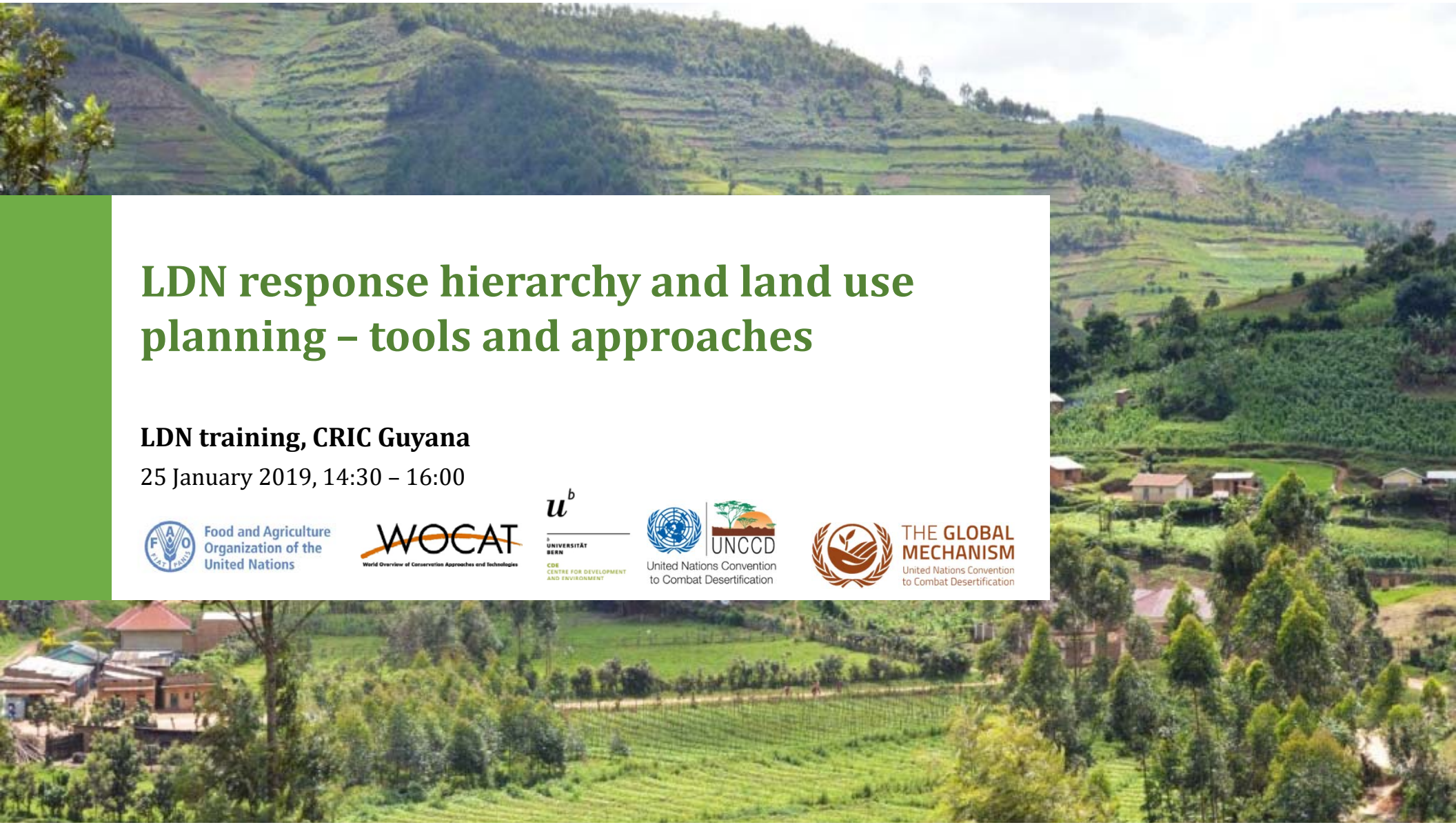

LDN response hierarchy and land use planning – tools and approaches

LDN training, CRIC Guyana

25 January 2019, 14:30 – 16:00

Food and Agriculture Organization of the United Nations

WOCAT
World Overview of Conservation Approaches and Technologies

UNIVERSITÄT BERN
CDE CENTRE FOR DEVELOPMENT AND ENVIRONMENT

UNCCD
United Nations Convention to Combat Desertification

THE GLOBAL MECHANISM
United Nations Convention to Combat Desertification

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A. LDN Response Hierarchy- Hanspeter Liniger WOCAT

B. LDN / SLM Implementation strategy? Sally Bunning &Vera Boerger FAO

1. **Assessment LD and SM (national to landscape)**
2. **Land planning**
3. **Integrated landscape management (ILM)**
4. **Integrate climate change and biodiversity**
5. **Mainstreaming in policy and financiing**
6. **Monitoring and communicating**

C. Country Experiences

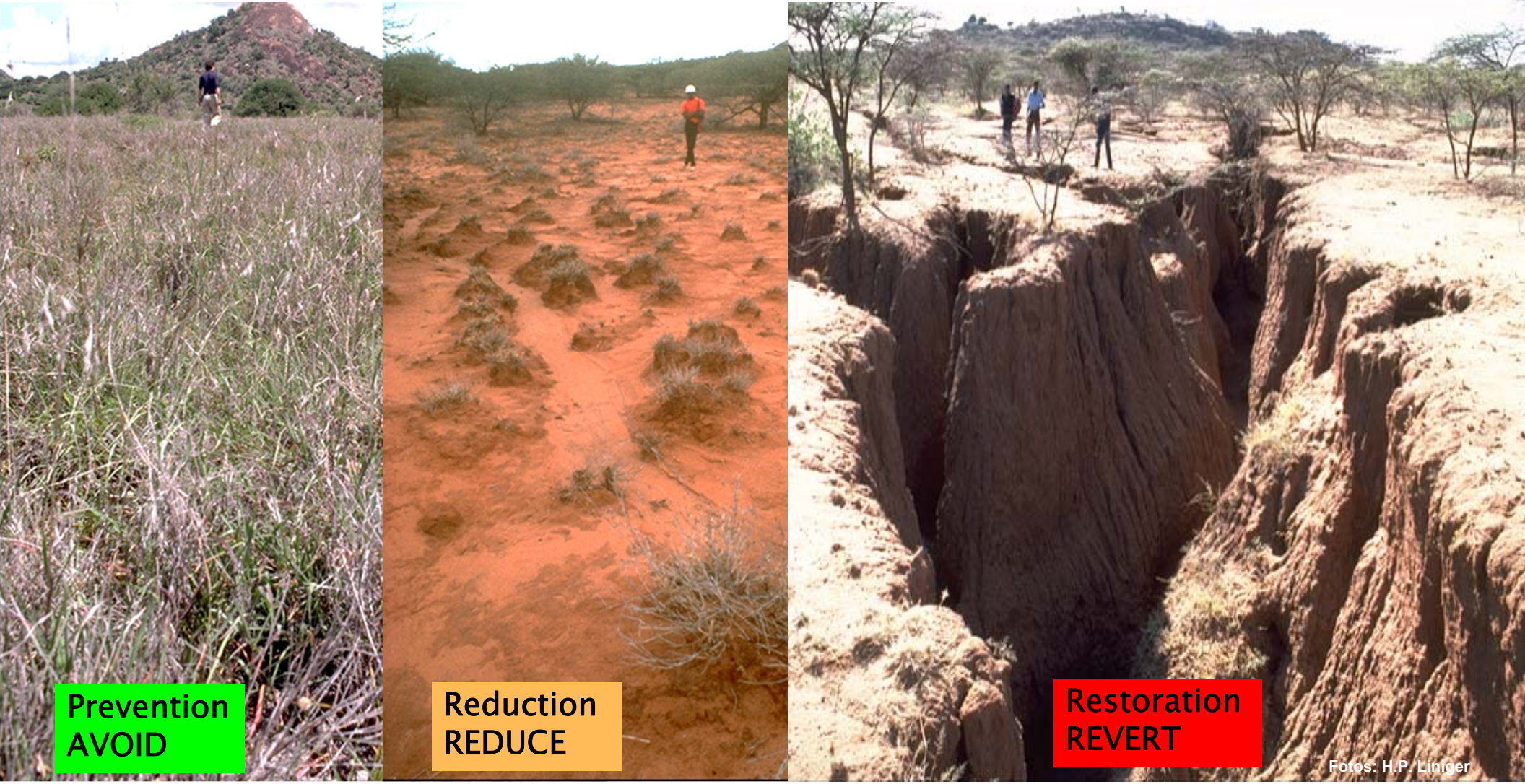
1. **Argentina - Latin America- Pablo Viegas**
2. **Bosnia & Herzogovina – Europe- Hamid Custovic**
3. **Ecuador- Latin America – Rosa Ana Gonzalez**
4. **Thailand – Asia – Wisit Ngamson**

D. Plenary session

Implementing land degradation neutrality (to achieve LDN targets)
UNCCD guidance

Step 6: Mainstream LDN in land use planning	• Integrate LDN into national land-use planning models to predict "gains" and "losses"
Step 7: Identify measures to achieve LDN targets	• Identify measures to address the drivers of land degradation • Promote implementation of the LDN response hierarchy: Avoid, minimize and reverse land degradation • Plan to balance unavoidable land degradation with restoration efforts
Step 8: Facilitate action towards LDN	• Communicate the multiple benefits of LDN • Mainstream LDN in national policies and plans • Increase investments to achieve LDN • Establish/strengthen LDN- related partnerships
Step 9: Monitor progress towards LDN	• Monitor changes in the values of LDN indicators to quantify "gains" and "losses" • Assess the achievement of LDN targets
Step 10: LDN Reporting	• Communicate progress towards LDN at all levels

Land Degradation Neutrality Response Hierarchy

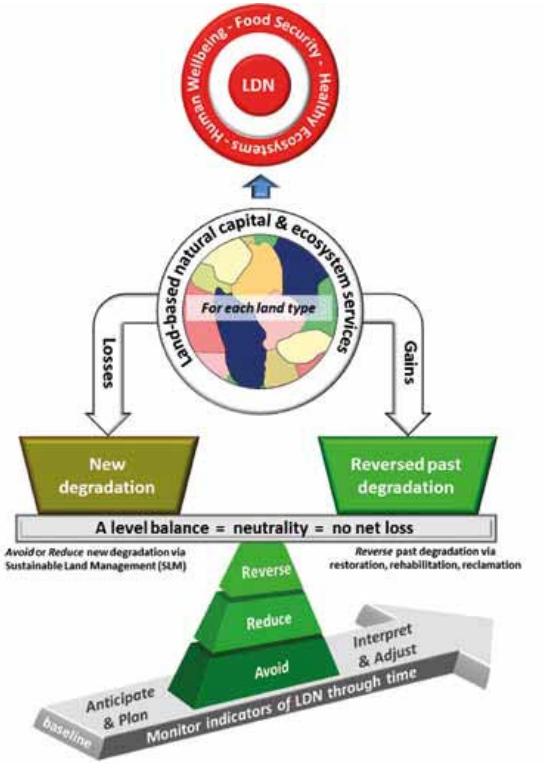


Global WOCAT SLM Database (field experiences)

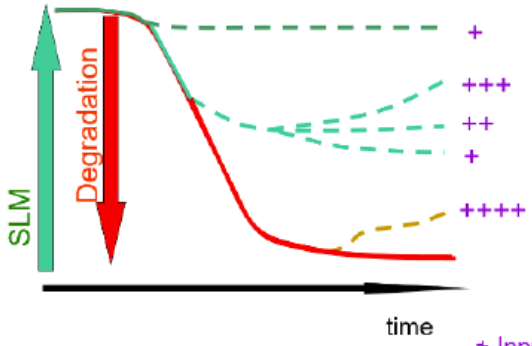
Participants:

- Who knows WOCAT?
- Who uses WOCAT tools?

LDN response hierarchy



Source: Orr et al. 2017



avoid / prevent degradation

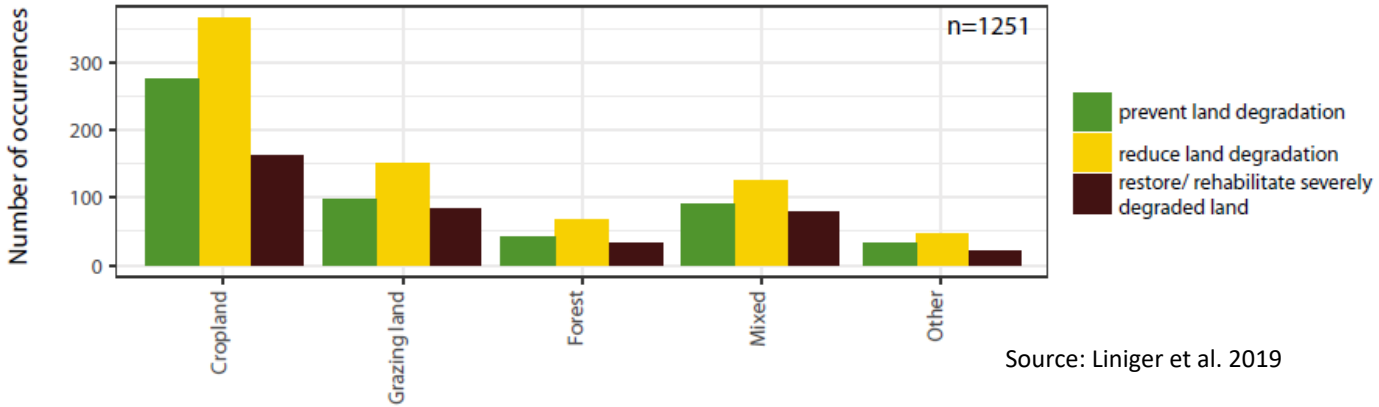
reduce degradation

reverse /restore degradation

Source: Liniger et al. 2019

+ Input needed to reduce degradation

WOCAT Db Technologies and LDN response hierarchy



Source: Liniger et al. 2019

Avoid / Prevent degradation (462)

Goal of the Technology with regard to land d

- ☑ **prevent land degradation (462)**
- ☐ reduce land degradation (618)
- ☐ restore/ rehabilitate severely degraded land (298)
- ☐ adapt to land degradation (23)
- ☐ not applicable (20)

SLM group

- ☐ natural and semi-natural forest management (19)
- ☐ forest plantation management (12)
- ☑ **agroforestry (55)**
- ☐ windbreak/ shelterbelt (17)
- ☐ area closure (stop use, support restoration) (16)
- ☑ **rotational systems (crop rotation, fallows, shifting cultivation) (38)**
- ☐ pastoralism and grazing land management (31)
- ☐ integrated crop-livestock management (15)
- ☑ **improved ground/ vegetation cover (102)**
- ☐ minimal soil disturbance (42)
- ☑ **integrated soil fertility management (67)**
- ☑ **cross-slope measure (75)**
- ☐ integrated pest and disease management (incl. organic agriculture) (26)
- ☐ improved plant varieties/ animal breeds (21)
- ☐ water harvesting (45)
- ☐ irrigation management (incl. water supply, drainage) (49)
- ☐ water diversion and drainage (25)
- ☐ surface water management (spring, river, lakes, sea) (28)
- ☐ ground water management (6)
- ☐ wetland protection/ management (4)
- ☐ waste management/ waste water management (4)
- ☐ energy efficiency technologies (10)
- ☐ beekeeping, aquaculture, poultry, rabbit farming, silkworm farming, etc. (12)
- ☐ home gardens (13)
- ☐ ecosystem-based disaster risk reduction (14)
- ☐ post-harvest measures (3)

Improved cover

Cross-slope measure

Int. soil fertility mgt.

Agroforestry

Rotational Systems

Dynamic agroforestry systems [Bolivia, Plurinat

Grazing with Holistic Management Principle

Annual green manure with Phacelia

Stone Wall Bench Terraces [Syria

Reduce degradation (618)

Goal of the Technology with regard to land d

- ☐ prevent land degradation (462)
- ☑ **reduce land degradation (618)**
- ☐ restore/ rehabilitate severely degraded land (298)
- ☐ adapt to land degradation (23)
- ☐ not applicable (20)

SLM group

- ☐ natural and semi-natural forest management (18)
- ☐ forest plantation management (9)
- ☐ agroforestry (54)
- ☐ windbreak/ shelterbelt (17)
- ☐ area closure (stop use, support restoration) (27)
- ☐ rotational systems (crop rotation, fallows, shifting cultivation) (45)
- ☐ pastoralism and grazing land management (55)
- ☐ integrated crop-livestock management (28)
- ☑ **improved ground/ vegetation cover (154)**
- ☐ minimal soil disturbance (52)
- ☑ **integrated soil fertility management (89)**
- ☑ **cross-slope measure (129)**
- ☐ integrated pest and disease management (incl. organic agriculture) (25)
- ☐ improved plant varieties/ animal breeds (23)
- ☑ **water harvesting (69)**
- ☑ **irrigation management (incl. water supply, drainage) (69)**
- ☐ water diversion and drainage (35)
- ☐ surface water management (spring, river, lakes, sea) (38)
- ☐ ground water management (13)
- ☐ wetland protection/ management (8)
- ☐ waste management/ waste water management (9)
- ☐ energy efficiency technologies (12)
- ☐ beekeeping, aquaculture, poultry, rabbit farming, silkworm farming, etc. (6)
- ☐ home gardens (10)
- ☐ ecosystem-based disaster risk reduction (17)
- ☐ post-harvest measures (1)

Improved cover

Cross-slope measure

Int. soil fertility mgt.

Water harvesting

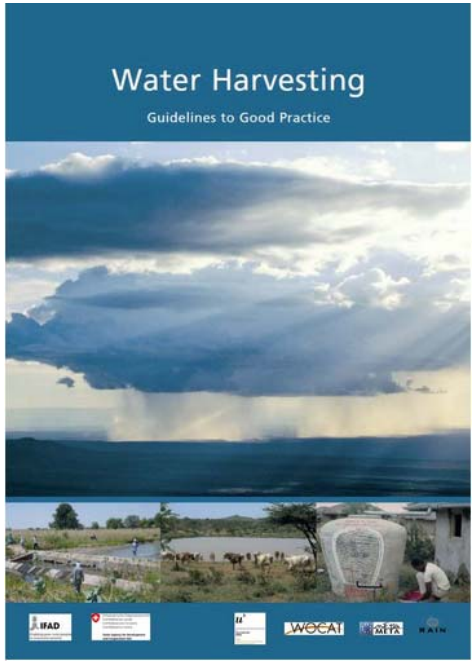
Water suppl. Irrig.

Agroforestry

Min soil disturb.

