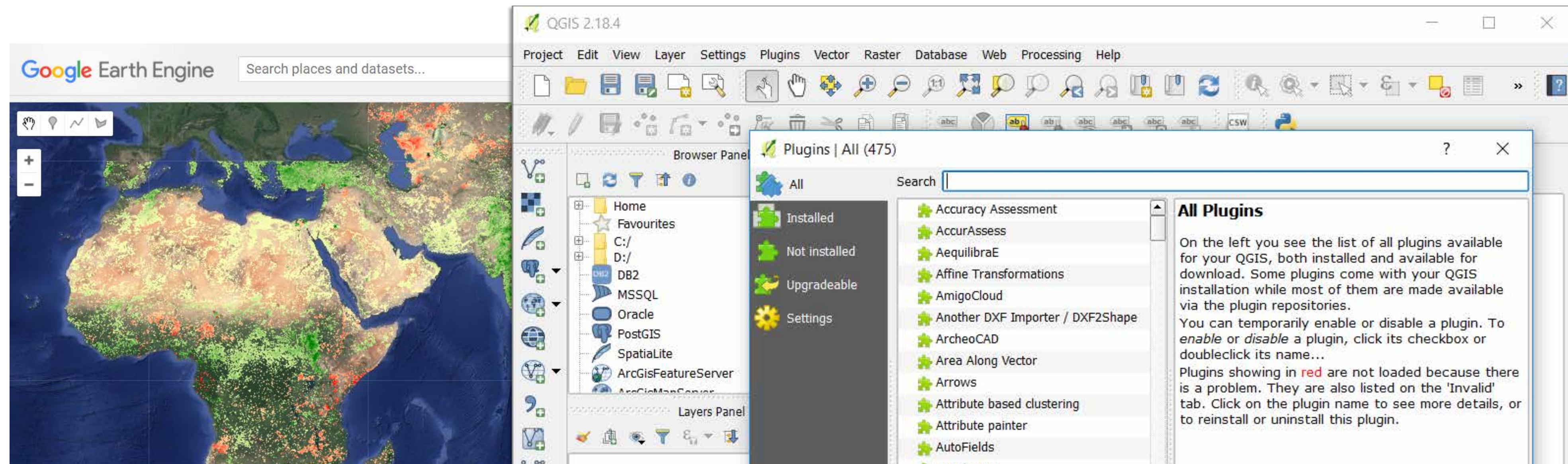Soil moisture corrected

NDVI methods

Field validation – Vital Signs

The Vital Signs monitoring system collects and integrates data using standardized protocols and methods including household surveys, vegetation plot measurements, and remote sensing.
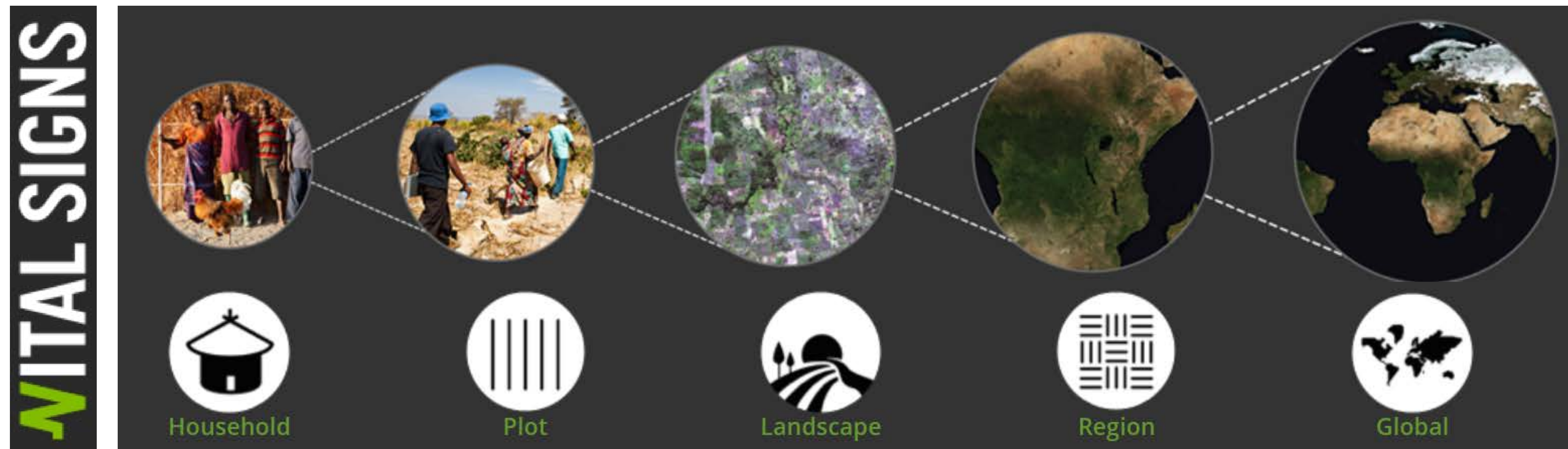
The toolbox

- Free and open source

- Stand alone (off-line) & cloud computing (online)