Vallerani System [Burkina Faso]

On-farm ponds



Revert / restore degradation (298)

Goal of the Technology with regard to land d

- ☐ prevent land degradation (462)
- ☐ reduce land degradation (618)
- ☑ **restore/ rehabilitate severely degraded land (298)**
- ☐ adapt to land degradation (23)
- ☐ not applicable (20)

SLM group

- ☐ natural and semi-natural forest management (14)
- ☐ forest plantation management (10)
- ☐ agroforestry (25)
- ☐ windbreak/ shelterbelt (10)
- ☐ area closure (stop use, support restoration) (24)
- ☐ rotational systems (crop rotation, fallows, shifting cultivation) (10)
- ☑ **pastoralism and grazing land management (38)**
- ☐ integrated crop-livestock management (10)
- ☑ **improved ground/ vegetation cover (81)**
- ☐ minimal soil disturbance (12)
- ☐ integrated soil fertility management (33)
- ☑ **cross-slope measure (64)**
- ☐ integrated pest and disease management (incl. organic agriculture) (6)
- ☐ improved plant varieties/ animal breeds (17)
- ☑ **water harvesting (30)**
- ☑ **irrigation management (incl. water supply, drainage) (45)**
- ☐ water diversion and drainage (29)
- ☐ surface water management (spring, river, lakes, sea) (23)
- ☐ ground water management (4)
- ☐ wetland protection/ management (3)
- ☐ waste management/ waste water management (2)
- ☐ energy efficiency technologies (3)
- ☐ beekeeping, aquaculture, poultry, rabbit farming, silkworm farming, etc. (2)
- ☐ home gardens (6)
- ☐ ecosystem-based disaster risk reduction (6)
- ☐ post-harvest measures (0)

Improved cover

Cross-slope measure

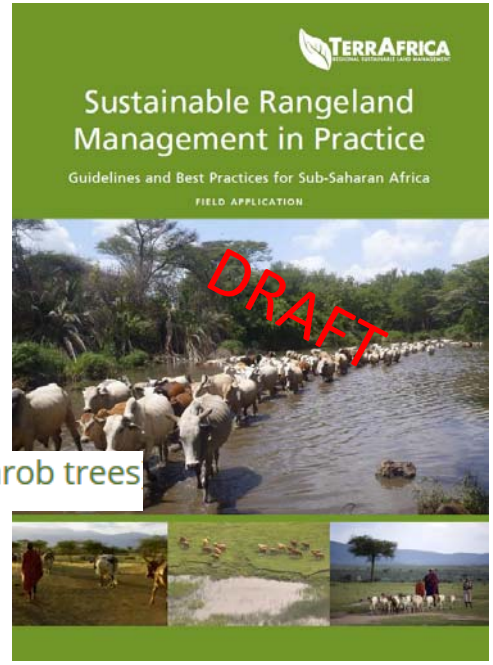
WH & Irrigation Water supply

Pastoralism & Grazing LM

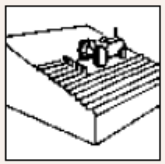
land afforestation with carob trees

Grass reseeding [Kenya]

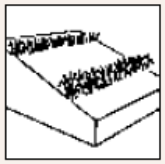
Gully erosion management [Ethiopia]



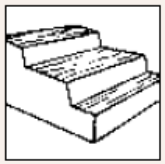
SLM measures and LDN response hierarchy

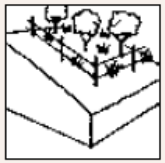
agronomic measures
- are associated with annual crops
- are repeated routinely each season or in a rotational sequence
- are of short duration and not permanent

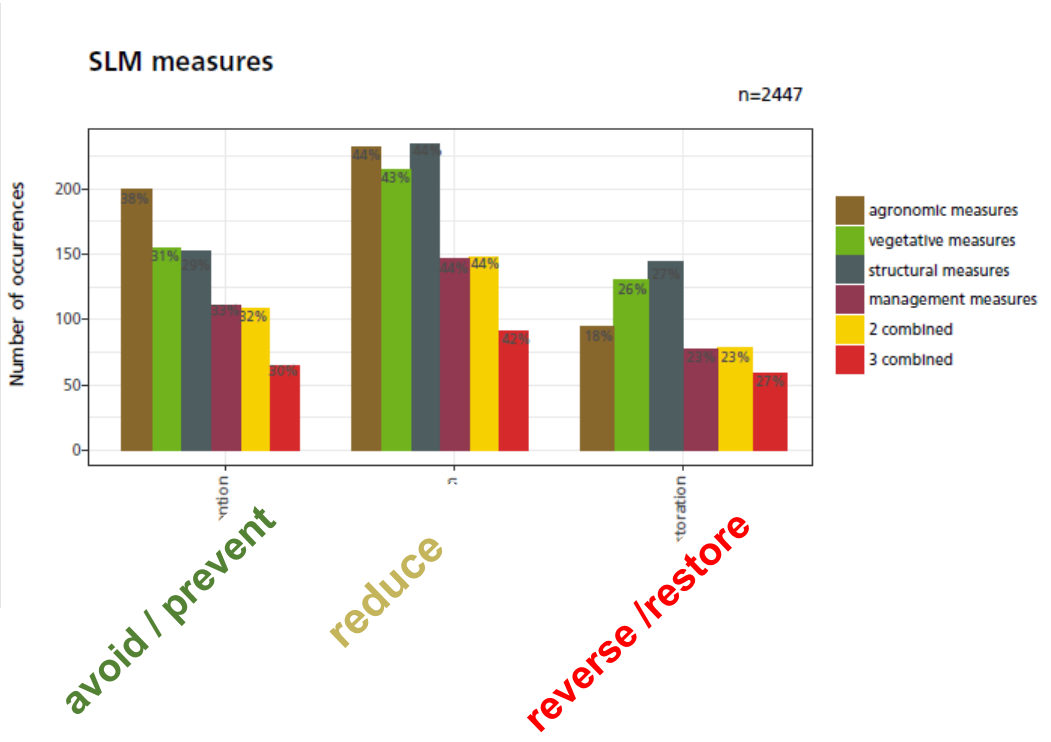
vegetative measures
- involve the use of perennial grasses, shrubs or trees
- are of long duration

structural measures
- often lead to a change in slope profile
- are of long duration or permanent

management measures
- involve a fundamental change in land use
- invovle no agronomic and structural measures



Countries are already implementing SLM
What more is needed?
Report → Evidence of Impact and Value
→ Recognise Importance → Expand $$$$$$$

Use of WOCAT Database for LDN reporting

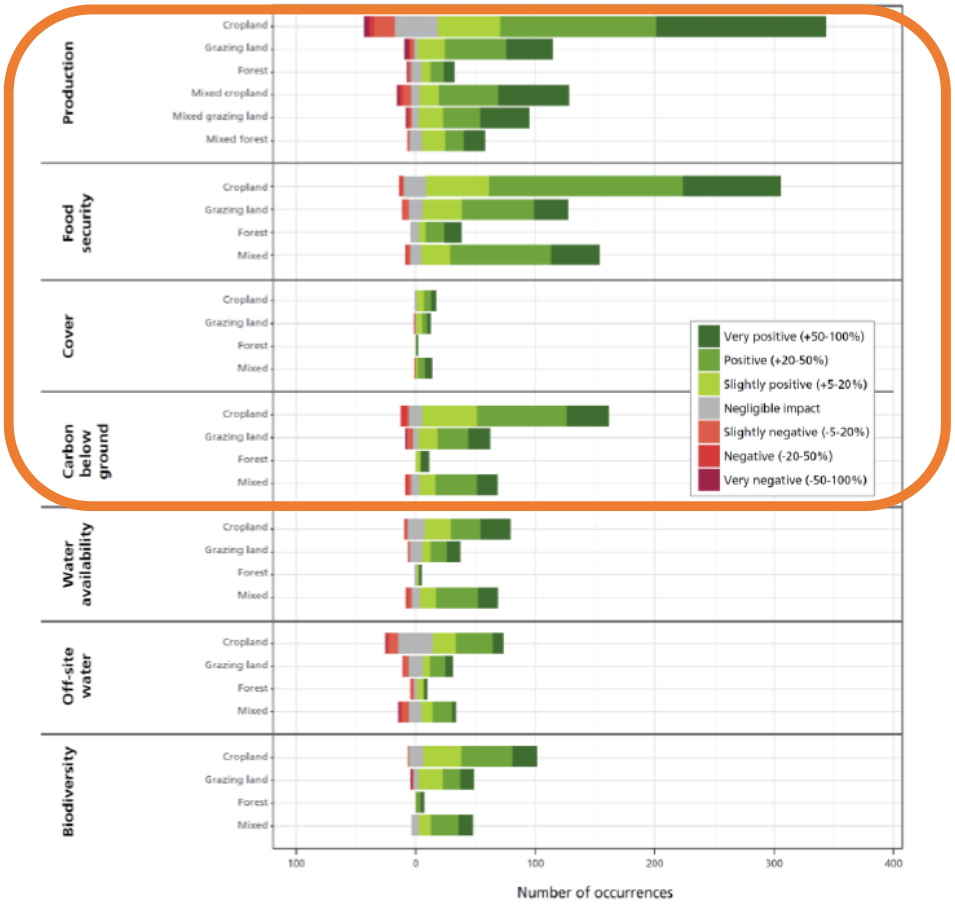


Figure 6: Impact of the SLM technology on LDN related indicators: productivity, food security, carbon below ground, and other key indicators including water availability, off-site water (quantity and quality) and biodiversity (Number of SLM technologies: 926. Note: the same technology may occur in different LUSs). (Source: WOCAT 2018b).

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Achieving land degradation neutrality: The role of SLM knowledge in evidence-based decision-making

Hanspeter Liniger[a,*], Nicole Harari[a], Godert van Lynden[b], Renate Fleiner[a], Jan de Leeuw[b], Zhanguo Bai[b], William Critchley[c]

[a] Centre for Development and Environment (CDE), University of Bern, Switzerland
[b] ISRIC, Wageningen University, Netherlands
[c] Sustainable Land Management Associates, UK

LDN indicator 'land productivity' corresponds to WOCAT categories 'crop, fodder and wood production':

crop production	decreased	increased
	Quantity before SLM:	5 bags of maize / acre
	Quantity after SLM:	up to 8 bags of maize / acre
fodder production	decreased	increased
	Quantity before SLM:	Less than 10 bags (90kg) of harvested grass / acre
	Quantity after SLM:	More than 20 bags (90kg) harvested grass / acre
	Comments/ specify:	This applies to 1 acres piece of land that was not managed on FMNR compared to same size on good management FMNR and better quality fodder.
wood production	decreased	increased
	Comments/ specify:	More wood is obtained from FMNR site because biomass increases faster and new ones regenerate faster. Before SLM, tree growth was suppressed.

LDN indicator 'land cover (land cover change)' corresponds to WOCAT category 'vegetation cover':

Vegetation cover	decreased	increased
	Comments/ specify:	A biodiversity studies shows already after 3 sampling periods that more species are found on FMNR / restored sites.

LDN indicator 'carbon stocks (soil organic carbon)' corresponds to WOCAT category 'soil organic matter/carbon below ground':

soil organic matter/ below ground C	decreased	increased

Figure 1: Example of LDN indicators for an SLM Technology in the WOCAT database and the sliding assessment scale (WOCAT 2018a).

Additional LDN indicators

Gliricidia sepium locally known as "kakawate" served as live trellis "balag" / or anchorage for annual crops and erosion control measure. (Mr. Baldwin Pine)

Highly Diversified Cropping in Live Trellis System (Philippines)

Kakawate as live trellis "balag"

DESCRIPTION

Gliricidia sepium locally known as "kakawate" served as live trellis / or anchorage for annual crops (mostly creeping-type vegetables) and erosion control measure. The technology is well-adopted in the community providing immediate food for the farmers and increased income due to diversified farming.

The Highly Diversified Cropping in Live Trellis System is a traditional or local farmers' initiative technology widely practiced in Brgy. Bukal, Nagcarlan, Laguna situated in the area of Mt. Banahaw. The area with rolling to hilly terrain is receiving an annual rainfall of 1000-2000 mm. Each of the farmers who practiced the technology has 0.5 to 1.0 ha production area. Moreover, the community is accessible to infrastructures such as schools and market. Soils in the area is relatively good for agriculture cultivation.

Kakawate, a small to medium-sized, thornless tree which usually attains a height of 10-12 m is being used as live trellis or "balag" to various annual crops such as tomato, cucumber, chayote, beans, and ampalaya in the community. The cropping system is highly diversified since crop rotation is being practiced throughout the year. Aside from being an anchorage for annual crops, kakawate also stabilizes sloping lands and reduces soil erosion due to its strong roots which can grow 3-5 meters laterally, thereby holding the soil firmly. They are planted in a row of approximately 2-3 meters making it more effective in preventing soil erosion. Furthermore, kakawate is being trimmed and maintained every 3-6 months or as needs arise to a approximate 3 meters high as live trellis, the trimmed leaves are very rich in nitrogen and will eventually serve as compost or crop cover. These will help in improving soil quality and moisture in the soil. In addition, kakawate has multiple uses and benefits: they can serve as hardwood or firewood when matured, as materials in making furniture and anchorage for flowering plants like orchids.

In establishing the live trellis system, kakawate trunks/or cuttings "quick sticks" with at least 2-meter height are planted in a row. An estimate of 0.5 to 1 meter planting distance within a row and also between rows is used. When the kakawate trunks are already set up and planted, they are interconnected using a metallic wires. Along these wires, plastic straws are tied in a vertical position whereby crops can utilize this straws for creeping/ climbing . Finally, the desired crop will be planted according to their cropping pattern. Maintenance of the technology includes: weeding and trimming. During infestation, application of pesticide is done but in minimal.

The technology requires manual works resulting to elimination of machines that contributes to soil compaction.

The technology has been a practice in the community for a long time, and land users continue to adopt the technology because of it's easiness and inexpensiveness to establish, and low cost in terms of maintenance activity. Adding up to this is the variety of plants to be grown, making their market more profitable.

Gliricidia normally grows in tropical countries like the Philippines and is being utilized as hedgerows for erosion control measures. Over the years, its effectiveness as erosion control is known, and an increasingly used forage crop in cut-and-carry systems.

LOCATION

Location: Brgy. Bukal, Nagcarlan, Laguna, Philippines

No. of Technology sites analysed: single site

Geo-reference of selected sites
- 121.44696, 14.07943

Spread of the Technology: evenly spread over an area (approx. 1-10 km2)

Date of implementation: 1950; more than 50 years ago (traditional)

Type of introduction
- [x] through land users' innovation
- [x] as part of a traditional system (> 50 years)
- [ ] during experiments/ research
- [ ] through projects/ external interventions

Socio-economic impacts

Crop production	decreased	increased
crop quality	decreased	increased
fodder production	decreased	increased
fodder quality	decreased	increased
wood production	decreased	increased
product diversity	decreased	increased
diversity of income sources	decreased	increased

Socio-cultural impacts

food security/ self-sufficiency	reduced	improved
SLM/ land degradation knowledge	reduced	improved

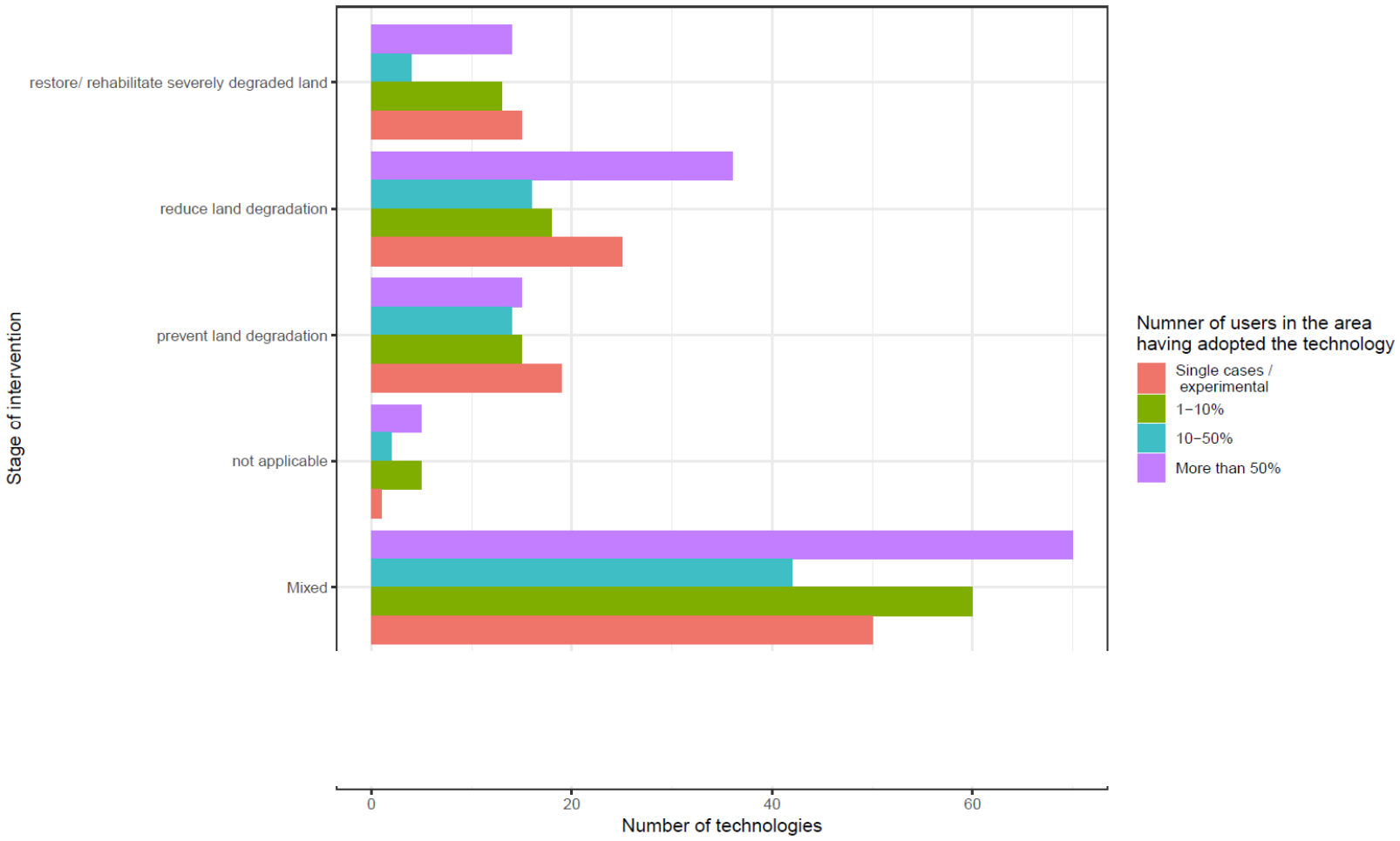
Ecological impacts

soil moisture	decreased	increased
soil cover	reduced	improved
soil loss	increased	decreased

Off-site impacts

downstream flooding (undesired)	increased	reduced

Adoption of SLM Technologies and LDN response hierarchy



Cost-benefits and LDN response hierarchy

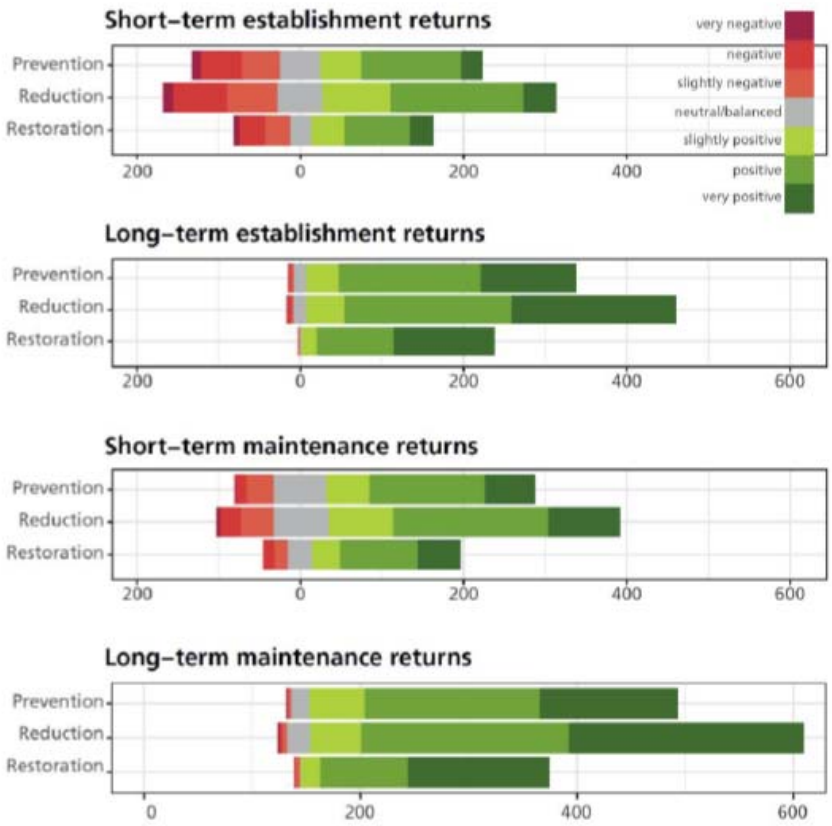


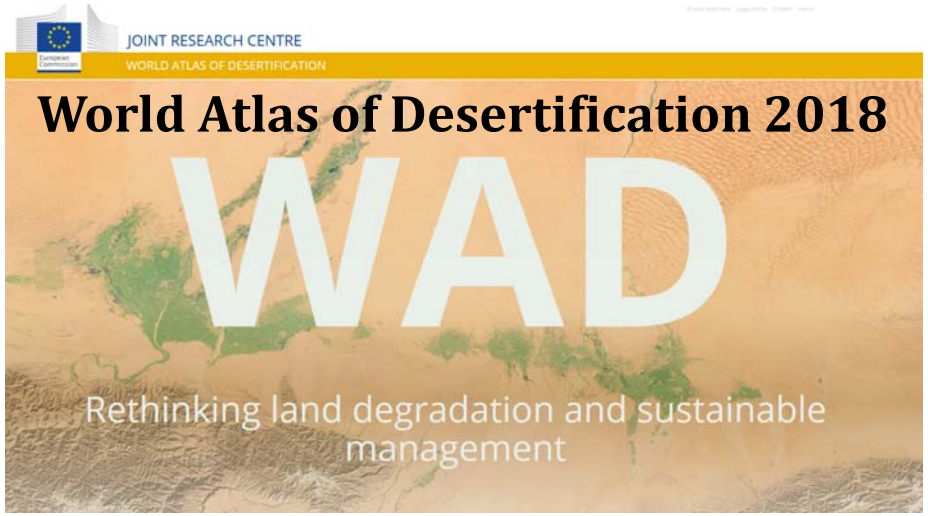
Figure 9: Short-term and long-term establishment and maintenance returns (Number of SLM technologies: 926. Note: the same technology may occur in different intervention groups). (Source: WOCAT 2018b).

Short-term

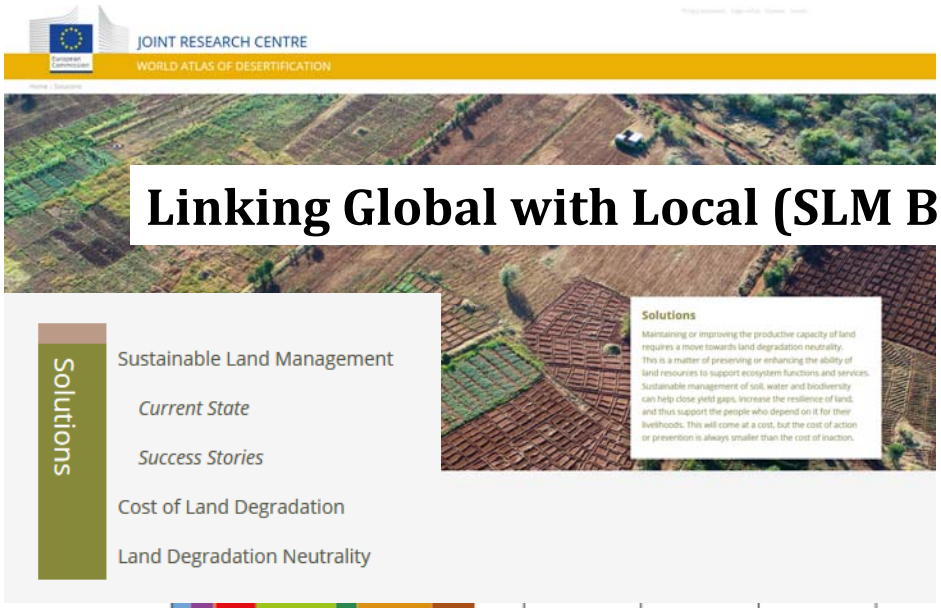
- Establishment: about 1/3 do not pay back
- Maintenance: <1/5 do not pay back
- All stages simlar but…
- higher investment also gives higer returns

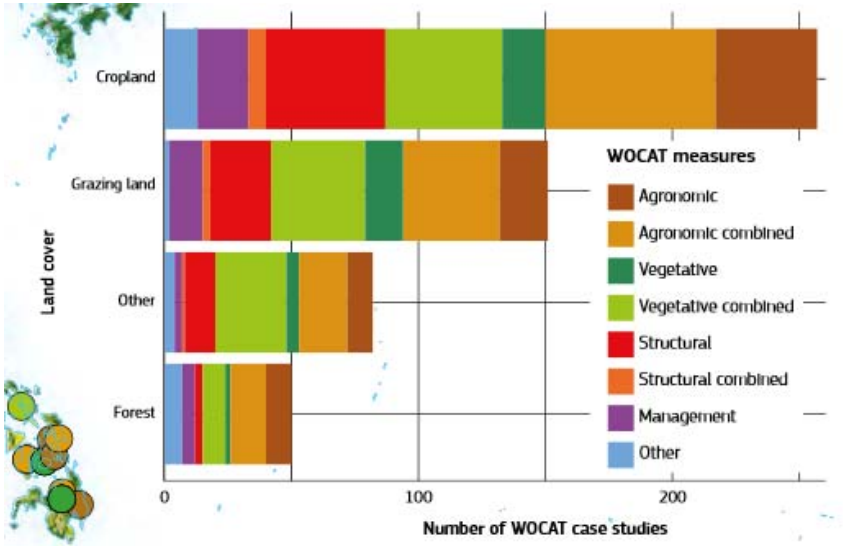
Long term

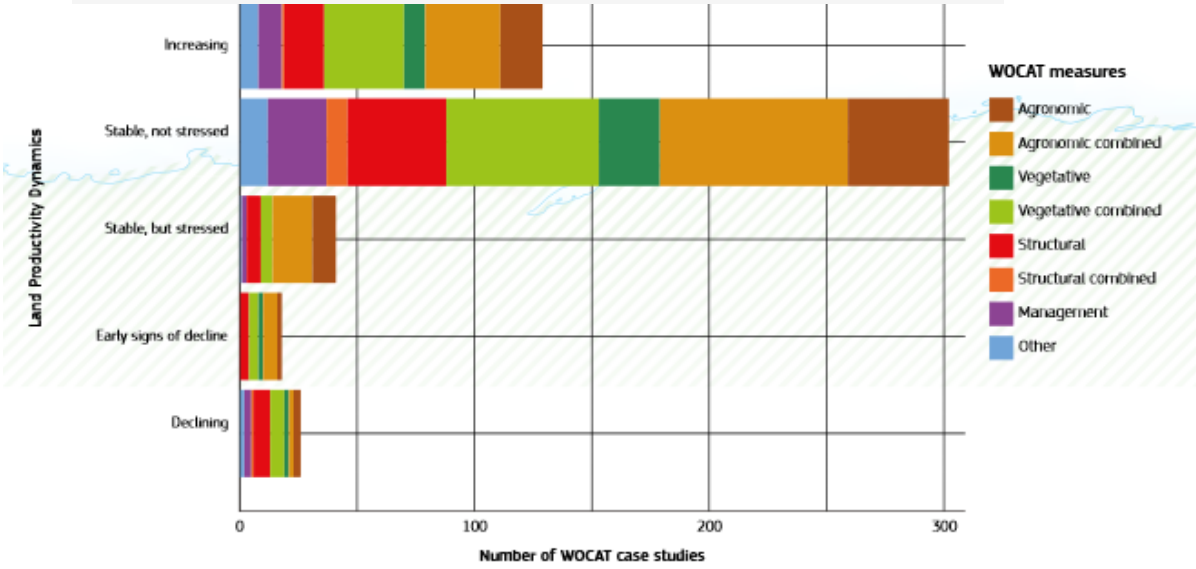
- Very few that do not pay back:
  → they have offsite benefits!



https://wad.jrc.ec.europa.eu/







Earth Observation: Trends.Earth

CONSERVATION INTERNATIONAL TRENDS.EARTH

Linking Global with Local (SLM BP)

MONITORING LAND CONDITION

- Identification of degraded lands
- Can set baselines, and track progress towards LDN
- Best global datasets
- Allows use of best-available local information

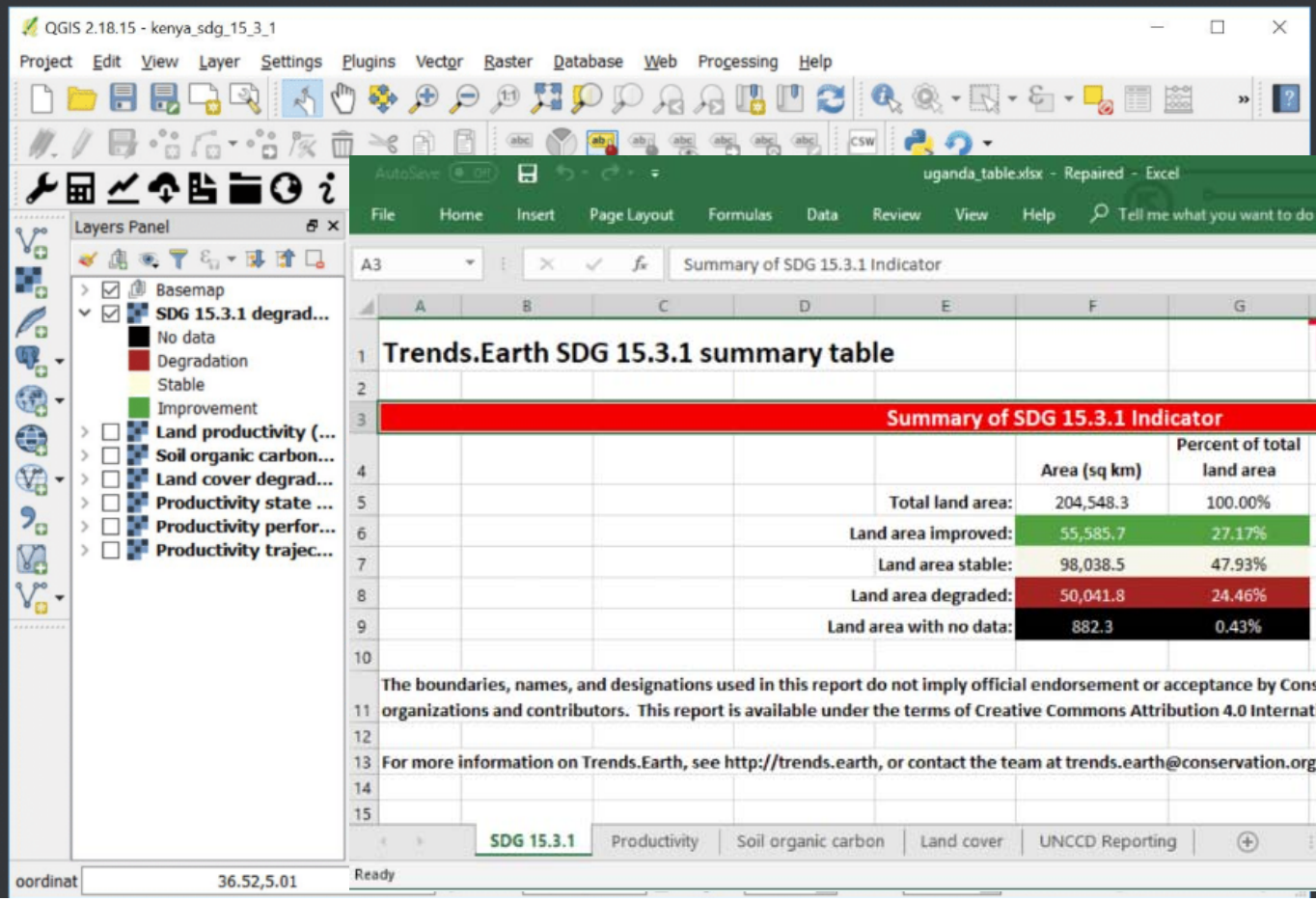
Supports all three components of SDG Indicator 15.3.1


Land Productivity


Land Cover


Carbon Stocks

TRENDS.EARTH SDG 15.3.1



CONSERVATION INTERNATIONAL

Linking Trends.Earth and WOCAT SLM Practices

Calibrating and validating earth observation with SLM field data

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Synergizing global tools to monitor progress towards land degradation neutrality: Trends.Earth and the World Overview of Conservation Approaches and Technologies sustainable land management database

Mariano Gonzalez-Roglich[a,*], Alex Zvoleff[a], Monica Noon[a], Hanspeter Liniger[b], Renate Fleiner[b], Nicole Harari[b], Cesar Garcia[c]

[a] Betty and Gordon Moore Center for Science, Conservation International, 2011 Crystal Drive, Suite 500, Arlington, VA, 22202, USA
[b] Centre for Development and Environment, Universi
[c] National Council of Scientific and Technological Re
Córdoba, Argentina

Linking Global with Local (SLM BP)

WOCAT UNCCD SLM BP

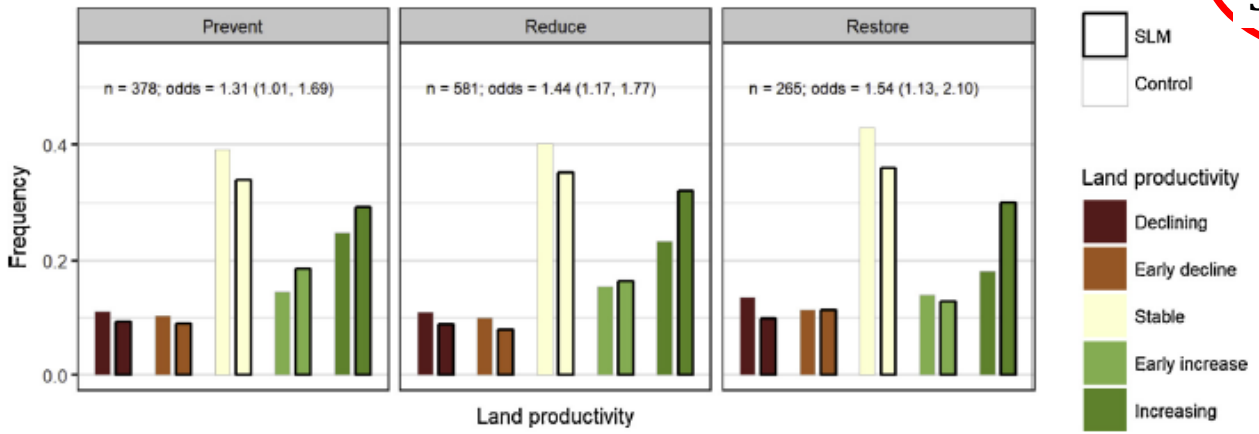
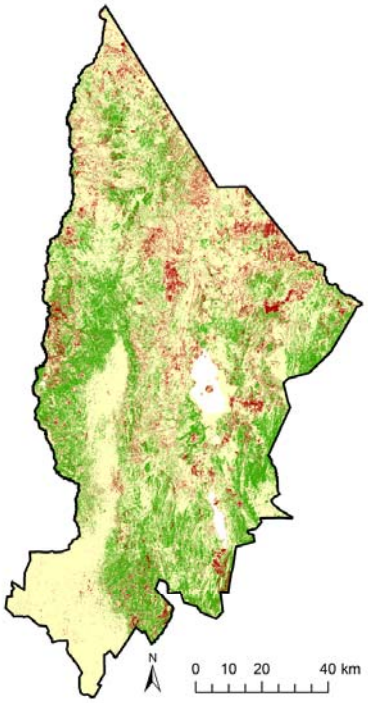


Fig. 6. Relative frequency of each of the 5 classes of the land productivity indicator representing change between 2001 and 2015 for the SLM technologies present in the WOCAT database and similar sites selected using the matching procedure (control) grouped by intended objective towards addressing land degradation. "n" indicates sample size, and "odds" indicates the odds ratio for an ordinal logistic regression (with 95% confidence intervals in parentheses).

Source: Gonzales et al. 2019

Verifying Global national 3 LDN with Local Assessment: Trends.Earth

Land cover degradation (2002 - 2016)



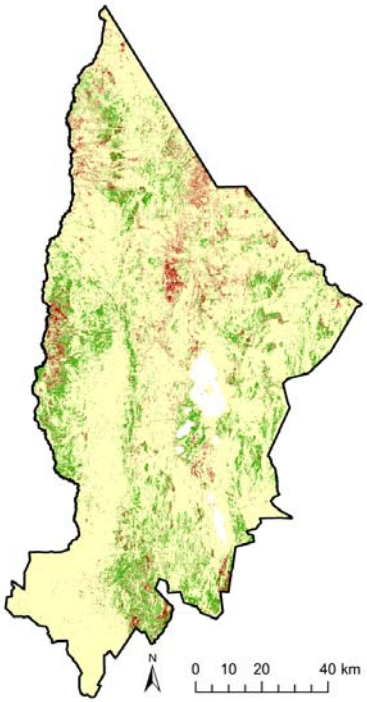
Legend

Land cover degradation (2002 - 2016)

Value

- Degradation
- Stable
- Improvement

Soil organic carbon degradation (2002-2016)

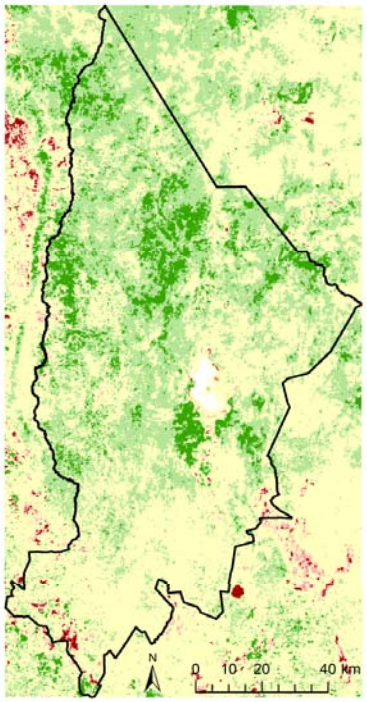


Legend

Soil organic carbon degradation (2002-2016)

- Degradation
- Stable
- Improvement

Productivity trajectory degradation (2002 - 2016)

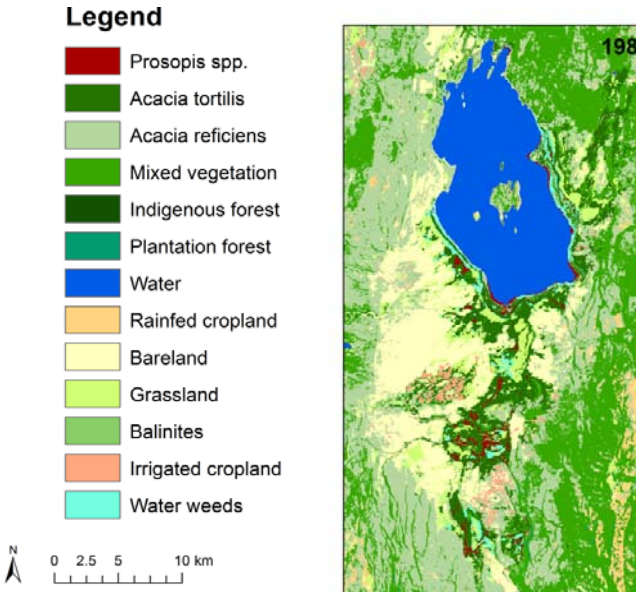


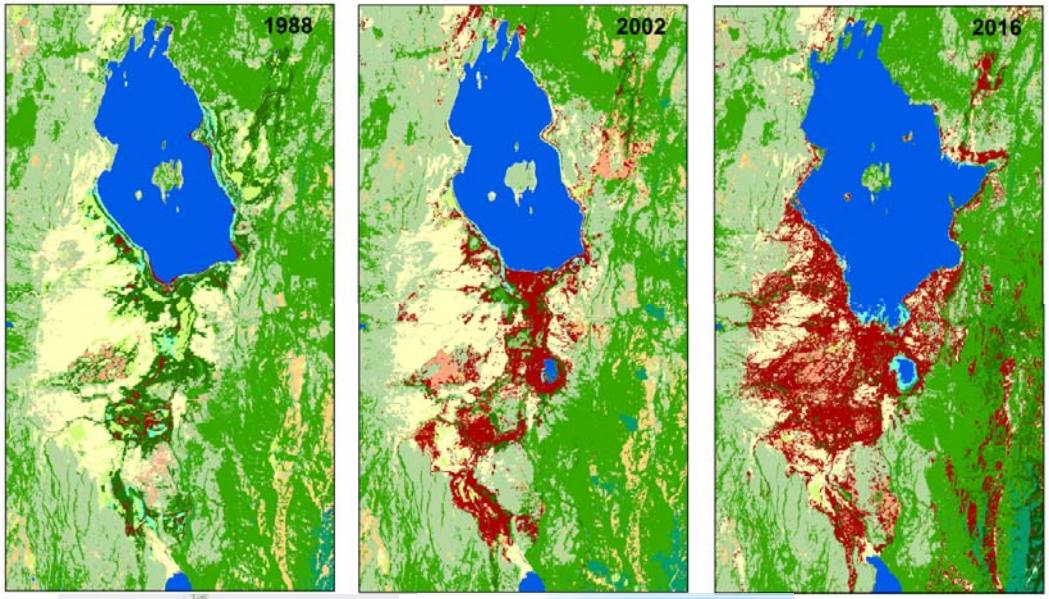
Legend

Productivity trajectory degradation (2002-2016)