- Basic global data provided
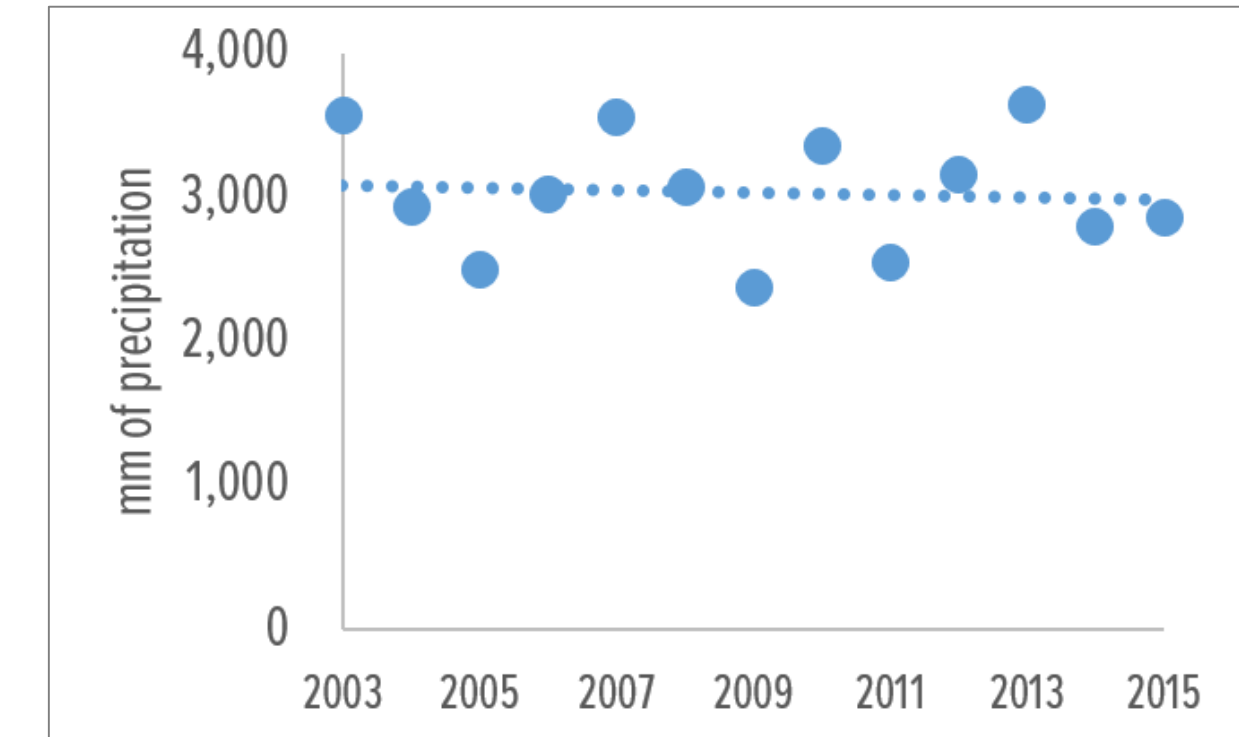
- Allows for user data

The toolbox – some functionalities

- Select starting and end period

- Time series of NDVI

- Time series of climate (precipitation & soil moisture)