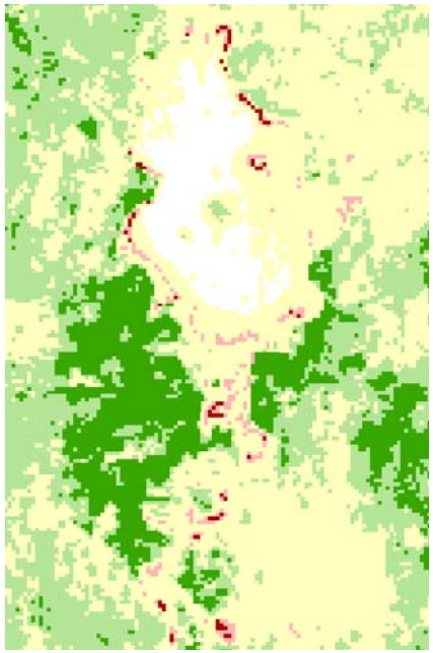
- Degradation (sign decr. p <.01)
- Degradation (sign decr. p<.05)
- Stable (no significant change)
- Improvement (sign. incr. p<.05)
- Improvement (sign. incr. p<.01)

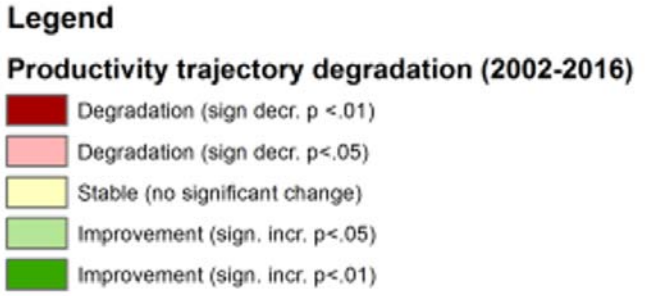
Verifying Global national 3 LDN with Local Assessment: Woody Weeds



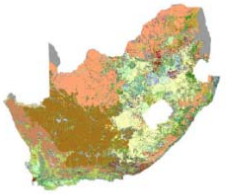


Productivity Trends.Earth





FAO-WOCAT Mapping of LD and SLM



Questionnaire for

Mapping Land Degradation and Sustainable Land Management.
(QM)

VERSION 1.0

Participatory expert assessment

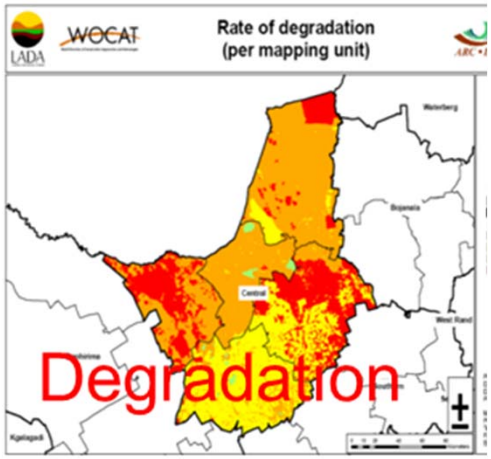
Degradation per LUS
Type
Extent (area)
Degree
Rate
(Impact on ecosystem services (type and level))
Direct causes
Indirect causes
Recommendation

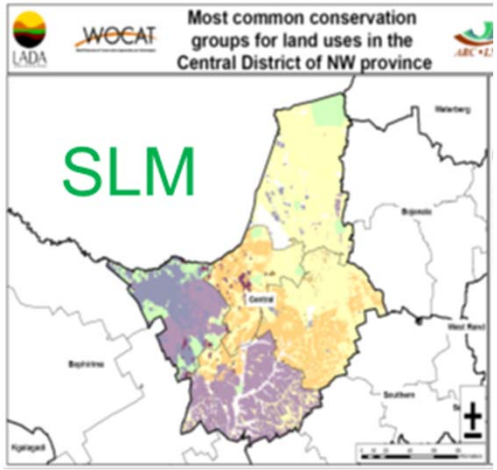
Conservation/SLM per LUS
Name / Group / Measure
Extent (area)
Effectiveness
Effectiveness trend
Impact on ecosystem services (type and level)
Degradation addressed

Table 2: Land degradation (Example)

Name: ___*X Y*_____ **Country:** __*South Africa*
Mapping Unit Id (LUS + admin. unit): 113 *(Savanna + Ratlou municipality)*

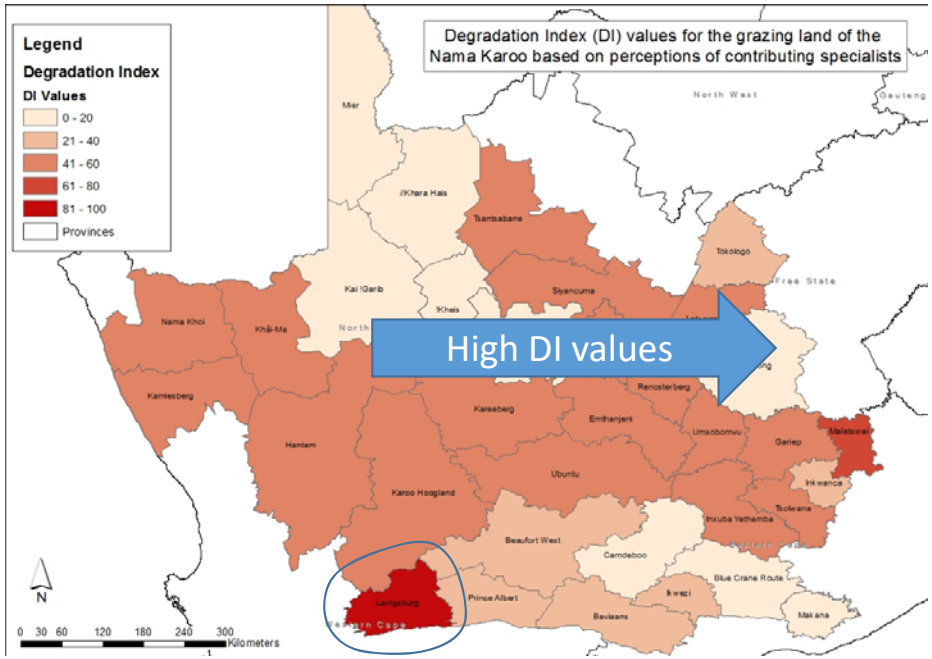
Land degradation (Step 3)								
a) Type (state)			b) Extent	c) Degree	d) Rate	e) Direct causes	f) Indirect causes	g) Impact on ecosystem services	h) Remarks
i	*ii*	*iii*						
Ha	*Pc*		*15%*	*2*	*1*	*g1, e1, f4,*	*p, h, t*	*P1-3, E2-2*	*Degradation is concentrated in NW communal grazing are of District*

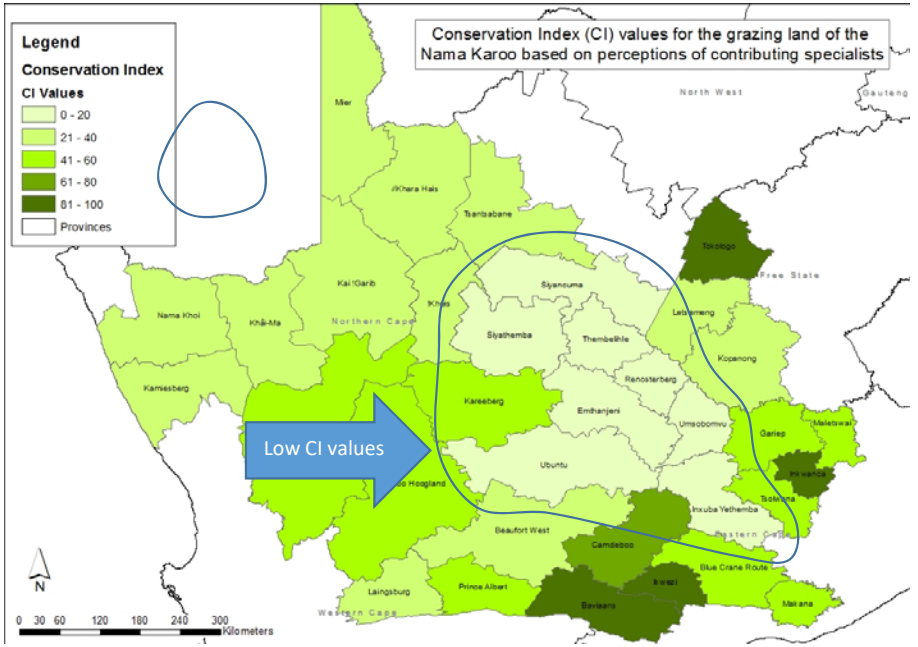




FAO-WOCAT Mapping of LD and SLM

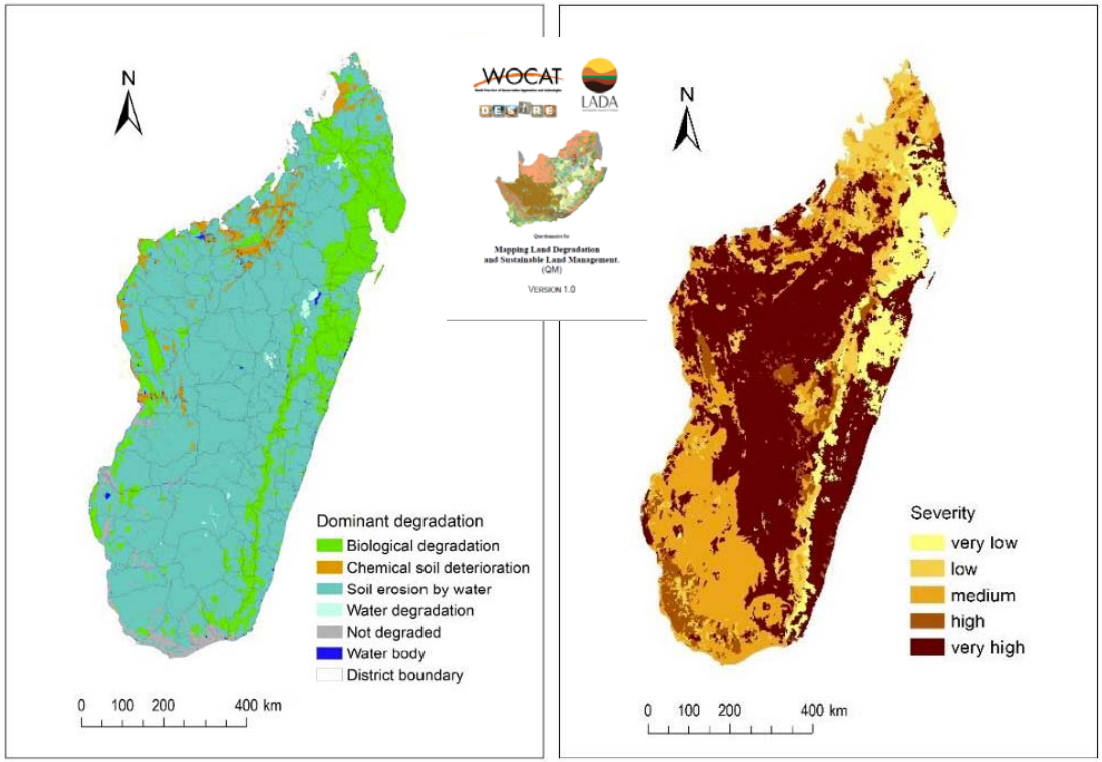
Where are the hotspots or priority areas for intervention?





Source: L. Lindeque

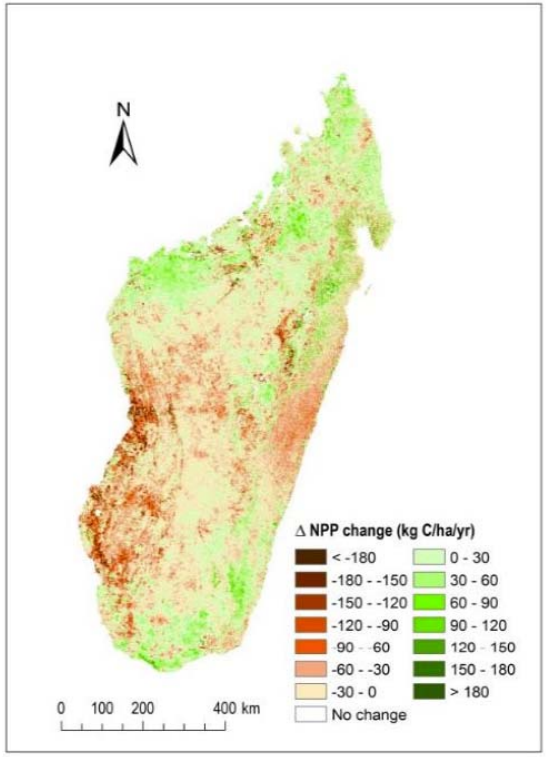
Linking FAO-WOCAT Participatory Mapping and Earth Observation



Dominant degradation type

Degradation Severity

vs.



Net primary productivity change 2000-2015 (MODIS)

Source: Liniger et al. 2019

Linking FAO-WOCAT Mapping and Earth Observation

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Land degradation assessment in the Argentinean Puna: Comparing expert knowledge with satellite-derived information

César Luis García[a,b,*,1], Ingrid Teich[a,c,1], Mariano Gonzalez-Roglich[d], Adolfo Federico Kindgard[e], Andrés Carlos Ravelo[a], Hanspeter Liniger[f]

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[b] Centro de Investigación y Desarrollo en Inmunología y Enfermedades Infecciosas, CIDIE – CONICET, Universidad Católica de Córdoba, Argentina
[c] Instituto de Fisiología y Recursos Genéticos Vegetales, CIAP, INTA, Camino 60 cuadras km 5.5 (5119), Córdoba, Argentina
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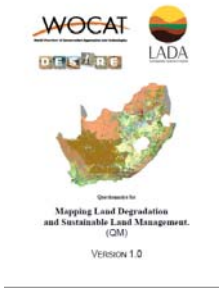


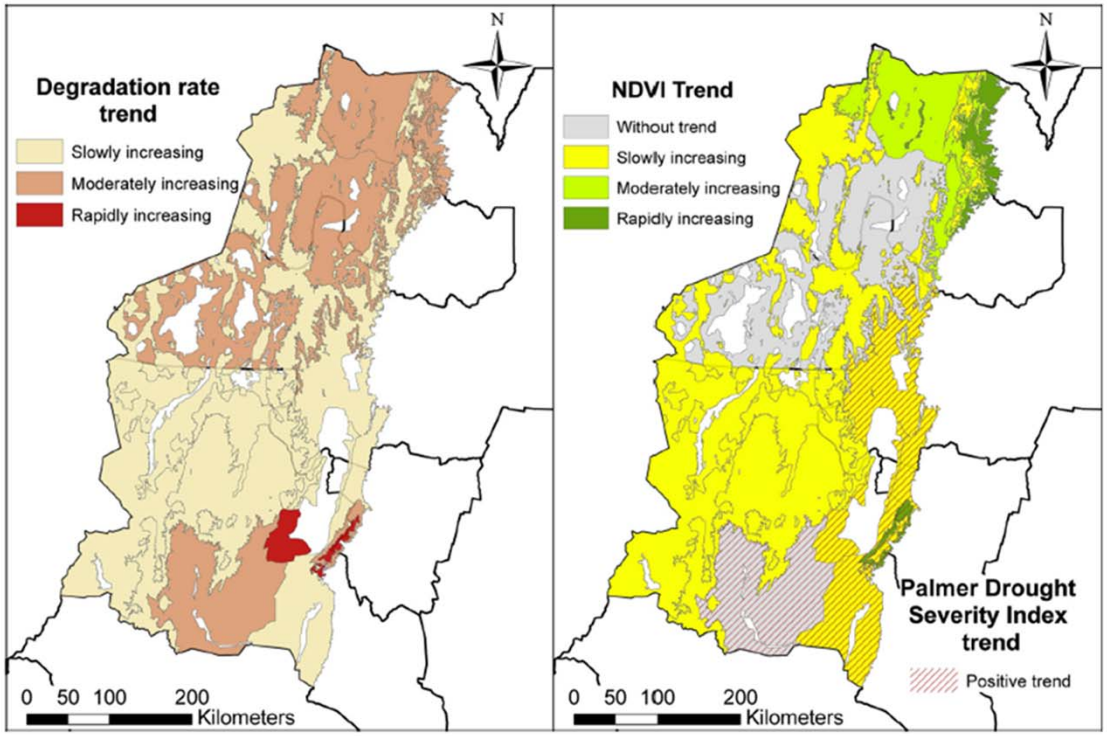


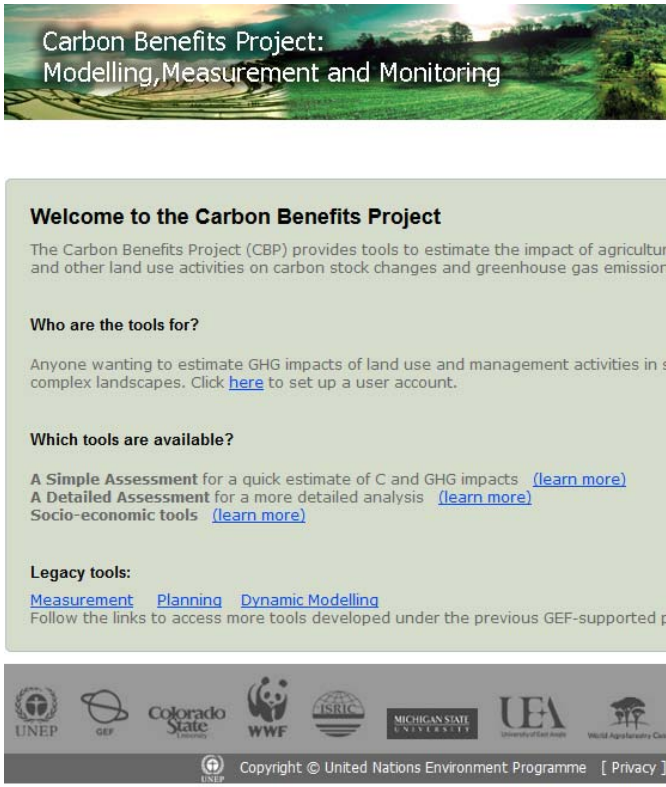
Fig. 6. Degradation trends in the Puna Region during 1999–2009 obtained by experts opinion in the WOCAT assessment (a) and NDVI and PDSI trends at the LUS level for the same period (b).