- NDVI trends – raw & corrected by climate

- Summaries by area

- Summaries by land cover type and change
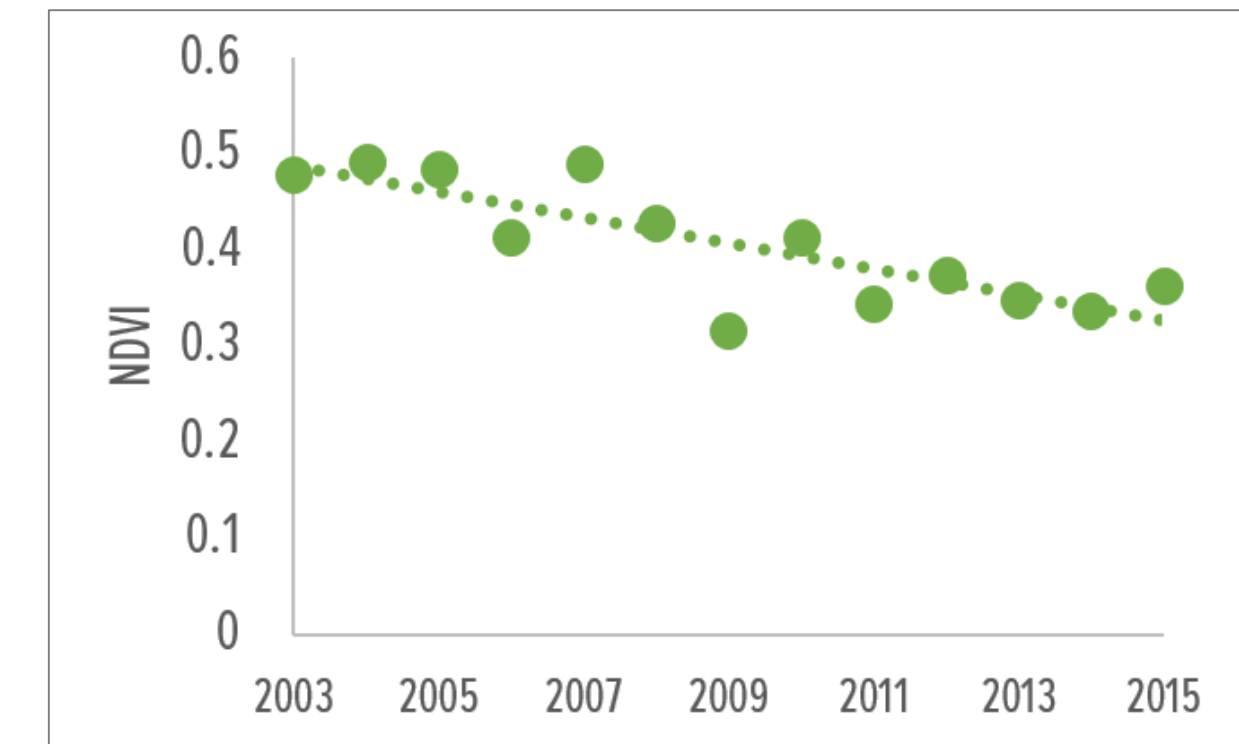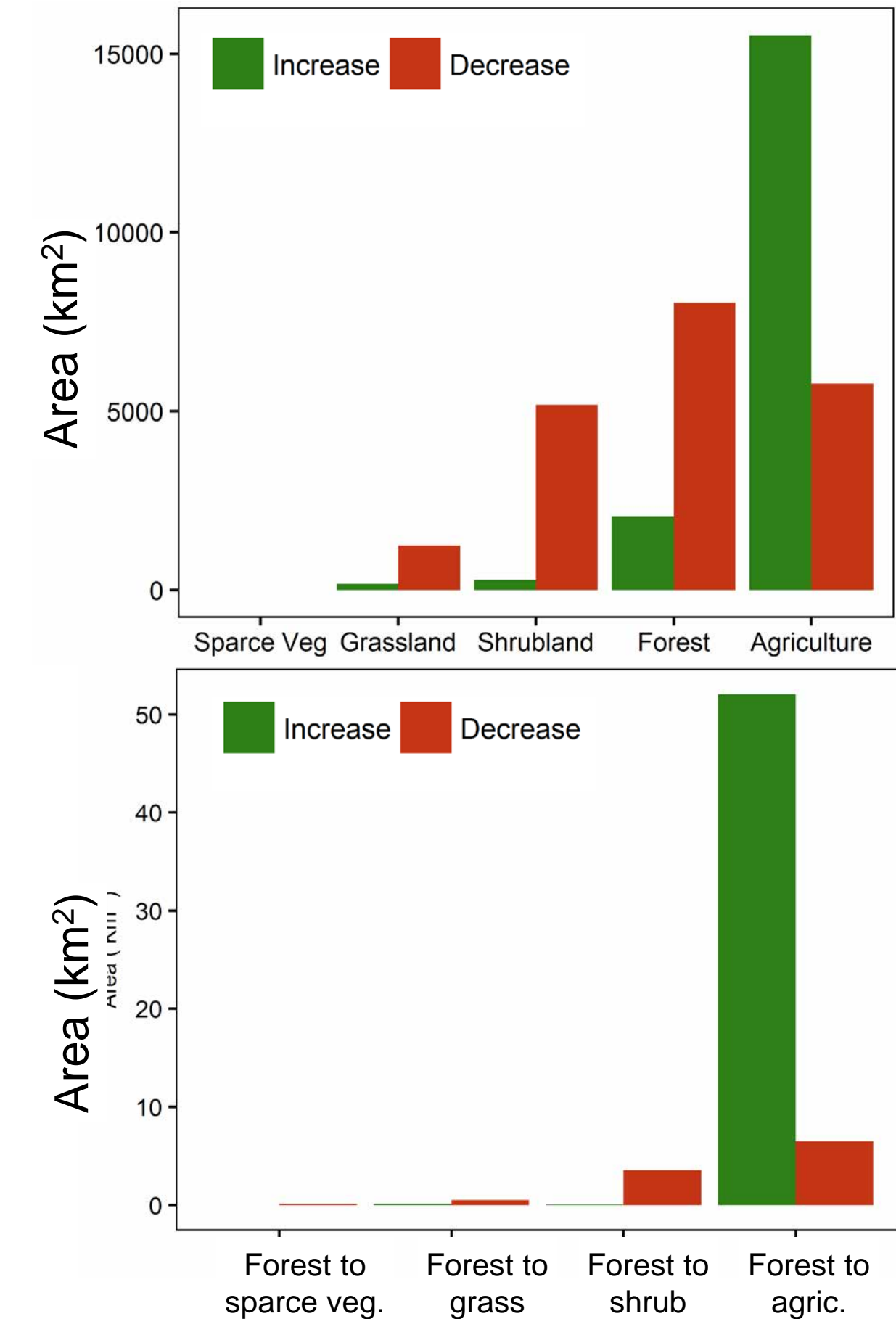 (e.g. ESA CCI Land cover - 300 m - 1992 to 2015)

The toolbox – some functionalities

- Select starting and end period

- **Time series of NDVI**

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  (e.g. ESA CCI Land cover - 300 m - 1992 to 2015)

The toolbox – some functionalities

Led by

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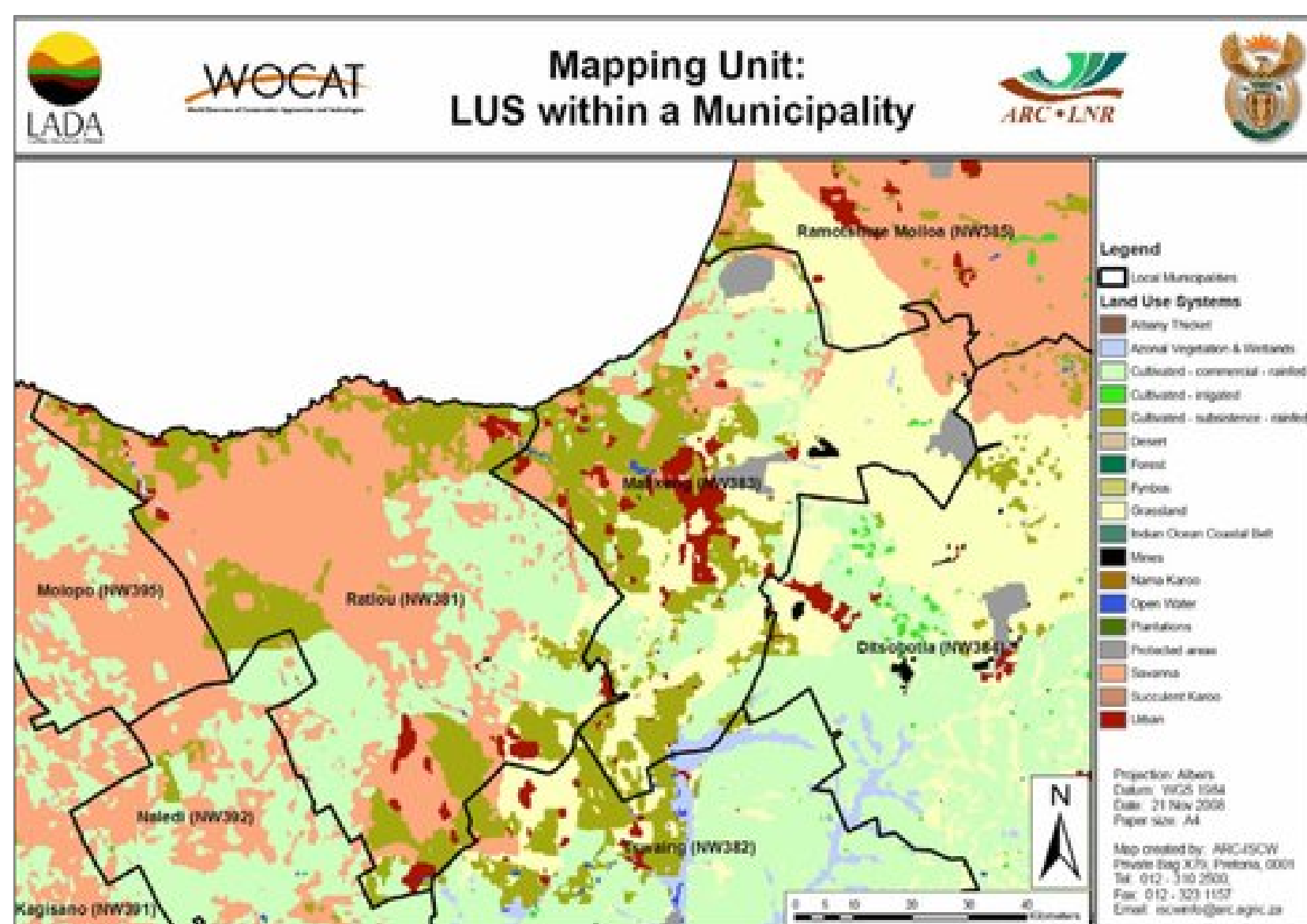 (e.g. ESA CCI Land cover - 300 m - 1992 to 2015)

The toolbox — links with existent platforms

Led by

UNCCD identified the World Overview of Conservation Approaches and Technologies (WOCAT) as the primary recommended database for best practices on sustainable land management.

The SLM Mapping Tool aims to capture land use, degradation and conservation, and to spatially assess the impact on ecosystem services.

Capacity building

LUND
UNIVERSITY

- Gender balanced and appropriate capacity building

- 5-8 participants per pilot country

- To be held in October 2017

Workshop   **Webinars**   **Documentation**

Morogoro

An open-source, multi-scalar approach for monitoring and reporting on land degradation

http://vitalsigns.org/gef-ldmp

Thank you!

Local partners: Centre de Suivi Ecologique (CSE)
African Innovations Institute (AfRII)
Tanzania Forest Conservation Group
(TFCG)

Mariano Gonzalez-Roglich
Director of Ecosystem Analysis
Conservation International
mgonzalez-roglich@conservation.org
06/13/2017 - WOCAT Symposium – Cali,

A Web-based Geoinformatic Tool to Better Target SLM Options at Different Scales and Support Achieving LDN

**WOCAT Symposium**
13 June 2017
CIAT HQ, Cali, Colombia

Quang Bao Le (ICARDA)

Richard Thomas (ICARDA)

Enrico Bonaiuti (ICARDA)

Chandra Birarda (ICARDA)

Claudio Zucca (ICARDA)

Jim Jaspe (IMAP)

Bashar Ayyash (IMAP)