Source: Garcia et al. 2019

SLM and Climate Change Mitigation Co-benefits (SLM + CCM)

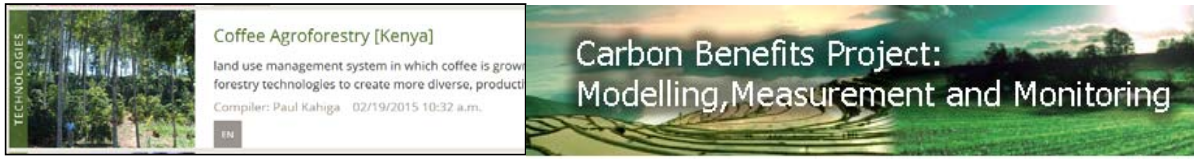
Link between WOCAT and the Carbon Benefit Project (CBP)

- A new version of WOCAT SLM Technologies with more drop down answers (adapted from IPCC)
- Approx. 60% of the questions in the CBP Tool can be answered with the link to the WOCAT database.
- Results from the CBP-Tool (Soil Carbon Stocks, GHG Balance) will be implemented into the Summary of the WOCAT Technologies.
- Future Projects (e.g. GEF) with an interest in Carbon Benefits will use WOCAT and the link to CBP Tool
- The link simplifies carbon benefit calculations of specific WOCAT SLM Technologies



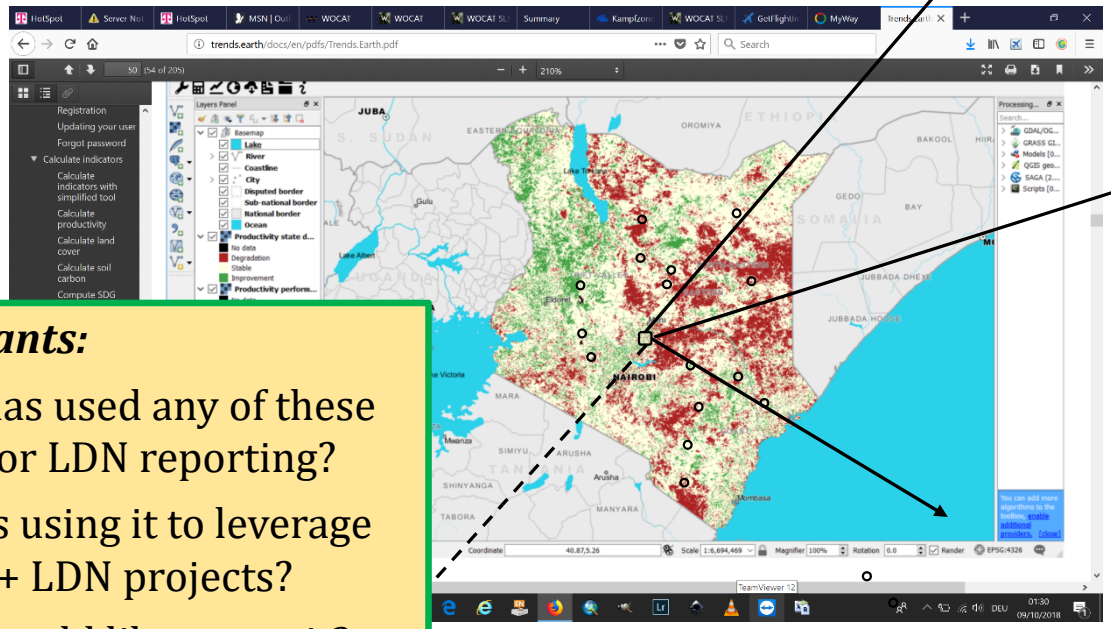
How to link
local – national - global
for LDN monitoring?

(2) WOCAT-UNCCD SLM BP reporting (avail. May 2019) (local)



www.wocat.net

(1) Trends.Earth (EO) (national) http://trends.earth/docs/en/pdfs/Trends.Earth.pdf

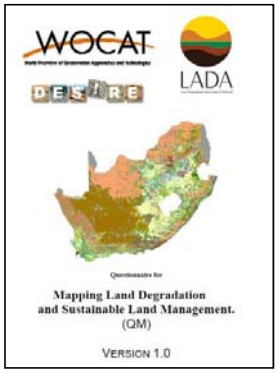


(3) Mobile App LandPKS – WOCAT light – Trends.Earth (GEF prop 2019)
→ Crowd sourcing (local) (in dev.)

Participants:

- Who has used any of these tools for LDN reporting?
- Who is using it to leverage funds + LDN projects?
- Who would like to use it?

(3) Add. Data e.g. Collect Earth (FAO)
→ (local-landscape)



(4) LADA-WOCAT mapping combined with data from (1), (2), (3), …
→ National – landscape) (exist.)

www.wocat.net

Conclusions - linking local and national LDN process

Support combination of available and used tools

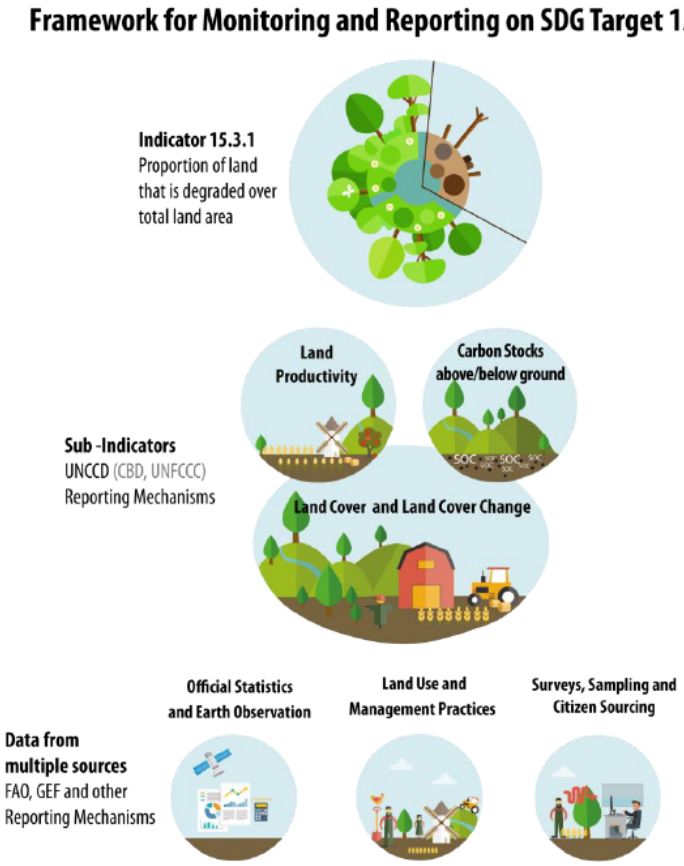
Improve link between local and national (global) assessmenent

- Trends. Earth (RS/E0)
- SLM BP (WOCAT-UNCCD) & Carbon Benefit assessment
- Mobile App?! (Land-PKS-WOCAT)
- Review of all data above in participatory process at local & national level
  → using WOCAT-LADA mapping on LD and SLM

- Other relevant national local data : e.g. Collect Earth (FAO), SOC data +mapping …

- More indicators to be included → **Water! DRR! Biodiversity!**

B. SLM implementation strategy Achieve LDN



Sustain the natural capital of land and associated land-based ecosystem services

Develop a strategy to Maintain or increase the area of healthy and productive land resources, necessary to support ecosystem services in a specified

- time frame (t0→ t1,…t2…t3… >end 2030)
- spatial scale (national, subnational, target area)

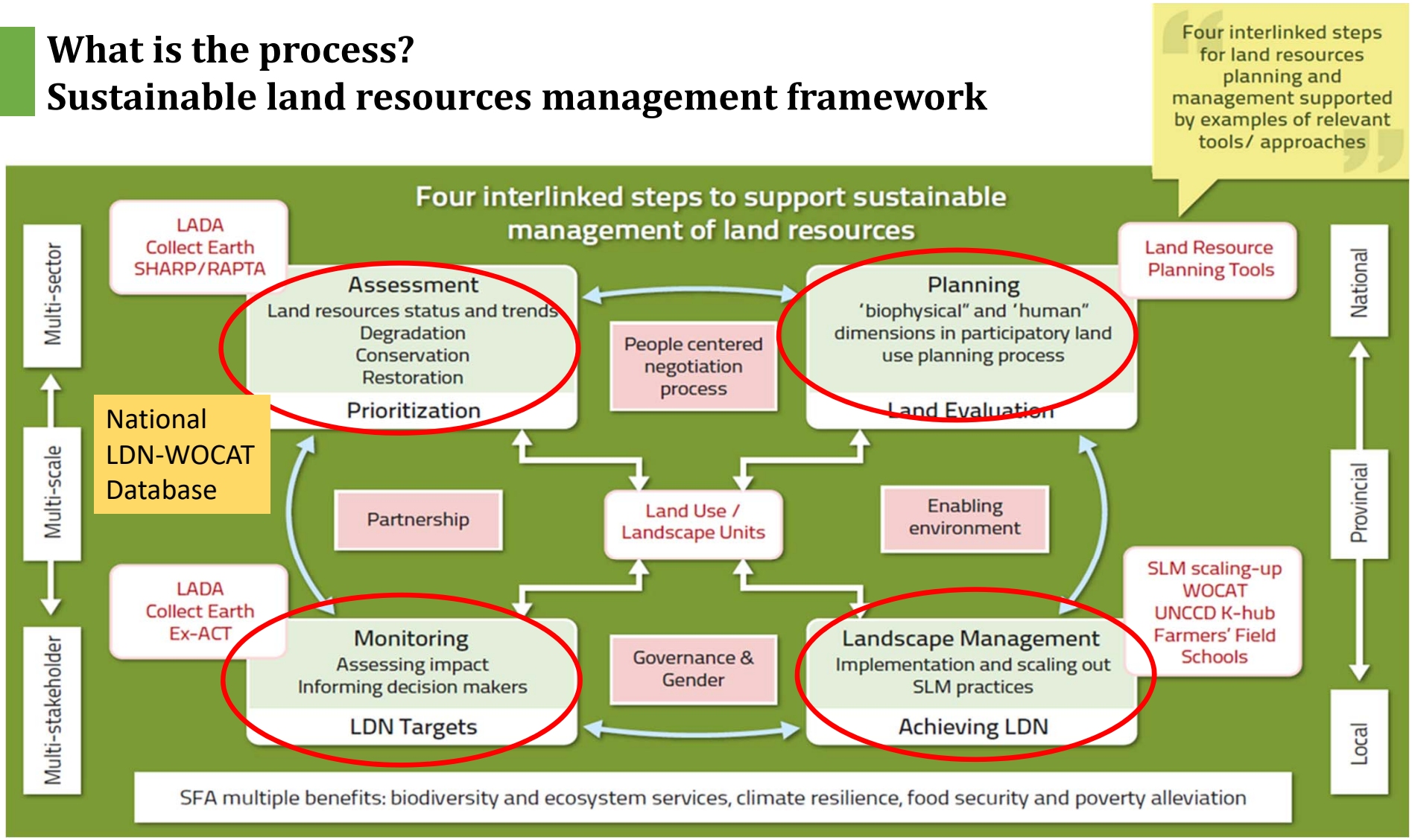
Scale up SLM measures –management practices and land use systems that

- sustain soil, water and biodiversity resources +
- sustain ecosystem services +
- deliver multiple benefits.

Enhance national capacities - understanding, knowledge and innovation and planning processes - to support SLM adoption, scaling out and the monitoring of impacts

Provide supportive policy, institutional, governance and financing mechanisms (public, private)

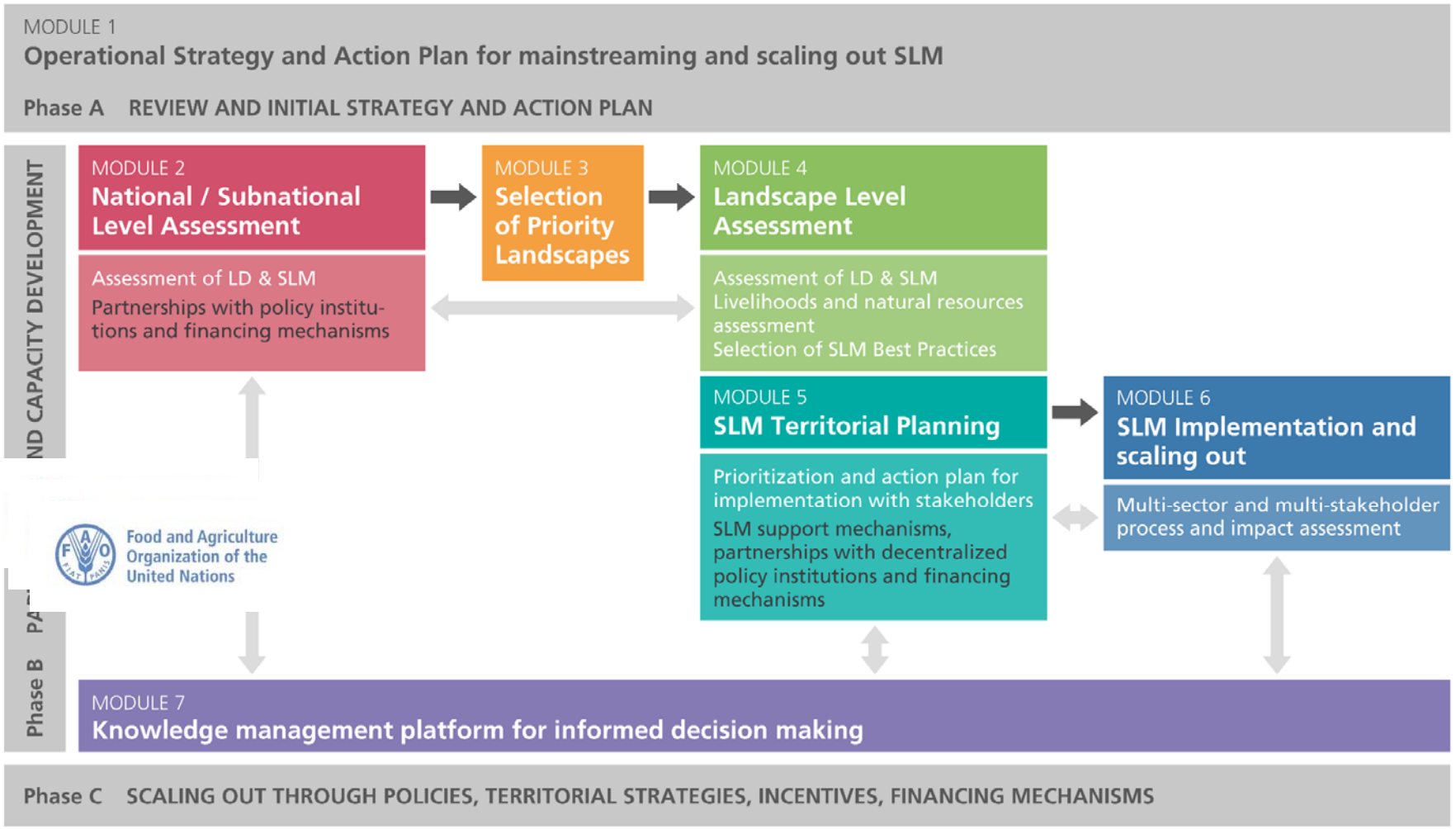
What is the process?
Sustainable land resources management framework



Decision Support Framework
for SLM mainstreaming and scaling out

Food and Agriculture Organization of the United Nations

WOCAT

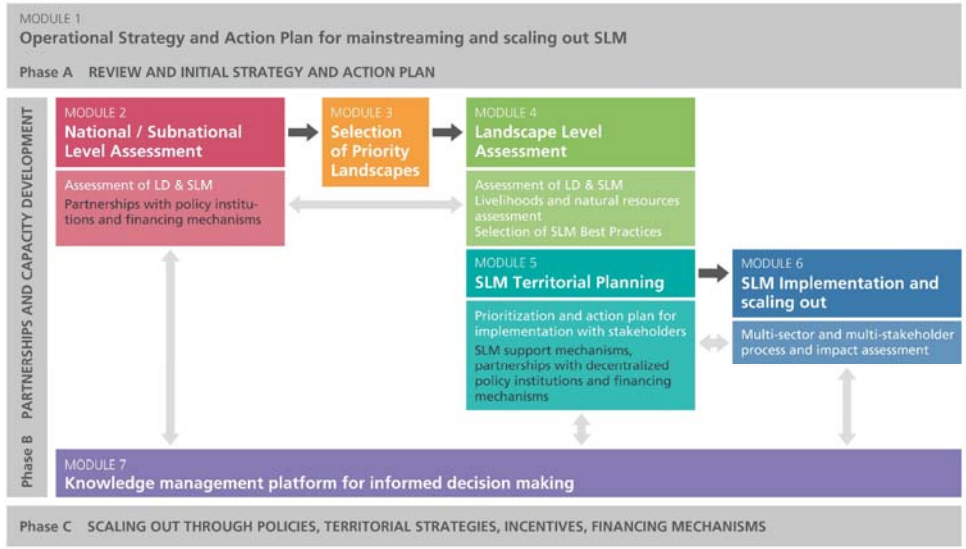


DS-SLM methodological framework (FAO/GEF project)

Key features

- **SLM mainstreaming and scaling out strategy where, what** and **how?**
- **Guidance to countries - Toolbox** for land use and management assessment and planning from local/ landscape to subnational/ national scales
- **Participatory**, multi-sector and **multi-stakeholder processes** and **capacity building**
- **Flexible, adaptable to country needs; modular format** offers different entry points based on country /landscape gaps, previous activities, data & resources.