- Sustainable Land Management (SLM) options are fitted to the social, economic and ecological contexts.
  - Example: Reuse crop-livestock residues by compost in Southwestern Burkina Faso

Nutrient management practices by a farm-based, labour-endowed and educated household

Livelihood characteristics
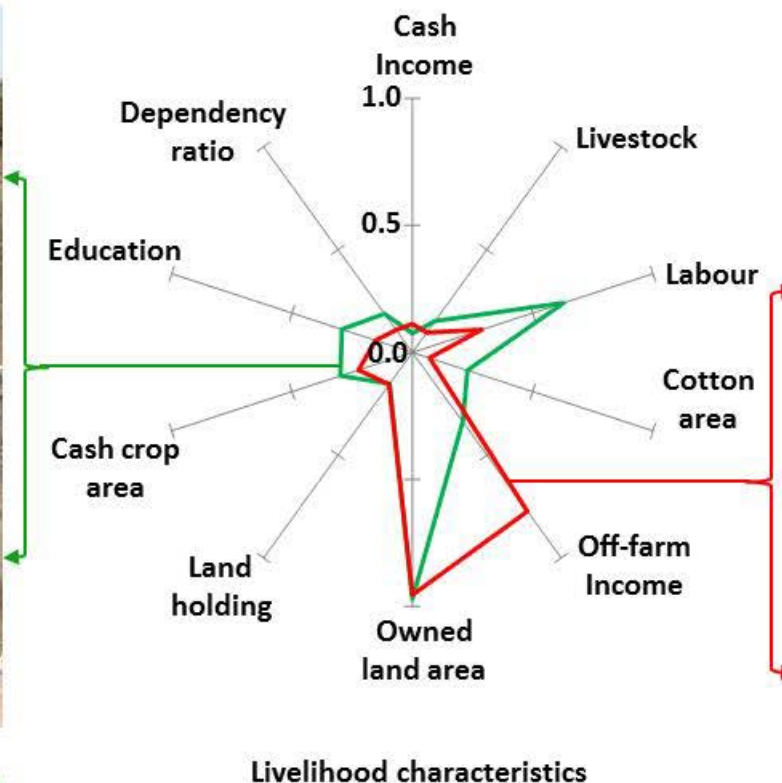
Nutrient management practices by an off-farm oriented household

Source: Thiombiano, Le (2016)

- High contextual diversity of drylands *vs.* "uniform blanket" approach in promoting SLM over large scales

- Lack of tools supporting comparative analyses/assessments of SLM options by context, thereby informing upscaling efforts
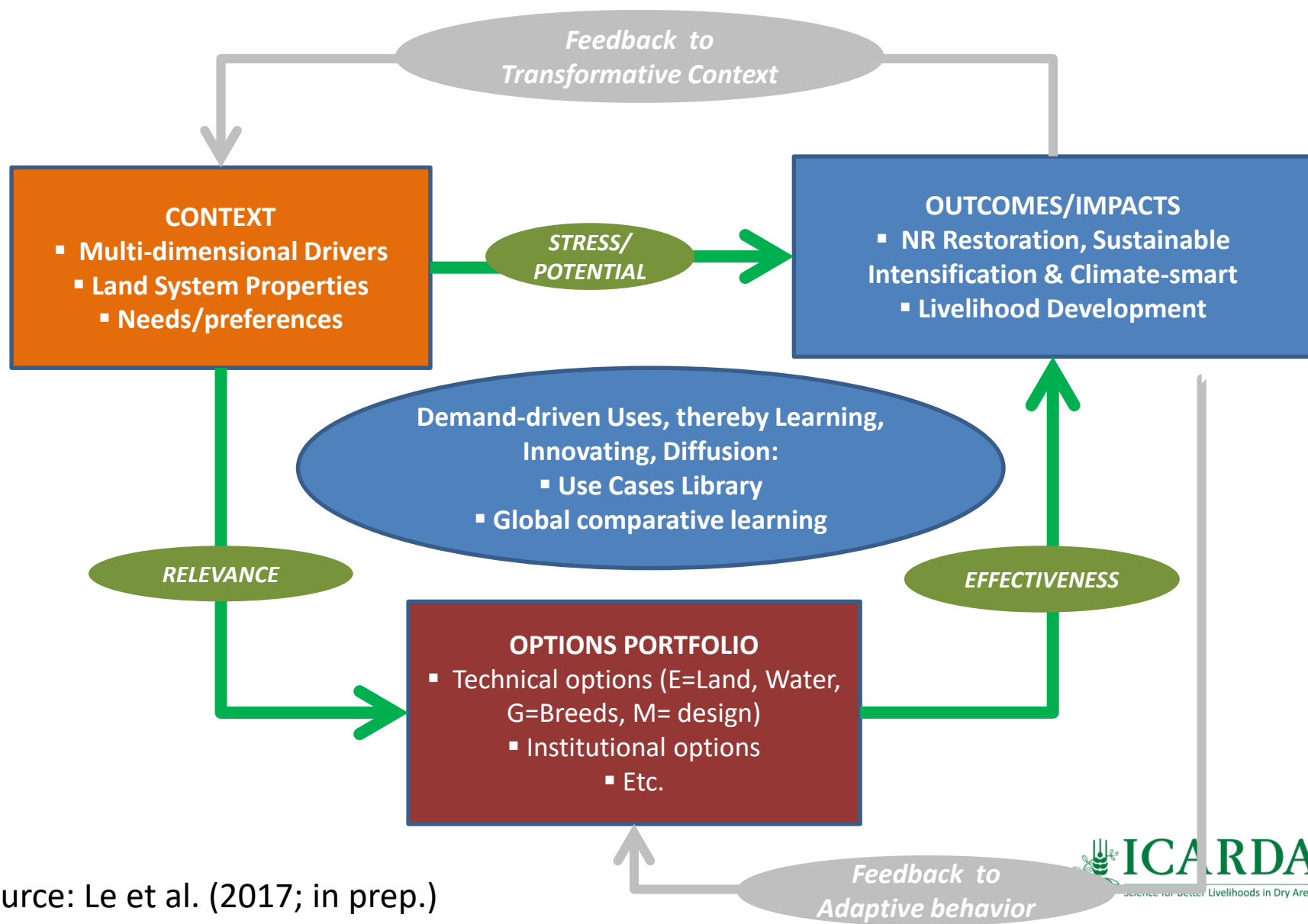
Global Geo-informatic Options by Context (GeOC) - A framework and web-based tool for defining, monitoring, assessing and co-learning SLM options fitted to the social-ecological contexts