Country experiences



Food and Agriculture Organization of the United Nations

WOCAT

1. Assessment + Understanding of LD & SLM by range of actors

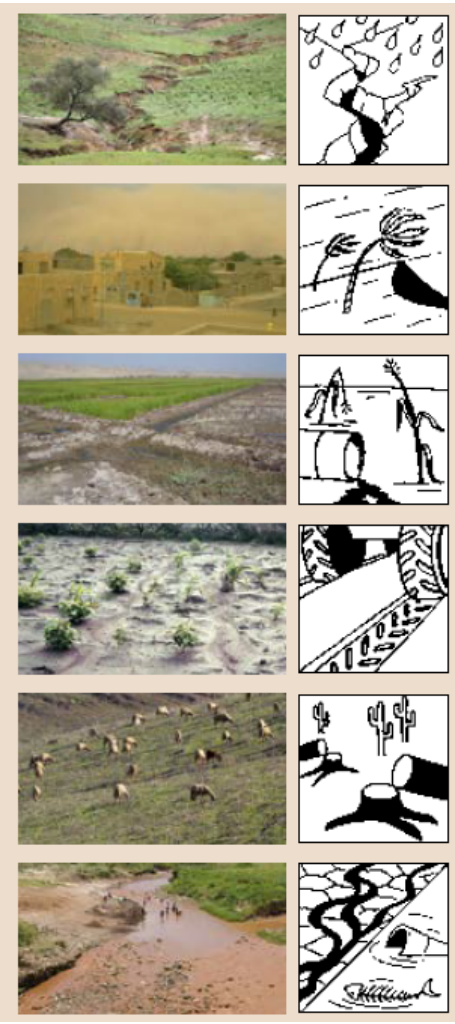
LADA-WOCAT Tools for Assessment of LD and SLM (national, sub-national + landscape)

Better understanding of

- **LD processes** and their **direct causes and the indirect drivers**
- **Trends in LD** (protection, reduced or increased degradation, restoration)
- **SLM measures (extent + Impacts + effectiveness** in conserving land resources + sustaining ecosystem services including supporting livelihoods and well-being

Also analysis of

- **LD Hotspots** (Where? + Why?) + SLM **Brights spots** (What is Working?, Why Success?)
- **Barriers + constraints**
- **What Support is needed to Scale out + Accelerate SLM adoption** (transformational change)
- **Progress** in terms of agreed LDN indicators and targets
  - No net loss & the gain - area with improved "state" (natural resources + ES)
  - Trend rate (rate of increase in area protected, reduced degraded lands and restored area) **Adoption**



Assessing Types / Main Processes of Land Degradation and their Drivers


Soil erosion by water
(e.g. gully erosion, mass move-ments/ landslides, loss of topsoil/ surface erosion)


Soil erosion by wind
(e.g. loss of topsoil, deflation and deposition)


Chemical soil deterioration
(e.g. fertility decline and reduced soil organic matter, soil pollution, salinization)


Physical soil deterioration
(e.g. compaction, sealing, waterlog-ging)


Biological degradation
(e.g. reduction of vegetation cover, loss of habitats, increase of pests/ diseases)


Water degradation
(e.g. change in quantity of surface water, decline of surface water quality)

LDN1- Loss of vegetation cover
(soil protection)
Reduced infiltration→Runoff

LDN2 Reduced productivity (biomass NDVI)
- Poor crop + pasture/range forest + wetlands mgmt
- Overuse of agro-chemicals
- Poor irrigation / drainage

LDN3 Loss of SOM (inadequate recycling, OM and nutrients)

LDN1 Loss of vegetation cover & loss of biodiversity
(GR, species, habitat)

Inadequate water capture, storage and inefficient use, Drought and Pollution
(sediments + chemicals)

What are the Drivers?
Agriculture expansión
Population growth
Urbanisation

Monocultures
Forest exploitation
Overgrazing
Mechanization
Commodity-driven

Inadequate knowledge
Lack of tenure security
Power differential

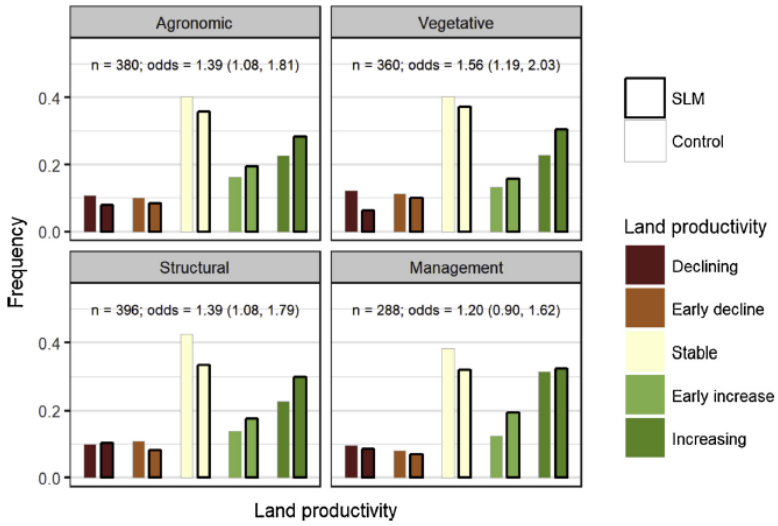
Sectoral approaches & institutional silos

Economic goals (dominate social & environmental goals)

Assessing Sustainable land management (SLM)

SLM is “the use of land resources, including soils, water, animals and plants, for the production of goods to meet changing human needs, while simultaneously ensuring the long-term productive potential of these resources and the maintenance of their environmental functions” (UNCCD).

Combination of SLM Measures →



Integrated Systems Focus

- **Sustainable Crop management**
- **Sustainable Grazing management**
- rangelands and pastures
- **Sustainable Forest management**

SFM

Improved Agroforestry, Rangeland managemnt, Crop-livestock, Agrosilvopastoral systems

Decision Support Framework for Mainstreaming and Scaling out SLM

Module 4 Landscape level assessment

- identify **priority locations** using landscape assessment results
- identify potential **SLM practices** in multi-stakeholder workshops
- document and **assess SLM data** and good practices
- **negotiate and select** relevant SLM options with stakeholders
- build up evidene for informed DM

Tools:

- ❖ WOCAT Questionnaires and Database on SLM Technologies and Approaches
- ❖ LADA local assessment

2. Land use planning- A key component of LDN (UNCCD Technical Guide)

LDN as a planning principle
- guides the implementation of a "no net loss" policy.
- involves land-use decisions - generate land user benefits
- evaluates positive+ negative impacts of land-use options

1. Prioritise avoidance of land degradation (less costly)
- sustain ecological and economic benefits and prevent further conversion of natural ecosystems

3. Minimise degradation (NR and ES)
- sustain productive potential to extent possible (population growth, food production etc.)

4. Restore degraded lands (more costly)
- transform to biologically and/or economically productive areas by restoring ecosystem functions, and to extent feasible ecosystem services

5. Counterbalance newly degraded areas, unavoidable degradation (e.g. due to population growth+development needs) by restoring land that is already degraded (gains). Enabling a state of no net loss ("neutrality").

Like for like: No net loss (gains =/> losses) within the same land cover class and the same ecosystem. (similar land resources and services)

Prioritise in situ restoration in or as close as possible to degraded site in the same territorial unit.

No loss of natural land

Restore more than you degrade: Degradation process can be fast while restoration may take one or several decades. Need to offset the significant time lag until a new balance is reached and "buffer" to mitigate other risks of counter-balancing.

Manage "no net loss" at the same scale as land use planning: within (sub-)national boundaries at the scale of biophysical or administrative domains at which land use decisions are made, to facilitate effective implementation.

Counterbalance domestically (avoid it between nations)

FAO Land resources planning Toolbox (National to Local)

www.fao.org/land-water/land/land-governance/land-resources-planning-toolbox/en/

Land & Water

Overview | Water | Land | Databases & Software | News | Events | Outreach

- Sustainable Land Management
- Land assessment & impacts
- Land governance and planning
  - Land Policy
  - Land resources planning
  - **Land Resources Planning Toolbox**
- LDN - Restoring degraded lands
- Soils

Land Resources Planning Toolbox

The LRP Toolbox is a freely accessible online source for a range of stakeholders, directly or indirectly involved in land use planning. The Toolbox contains a comprehensive number of existing tools and approaches that are used to implement land resources planning. The overall goal of the Toolbox is to make potential users aware of the existence of these tools, facilitate access to their information, and assist with the selection of those tools that meet the requirements of different stakeholders, operating at different levels, in different regions, and in different sectors. See the users' guide for more information.

For further information or comments please contact us at LRP-Secretariat@fao.org.

Free text search

More search options

Biophysical approaches/tools

This category of tools gives prominence to biophysical attributes (climate, soil, terrain, water, etc.) and their interactions in the land evaluation process. The output, in most cases, guides the users to suitable options for land use alternatives, based mainly on biophysical attributes. Land suitability and similarity analysis are typical examples. Documents describing principles, approaches and guidelines for land evaluation are included, as well as different tools for classifying soils based on the suitability for a specific use, capability or potential, fertility constraints and management and linkages to yield, productivity, physical and chemical properties. Sophisticated or simplified modelling of crop growth and yield predictions, also fall into this category.

Biophysical approaches/ tools

Integrated biophysical, socio-economic and negotiation land resources planning approaches/tools

Socio-economic/ negotiated approaches/ tools

Databases/Information systems

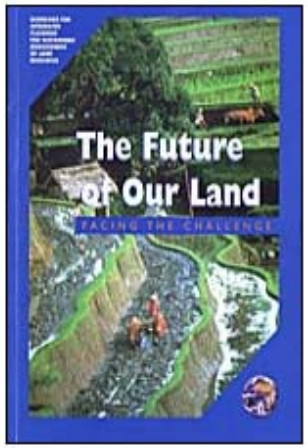
Support tools

Land evaluation and land planning processes & guides

Land evaluation process based on biophyscial attributes (climate, soil, terrain, water, atmosphere) and their interactions. The output guides the users to suitable options for land use alternatives

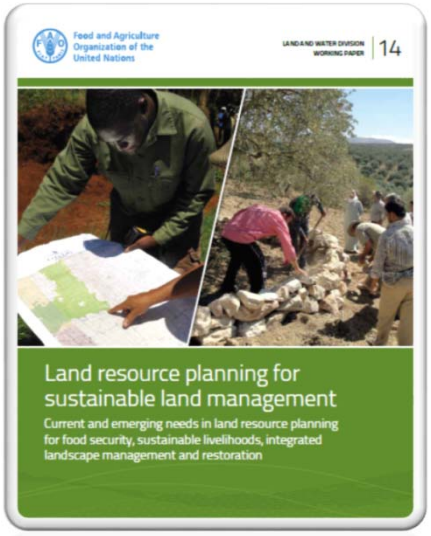
- **Land suitability assessment**– classifying soils based on suitability, capability or potential, fertility constraints and management and linkages to yield, productivity, physical and chemical properties.
- **Similarity analysis**. Sophisticated or simplified modelling of crop growth and yield predictions,.

[The Future of Our Land. Guidelines for Integrated Planning for Sustainable Management of Land Resources (FUTURE_LAND)]



Participatory land use planning: Information on biophysical characteristics and social and economic conditions are used in some approaches with the aim of reaching mutually beneficial outcomes for all stakeholders.

Socioeconomic Negotiated territorial development empowering marginalised groups and may be focused to address rights of Access over land and wáter resources or to promote a Green/bioeconomy



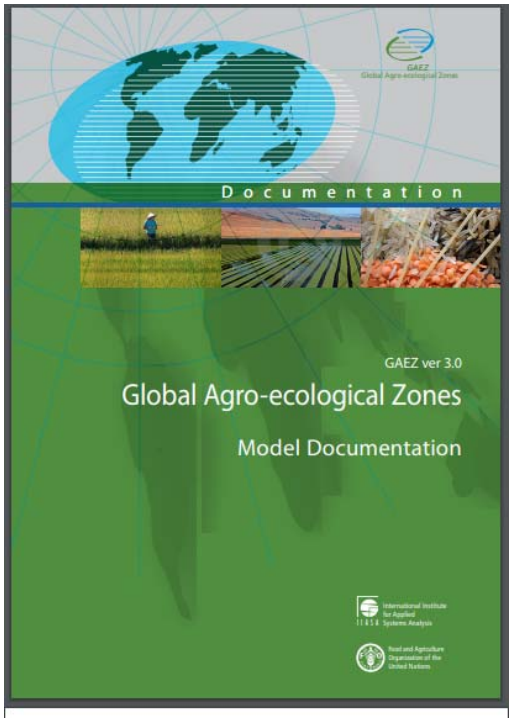
[Participatory territorial planning. The farming systems development approach in community planning in the Philippines (PTP_PHI)]

Support tools for planning

Databases – data and maps - that can facilitate land evaluation and land use planning by providing information and analysis as inputs for the process.

- soil and terrain characteristics, land degradation,
- land cover, land use,
- climatic data including future projections,
- crops and yields, food, agriculture,
- water resources,
- adaptability/suitability of plant species for a given environment,
- socio-economic data and statistics on poverty, population, tenure and gender, food security.

Example of national spatial data infrastructure (NSDI) diagnostic and action plan in Guyana led by Land and survey Commission
(FAO Technical Support and Linked to UNGGIM)



Experience of Bosnia & Herzogovina Environmental and Economic Zoning

System of Environmental-Economic Accounting (SEEA)

Mobile phone Apps - LandPKS Land Potential Knowledge System USDA supported free modular ***app.***
- for ***storing*** and ***accessing*** user data, cloud-based storage, global databases and models
- for ***sharing*** data, information and knowledge
LandInfo– for rapid soil identification, and accessing soil +ecological site info. (soil infiltration, water-holding capacity (-SOM), Soil Color (phone camera: reference card), LCC for LUP + management
LandCover for rapid vegetation monitoring -rangeland monitoring, conservation, crop residue monitoring
LandManagement –on-farm record keeping
(coming ***SoilHealth Biomass Utilization***.)

3. SLM through Integrated landscape management (ILM)

ILM = long-term collaboration among different groups of land managers and stakeholders to achieve multiple objectives and expectations within the landscape for local livelihoods, health, and well-being" in a sustainable manner (EcoAgriculture Partners).

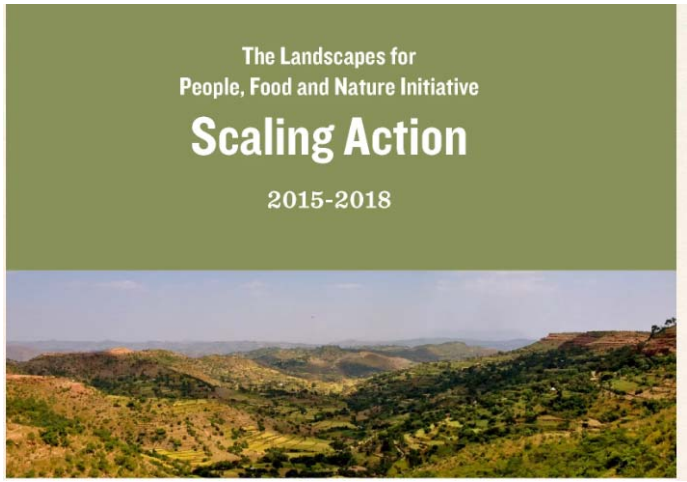
Key concept maintain functioning ecosystems

- Enhance soil health, stability, productivity
- Rehabilitate /restore degraded land
- Integrated land and water management (IWRM; Nature based solutions)
- Enhance resilience (reduce vulnerability) to climate change –drought + water scarcity,, erosion, runoff + flood control
- Enhance biodiversity for enhanced functions, livelihood options and diversified diet
- Valuation of ecosystem services

SLM and ILM Common principles:

- land-user-driven and participatory approaches;
- integrated use of NR at different scales (e.g. farming system level)
- multi-level + multi-stakeholder involvement
- targeted policy and institutional support including incentive mechanisms for SLM adoption and income generation at the local level.

Landscapes for People, Food and Nature (LPFN)



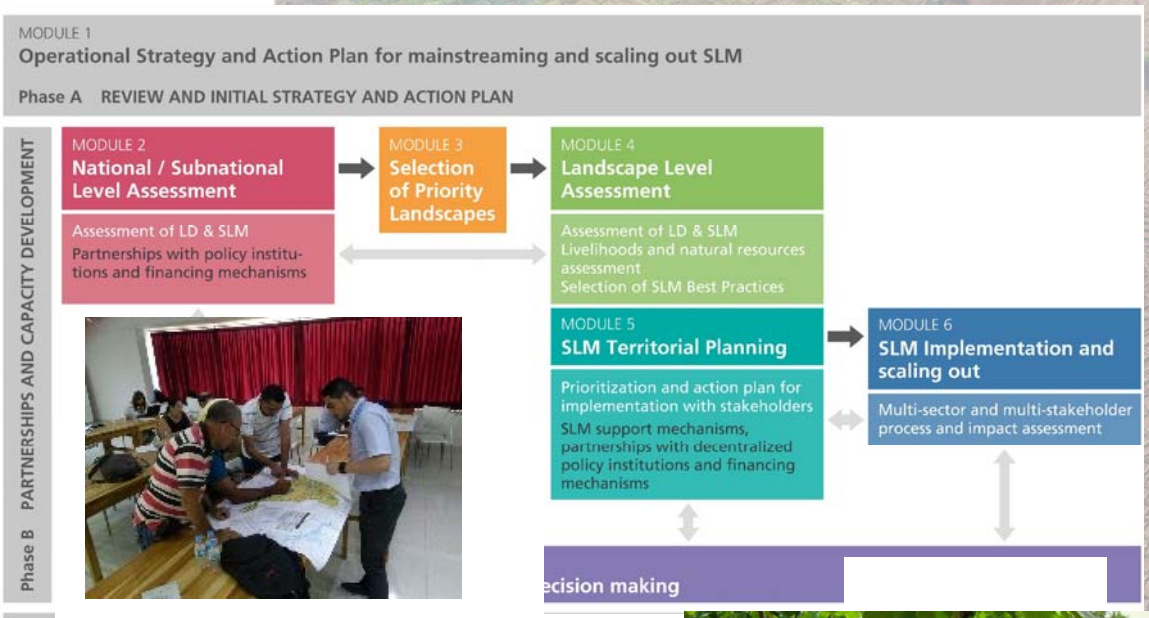
Decision Support Framework for Mainstreaming and Scaling out SLM

Module 5 Territorial planning & *Module 6 SLM implementation and scaling out*

- review of data and information from landscape assessment
- multi-stakeholder process to negotiate and select **territorial responses**, considering existing plans and implementation mechanisms
- SLM territorial planning (link to Module 1)
- **test implementation** and **demo sites**, **farmer-to-farmer** learning, awareness raising, capacity building through technical assistance teams etc.

Tools:

- FAO Participatory Land Use Planning (PLUP)
- FAO Land Resources Planning toolbox



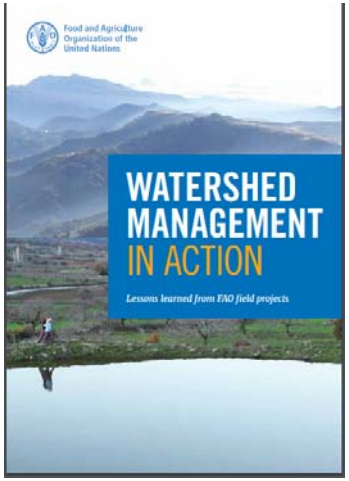
Watershed and hotspot management

UNCCD guidance: Contextualise LDN data layers at the watershed level (FAO Hydrosheds + country boundaries and Global Administrative Unit Layers - GAUL) Geonetwork:

1. Facilitate identification of priority watersheds and land degradation LDN hotspots

2. Provide decision support in formulating land use and restoration strategy and design LDN projects / programmes at the country level (transformational).

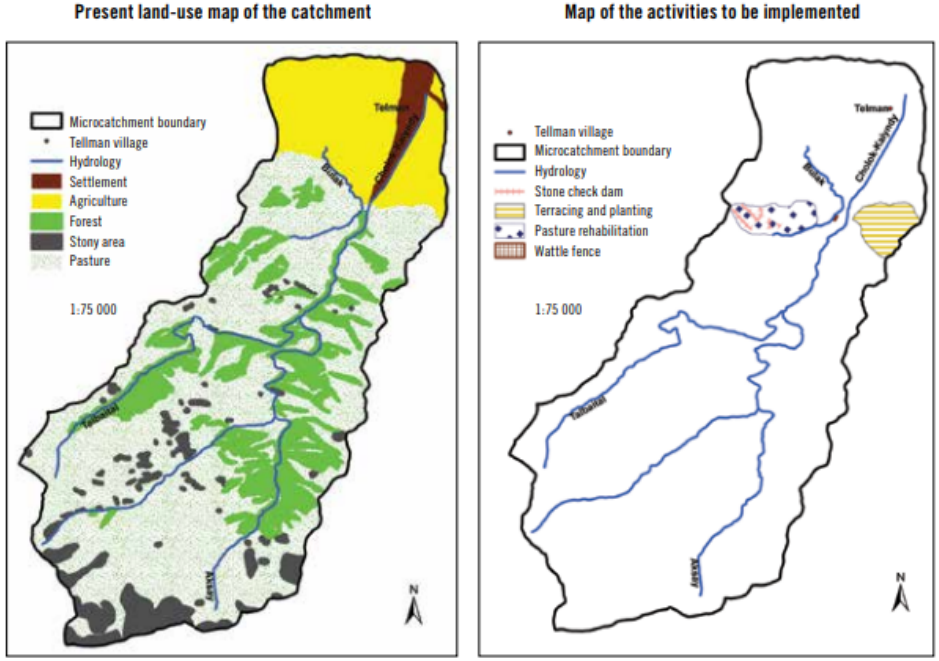
3. Enable creation of targeted policies and support scaling up action on the ground (transformational).