- 2016: ICARDA funded by CRP Dryland Systems
- 2017: ICARDA funded by GIZ/BMZ

Aims: to provide land users, projects/programmes and policy decision-makers with a web-based tool as being:

- plausible, robust extrapolation domains for guiding decisions on the selection and use of SLM options,
- an open platform for docking different disciplinary projects into integrative/holistic and converging actions for promoting SLM at scale.

GeOC's Conceptual Framework

Feedback to Transformative Context

CONTEXT
- **Multi-dimensional Drivers**
- **Land System Properties**
- **Needs/preferences**

STRESS/ POTENTIAL

OUTCOMES/IMPACTS
- **NR Restoration, Sustainable Intensification & Climate-smart**
- **Livelihood Development**

Demand-driven Uses, thereby Learning, Innovating, Diffusion:
- **Use Cases Library**
- **Global comparative learning**

RELEVANCE

EFFECTIVENESS

OPTIONS PORTFOLIO
- Technical options (E=Land, Water, G=Breeds, M= design)
- Institutional options
- Etc.

Feedback to Adaptive behavior

Source: Le et al. (2017; in prep.)

Web-based GIS*

- **Web-based GIS for key functions (filtering/querying, zonal statistics, spatial similarity analysis)**
- **Global GIS database of divers and performance/impact indicators of SLM**

Matched
Synchronized

Sustainable Land Management (SLM)

- **Web-based form* for importing standardized and completed SLM options by context**
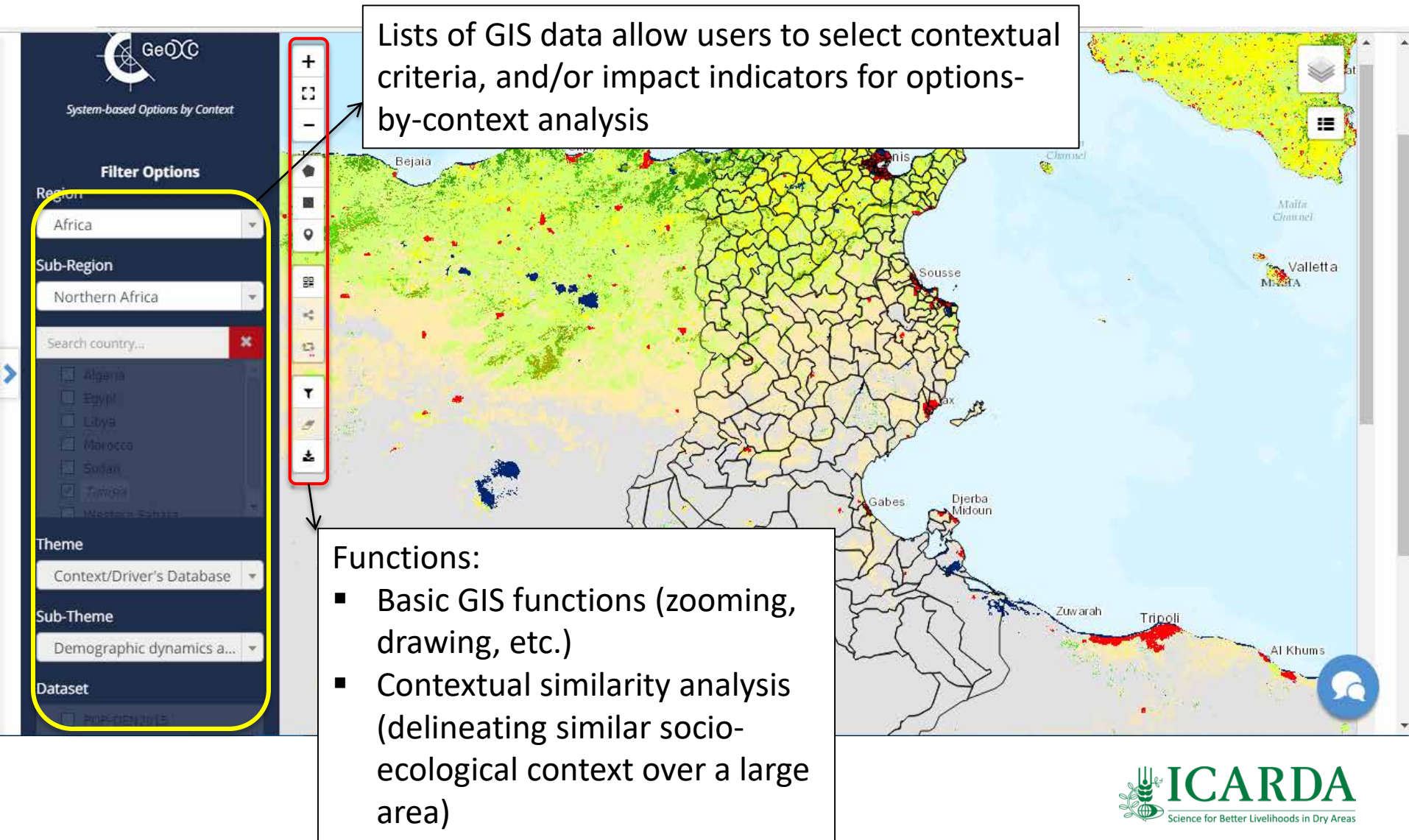- **Database of SLM options by Context**

Note: red asteric * refers to complementaty aspects compared to WOCAT

ICARDA
Science for Better Livelihoods in Dry Areas

Global GIS data*:

- Compiles common intermediate and underlying drivers/causes of land use/management practices:
  Biophysical, demographic, economic, resource governance/institutional factors (22 global GIS layers)

- Includes key indicators for performances and impacts of land management practices:
  biomass productivity, rain use efficiency, land productivity gap, affected/benefited population (6 indicators in GIS format)

- These data are presented in a Global WebGIS tool

Note: red asterisk * refers to complementaty aspects compared to WOCAT

ICARDA
Science for Better Livelihoods in Dry Areas

## Graphic interface of GeOC's WebGIS and key functions

Lists of GIS data allow users to select contextual criteria, and/or impact indicators for options-by-context analysis

Functions:
- Basic GIS functions (zooming, drawing, etc.)
- Contextual similarity analysis (delineating similar socio-ecological context over a large area)

- In Uzbek agricultural land, there are 5 typical spatial clusters being different in drivers of land use/management (e.g. soil, land-form, accessibility and economic development) (see map). These drivers shaped land productivity (not shown)
- Similar studies done for other land use strata (not shown)
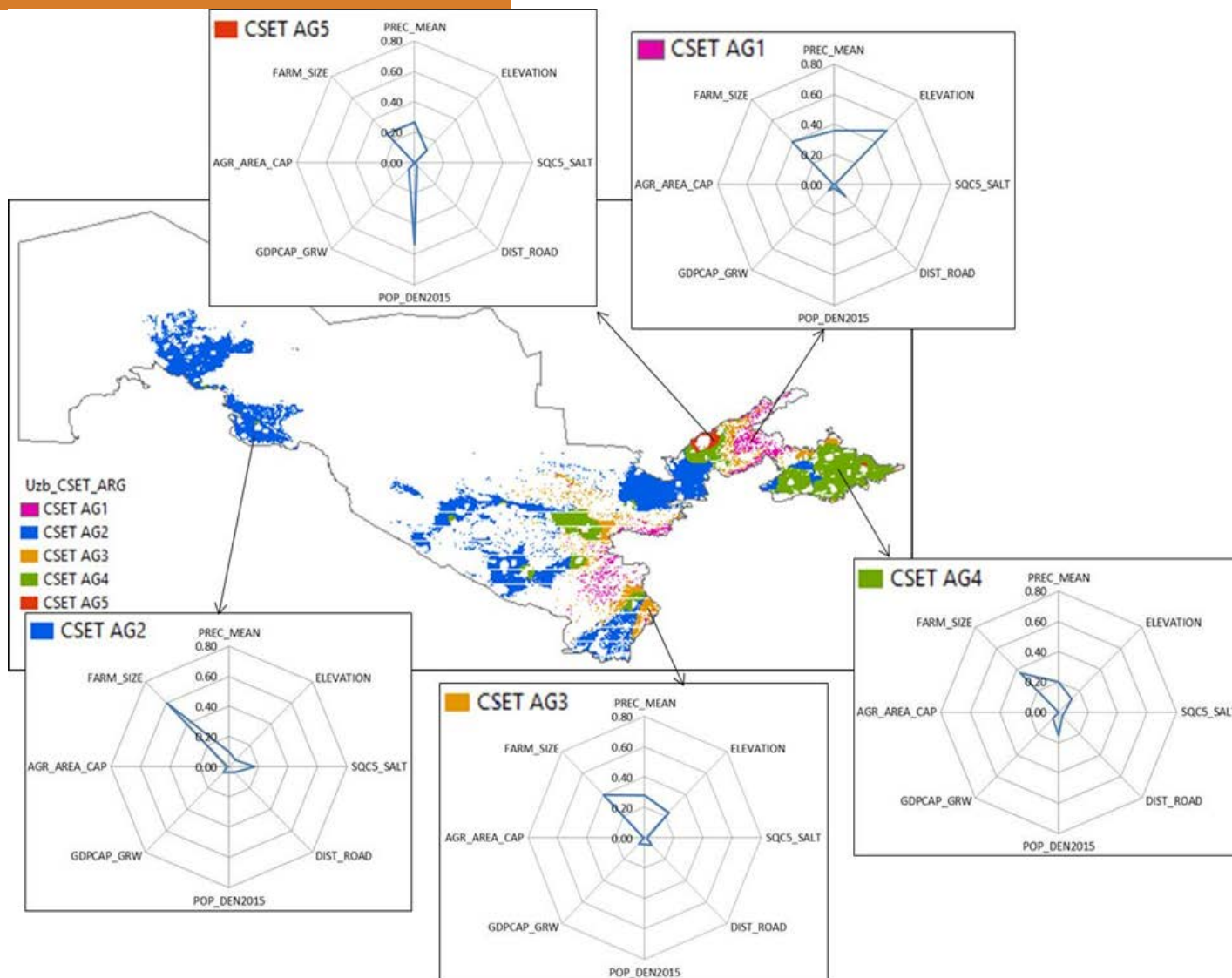
Source: Le, Akramkhanov et al. (in prep).