FAO worldwide review of Lessons learned from countries (last 10 years)

FIGURE 3

Present land use and localization of project activities, Kyrgyzstan



1. Watershed boundaries, stream networks, towns;
2. Landscape slope ranges and soil types
3. Combination of LDN indicators (+ erosion, biodiversity…).
4. Action plan - to be implemented + monitored

Watershed- implies integrated land and water management

Adaptive management in the Design and Implementación of Infrastructure and management Measures for the Protection of Watersheds and Farms

- **Protect** springs and wáter sources
- **Soil and water conservation** practices on slopes
- **Crop, pasture and forest management** in landscape (hills, irrigated lands, wetlands, green cities)
- Technologíes for **water capture, retention and storage** (catchmnets, households)
- **Governance of land and surface and groundwater** resources (access and use rights)- VGGT, VGSSM
- **Improve efficiency** -land, irrigation, energy, food losses reuse water
- Enhance resilience **– manage and reduce risk** - drought flood - Reduce Vulnerabiity (specific groups)

4. Integrate LDN and Climate resilience
(… linked to Biodiversity…DRR)

LD exacerbates climate change and the LDN strategy will generate significant benefits in mitigating and adapting to climate change.

Mitigation: Avoiding and reversing LD can reduce greenhouse gas emissions and enhance sequestration by increasing carbon stocks in soils and vegetation.

Adaptation: LDN plays a key role in strengthening the resilience of rural communities against climate shocks by securing and improving the provision of vital ecosystem services.

Soils alone can sequester 1–3 billion tonnes of CO2/ year and the land sector as a whole has a mitigation potential of 7–11 billion tonnes of CO2 / year, (1/3 of all fossil fuel CO2 emissions (UNCCD, 2015).

Climate smart agriculture Toolbox and national Policy/Strategy

Mapping Climate Change Vulnerability and Impact Scenarios: a Guide-book for Sub-National Planners (MAP_CCVIS)

Land use planning for Low Emission Development Strategy (LUWES)

5. Decision Support Framework for **Mainstreaming and Scaling out SLM**

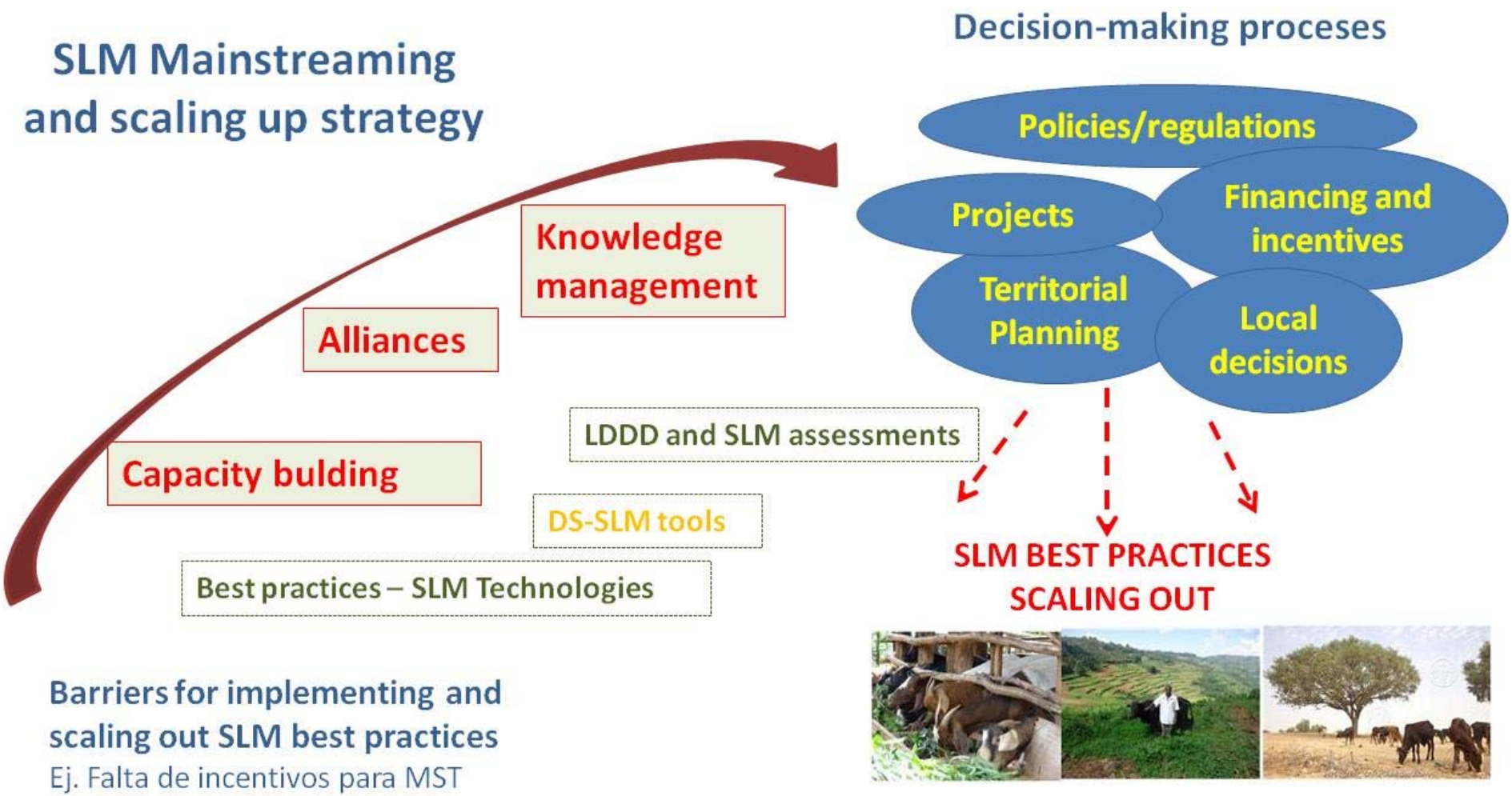
- Countries to design and conduct a **mainstreaming strategy** to integrate SLM into key **national / subnational decision-making processes**
- Start from **barriers** at local level, be **simple**; focus on **few objectives and activities**
- **prioritize decision-making capacity in long term** (beyond project for SLM implementation + scaling out)
- Integrate strategies at national and **landscape** levels
- Strengthen **partnerships** and **capacity development**

Tool:

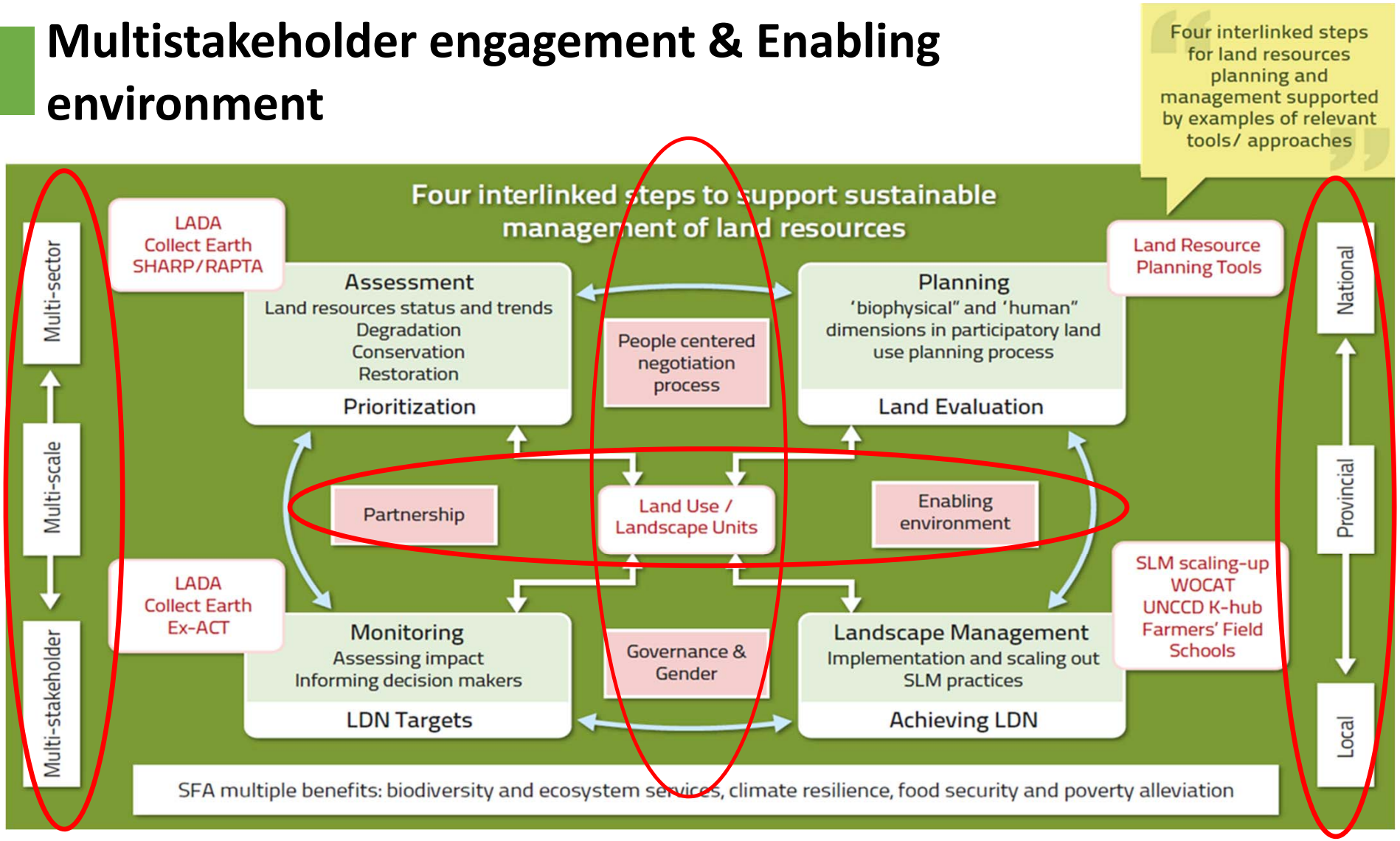
❖ FAO DS-SLM Mainstreaming Tool Module 1

Policies and regulations	• National development policies • Sectoral policies (e.g. agriculture, economy, environment) • Regulatory instruments (laws, regulations) • National strategies and action plans
Programmes and projects	• National and subnational sectoral and cross-sectoral programmes and projects (e.g. environment, agriculture, climate change, small business)
Incentives and Financing mechanisms	• Financing frameworks (budget allocations) • Economic and non-economic incentives • Microcredit • Financing mechanisms and funds (e.g. watershed funds) • Certification schemes
Land-use and territorial planning processes	• Land-use and territorial planning processes at all levels • Landscape planning • Budgetary allocations of administrative units for sustainable land management • Information and monitoring systems
Local decisions	• Local organizations (e.g. producer associations, indigenous organizations) • Local management plans

DS-SLM mainstreaming approach

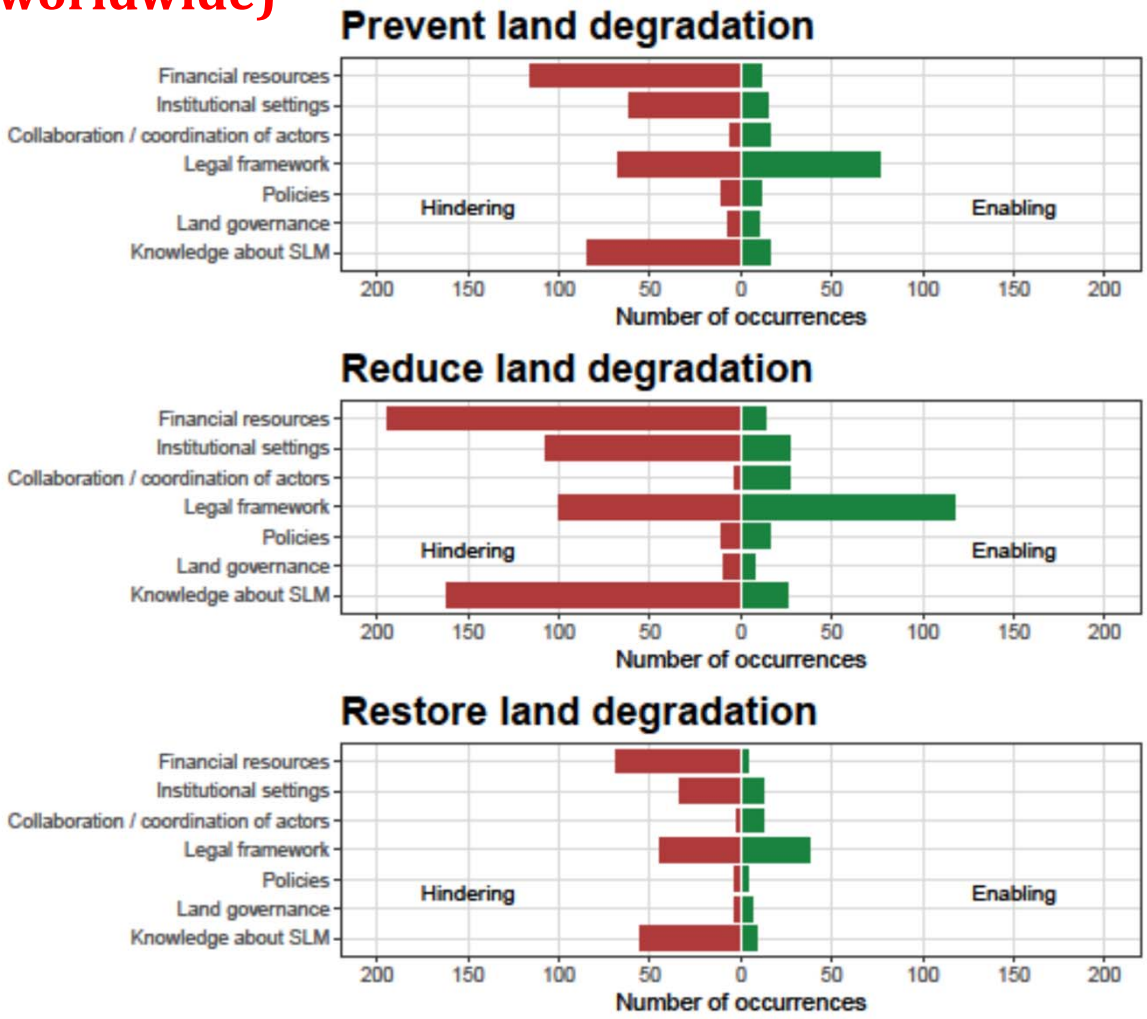


Multistakeholder engagement & Enabling environment



What is hindering / enabling outscaling of SLM?
(1063 SLM Technologies shared worldwide)

1. **Financial resources**
2. **Knowledge**
3. **Institutional Setting & Legal Framework- Governance**



Identify opportunities to Mainstream LDN / SLM in National development policy frameworks

- **National planning processes** (development planning and land-use planning),
- **Poverty Reduction and Food Security** Strategies
- National action plans related to the Rio conventions
  - **UNCCD NAPs** often include an assessment of the enabling environment. The LDN target setting process can update and/or complement this assessment and propose targeted action to **improve policy and legislative, institutional and coordination frameworks**
  - **REDD+** (Reducing Emissions from Deforestation and Forest Degradation) strategies
  - **NDCs** Nationally determined contributions under UNFCCC;
  - **National Biodiversity Strategies and Action Plans (NBSAPs)** under the CBD.
- Voluntary guidelines on responsable land tenure and VG Sustainable soil management
  Do we need VG on Planning and implementing SLM?
- SDGs 15.3 and links e.g.

Land use plans to increase financing / investments to achieve LDN (UNCCD guidance)

LDN mainstreaming at policy level is also a prerequisite to increasing finance for LDN-related activities on the ground. An assessment by the GM (2009) on interrelationship between policy & financing for SLM

Key areas for action:

- strengthen the **information and evidence base** on the scale and determinants of soil (land) degradation and their costs, economic or otherwise (22);
- **enhance security of land tenure** in policies and institutional support for poorest and marginalised farmers who are most vulnerable to land degradation;
- **use a programmatic approach to SLM** to match human & financial resources with needs based on evidence (i.e. impact of LD on poverty and economic performance);
- **carry out public finance reforms** to improve effectiveness of planning and management of public resources and their allocation to in line with agreed priorities.

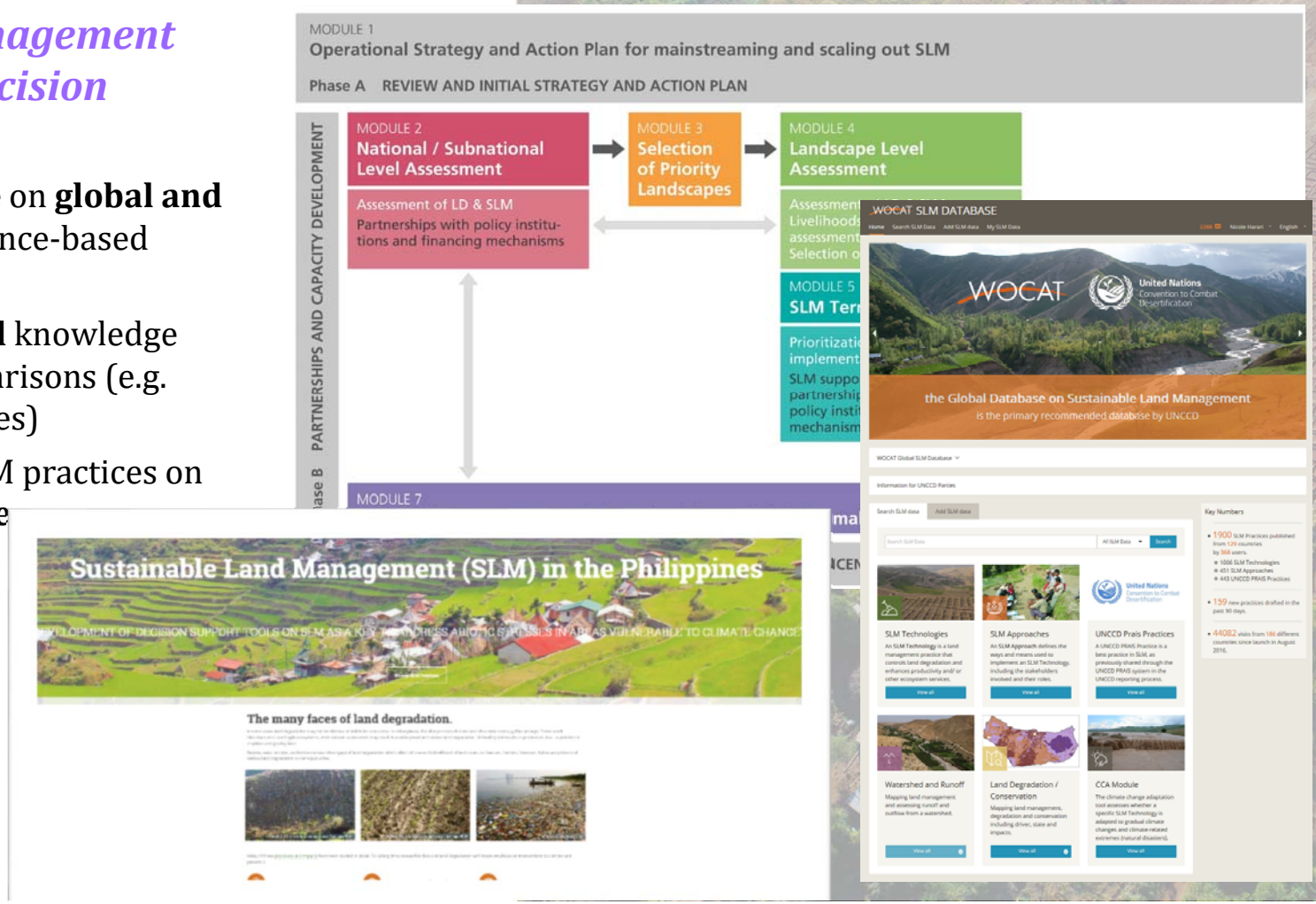
Decision Support Framework for Mainstreaming and Scaling out SLM

Module 7 Knowledge management platform for informed Decision making

- compile and share knowledge on **global and national platforms** for evidence-based decisions
- **standardized & harmonized** knowledge management to enable comparisons (e.g. between different Technologies)
- facilitate exchange - share SLM practices on Global **WOCAT SLM Database recommended by UNCCD**

Tools:

- ❖ Global WOCAT SLM Database
- ❖ DS-SLM knowledge platform
- ❖ National platforms



7. Monitoring, assessing progress & impacts + informing decision makers

What are the purposes of monitoring? (UNCCD guidance)

- to help assess effectiveness of a policy or set of interventions in achieving intended outcomes and whether they have been implemented efficiently
- to help track progress made towards intended outcomes (agreed targets and indicators)
- to serve as early warning system for potential problems and lead to identification of remediation or adaptive management actions;
- to support the learning of what works well (or not), in which situations where and for what reasons.

FAO-WOCAT + countries + partners (CI etc.) guidance

- Use local knowledge and evidence (costs benefits, impacts) in combination with RS analysis e.g. Trends Earth for LDN reporting and decision making
- Integrate environmental (LDN, CC BD) and socioeconomic aspects (food security, poverty, equality etc.) in planning and decision making at all levels
- Harmonise and integrate databases (projects /interventions feed into national datasets)
- Use SLM strategy and DM process for policy making and leveraging funding

Use of Innovations (e.g.Collect Earth in Cape Verde-SIDS) for setting targets and implementing LDN

Combine local knowledge and cloud computing

Collect Earth- A Framework for Assessing, Monitoring, and Reporting – can be used for Land Degradation Neutrality (SDG Target 15.3) and other targets

- Can be combined or an alternate to Trends Earth (not possible in SIDS due to scale and inadequacy of global datasets)
- Can be complemented by LADA-WOCAT assessment and mapping tools for more knowledge on LDN and effects of SLM measures (confront local experiences and data with national assessment results and local territorial action planning in the field.

Brazil. Photo by Annette Cowie©

Indonesia. Photo by Annette Cowie©

Namibia. Photo by Niels Dreber©

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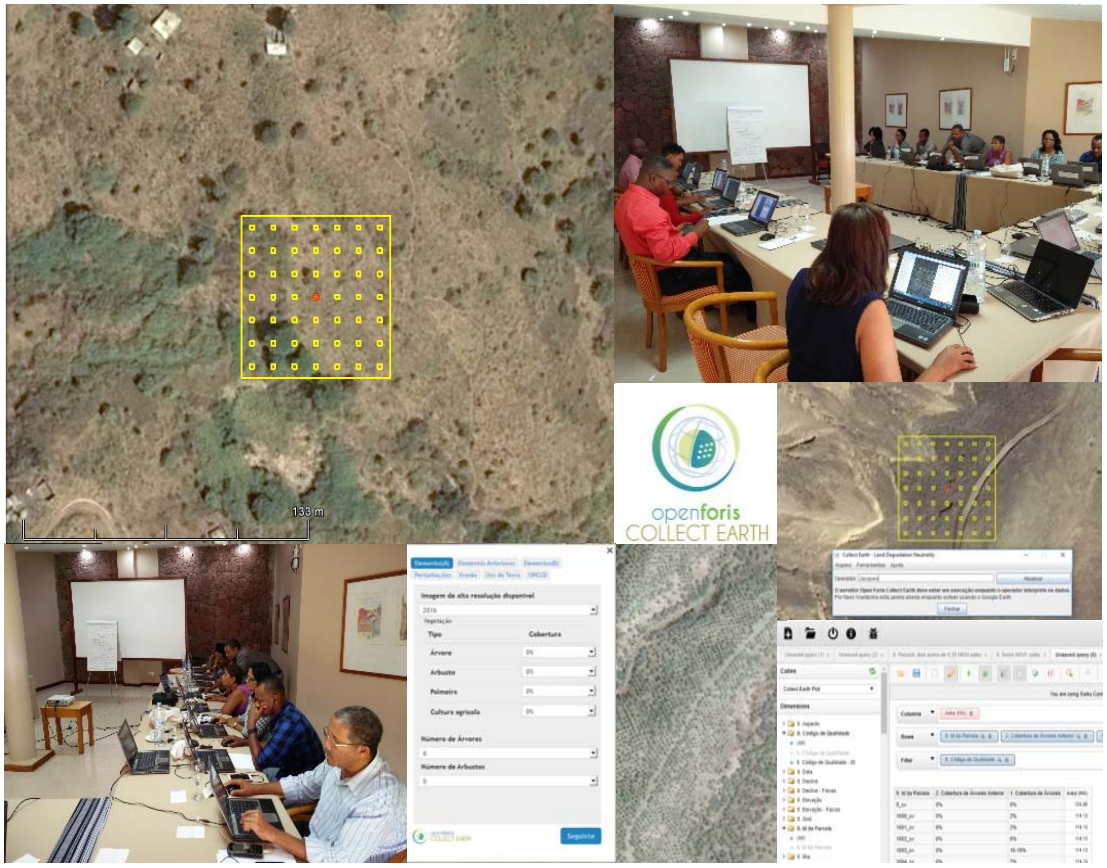
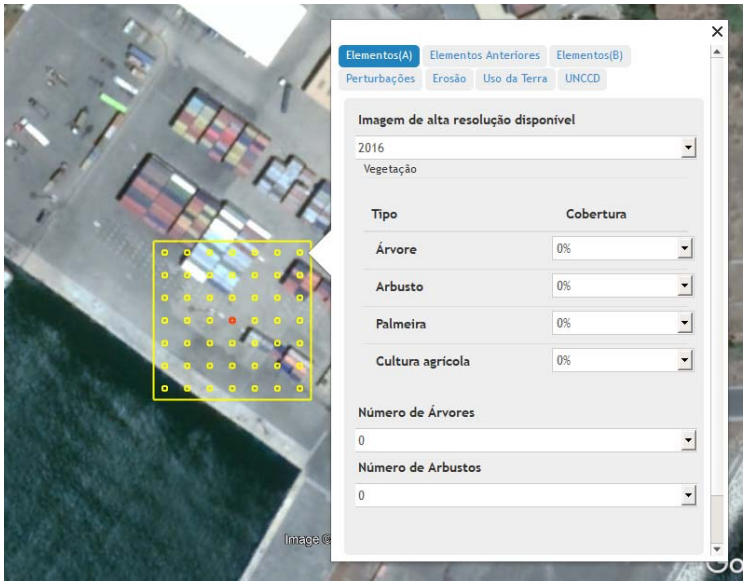
Cape Verde Working Group

Diverse expertise-Departments of Forestry, Agriculture, Statistics
No previous GIS background; Capacity to use a computer and motivation!

Ministério da Agricultura e Ambiente
Direcção Geral da Agricultura, Silvicultura e Pecuária





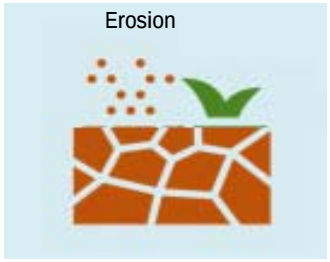
- **Methodology**
- **Land use (sub) classes**
- **Grid Design**
- **Attributes to assess**
  - **Tree Cover & Tree Count Trends**
  - **Vegetation Trend**
  - **Cropland Productivity**
  - **Land Use & LU Change**
  - **LDN Indicators + Erosion**

LDN: Target Setting Cape Verde

15 experts 2 weeks work to establish targets

Sub Indicators

Sub -Indicators
UNCCD (CBD, UNFCCC)
Reporting Mechanisms



Baseline

Sub Indicator	Area (ha)
Land Use Change	2,109
Land Productivity	8,545
Carbon Stocks	Not Measured
Total	**10,452**

Cape Verde working group decided to include area under erosion processes in national LDN process and in implementing rehabilitation actions in Cabo Verde.

Ministério da Agricultura e Ambiente
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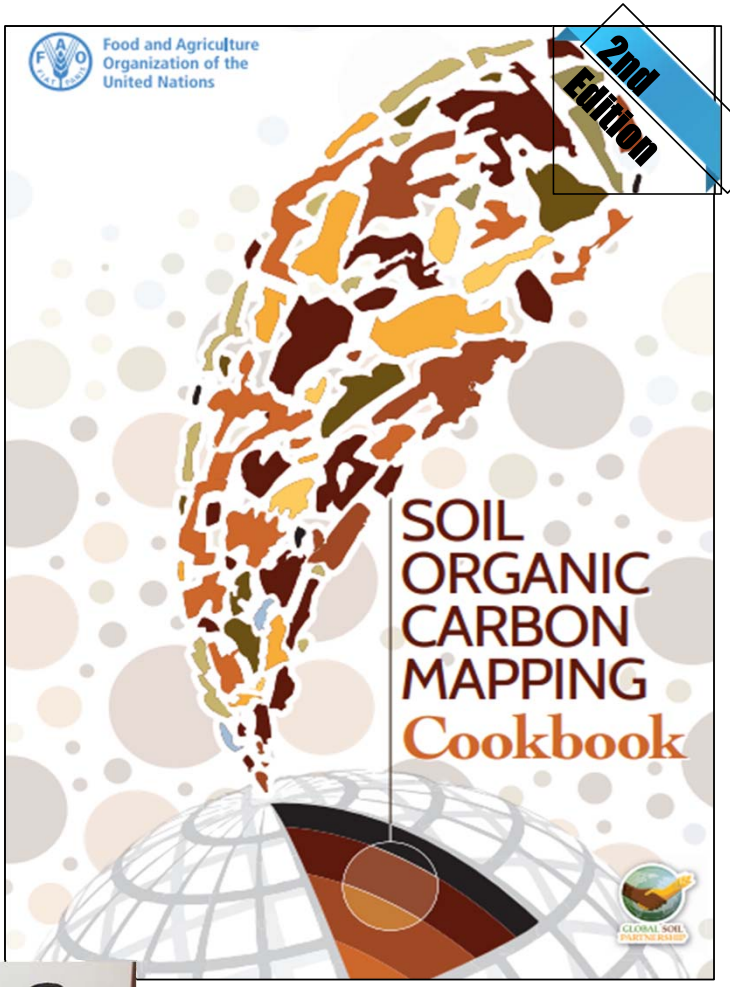
Global soil partnership technical support in improving soil data + SOC maps

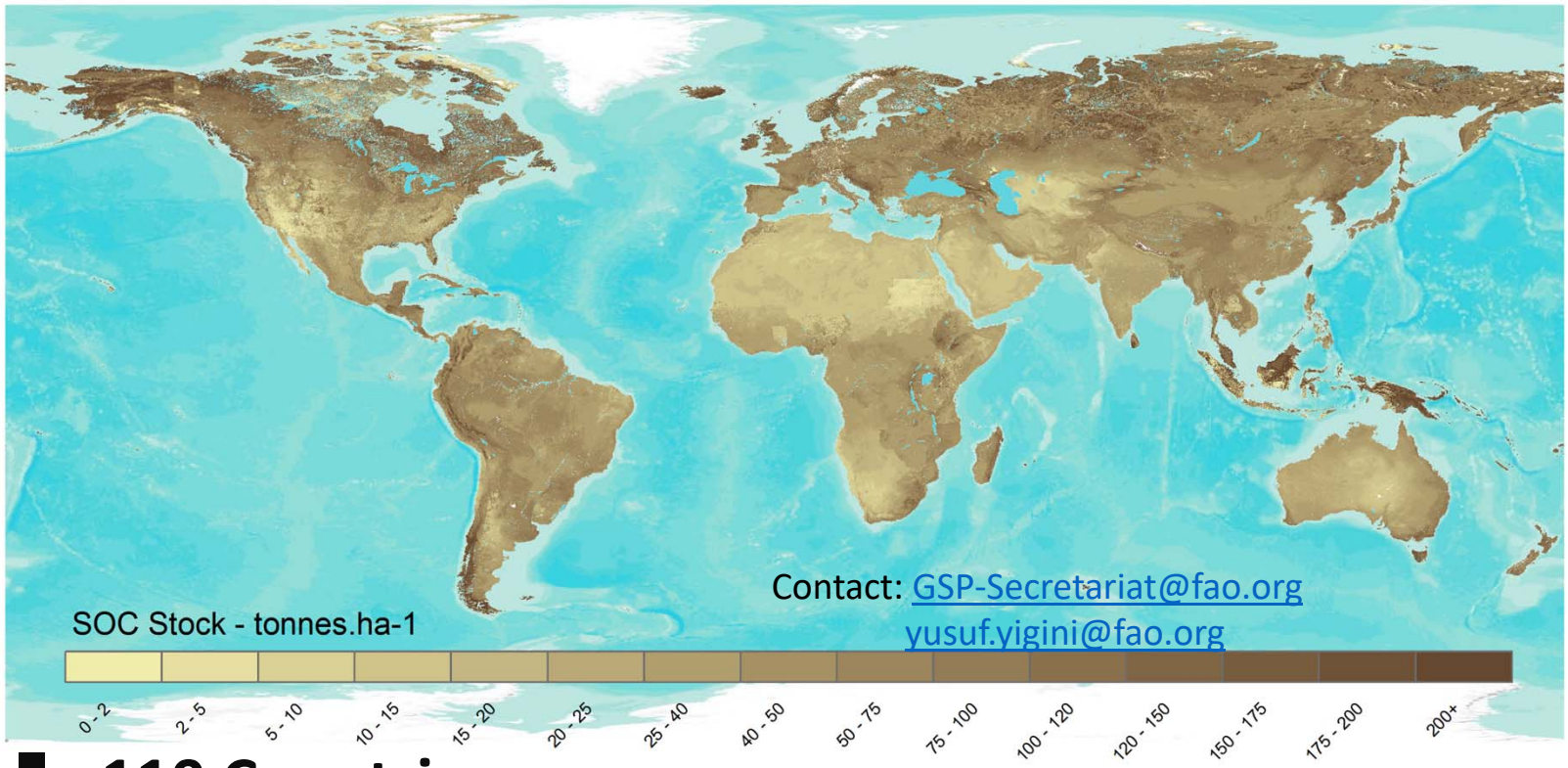
- New data for national SOC mapping 2017-18
- National SOC Maps (Stocks)
- Metadata and published reports
- **Harmonized methods and indicators (collaboration)**Soil profiles, digital SOC map, harmonise methods in soil laboratories, data reliability (scientific)
- **National and global soil/land information system**



GSOCmap V1.2.0

(20/02/2018)

Guidance Intergovernmental technical panel on soils and collaboration with UNCCD Science policy Interface

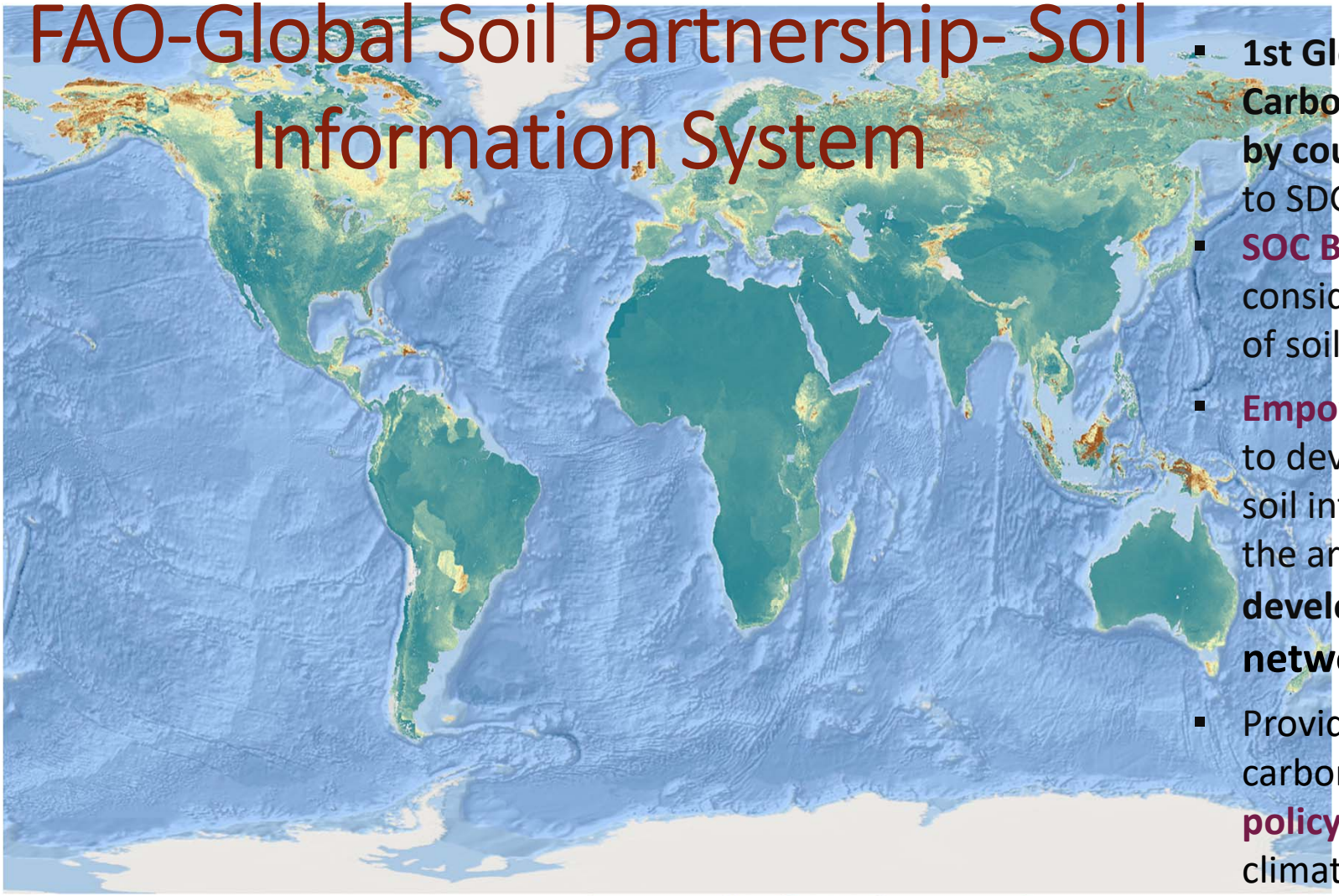


- **110 Countries**

(66% global Coverage)

1 Million points- Global SOC Stocks ~677 Pg

FAO-Global Soil Partnership- Soil Information System



Development Programme

- **1st Global Soil Organic Carbon assessment & map by countries as c**ontribution to SDG 15.3.1.
- **SOC Baseline** is crucial considering dynamic nature of soils.
- **Empower** member countries to develop their own national soil information using state of the art techniques (**capacity development**). **Distributed network approach.**
- Provide support on soil carbon issues→ **Help shape policy and action** towards climate change mitigation, sequester more carbon and protect carbon rich soils.

References and links

- UNCCD Land Degradation Neutrality Target Setting – A Technical Guide
- Trends Earth http://trends.earth/docs/en/
- WOCAT **www.wocat.net + Global SLM database https://www.wocat.net/en/global-slm-database +** **www.wocat.net/en/projects-and-countries/projects/ds-slm**
- **FAO www.fao.org/land-water/land/sustainable-land-management/slm-decision-making/en/**
- **LADA-WOCAT DS/SLM framework**
  http://www.fao.org/land-water/land/land-assessment/assessment-and-monitoring-impacts/en/
  https://www.wocat.net/global-slm-database/wocat-tools-and-modules/la management-mapping-tools
- **FAO Land use planning toolbox**
- **Global soil partnership- soil organic carbon mapping and harmonised national soil data sets (GLOSIS)**
- **Achieving land degradation neutrality: The role of SLM knowledge in evidence-based decision-making (**LDN special issue of Environmental Science and Policy).

THANK YOU!

UNCCD
United Nations Convention to Combat Desertification

THE GLOBAL MECHANISM
United Nations Convention to Combat Desertification

gef

Food and Agriculture Organization of the United Nations

WOCAT
World Overview of Conservation Approaches and Technologies

upra
Unidad de Planificación Rural Agropecuaria

Royaume du Maroc
Haut Commissariat aux Eaux et Forêts et à la Lutte Contre la Désertification