8

The SLM part of the GeOC

Main features

- Data entry forms both Excel and web-based form* for standardized description of SLM (adapted from with from WOCAT)

- Multi-variate* database rather than static factsheet

- Synchronized with the GIS database and tool (WebGIS) to retrieve - hence relate with - contextual and impact variables at larger scale*

- Peer-reviewed process for submitted SLM (handled as paper submission to journals)*

Added values

- Relatively match with WOCAT questionnaire; allow either on- or off-line inputs

- Allow user-defined queries in responsive to SLM's attributes selected (e.g. type, environmental and socio-economic characteristics)
- Allow spatially explicit analysis/assessment

- Better quality management

Note: red asterisk * refers to complementaty aspects compared to WOCAT

Web-based SLM interfaces

KEY USING FUNCTIONS (in red)

CONTEXT
- Multi-dimensional Drivers
- Land System Properties

QUERIES:
1. Map of degraded/improved area vs. contextual criteria

OUTCOMES/IMPACTS
- Land Degradation/Restoration
- Population Poverty/Development

QUERIES:
1. Map of areas vs. contextual criteria
2. List of options vs. contextual criteria

CONTITIONAL STATISTICS:
1. Area of degraded/improved area vs. contextual criteria
2. Number of people (male/female, urban/rural) affected

CONDITIONAL STATISTICS:
Of the above queried variables

QUERIES:
1. List of successful/working intervention stories vs. contextual criteria
2. List research/ management gaps/needs
3. List of references to underlying documents

OPTIONS PORTFOLIO
- Technical options
- Institutional options
- Etc.

GeOC tool will be officially launched in July/August 2017:

- SLM form/data: https://mel.cgiar.org/slm (users'/testers' registration needed)
- WebGIS: https://mel.cgiar.org/visualization (users'/testers'registration needed)
- Approval: http://mel.cgiar.org/approval (only for tool admin)
- URL to tutorial video clips

Five video clips (preliminary products, currently for internal uses only):

- Introduction of GeOC tool - motivation, goals, potential users (**video clip 1**)
- Introduction of the WebGIS tool- key functions (**tutorial video clip 2**)
- General introduction of the web-based SLM input form (**tutorial video clip 3**)
- Use case 1: Context-based analysis: searching implemented SLM options with a defined context (**tutorial video clip 4**)
- Use case 2: Option-based analysis: searching similar context(s) given a considered SLM option (**tutorial video clip 5**)

Focused countries for collecting/transfering SLM data for piloting GeOC:

- Tunisia (ICARDA – CRP Dryland Systems
- Niger, Mali, Ethiopia, Kenya, Tanzania (ICARDA, ICRAF, ICRISAT – EU-IFAD project)

Thank you!

GeOC's option-by-context approach: A system-base view

Context (C) x **Structure & Function (SF)** x **Options (O$_{C,SF}$)** = **Performance (P)**

Context (C):

1. Manageable driving factors (**EXTERNAL CAUSES**) as interventional options

2. Underlying social, development, biophysical aspects acting as **BOUNDARY CONDITIONS,** not necessarily as CAUSES)

Manageable structural, functional factors (not all) as options → **SYSTEM ENGINEERING**

SLM strategies:

1. Changeable factors from external context (O$_C$), e.g.
- Smart subsidy policy
- Improved market access
- Developed, inclusive value chains
- Effective partnerships

2. Alternative farm design/planning/practices (O$_{SF}$), e.g.
- Improved varieties
- Efficient use of inputs
- Farm design for subsidiary links

3. All in coping with the Context (C)

SLM outcomes:

1. Total productivity persistently improved
2. Resource use efficiency
3. System capital build
4. Social equity

Secondary feedback (rebound effect)

Source: Le et al. (2017; in prep.)

Use-case: a sequence of limited, yet guided, steps that describes the interactions between a typical user and the information system to accomplish a typical goal.

Use case library: consists of as many as possible typical use cases, in which a user can find a use case most similar to his/her need to start with.

Strengths of the use case approach:
- strong analytical perspective and complete analysis assurance,
- simple and easy to understand and adopt,
- widely a recognised market standard,
- encourage join work between users and system designers to develop typical use case library.