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SAMARKAND, UZBEKISTAN

**CRIC 21**

United Nations Convention to Combat Desertification



# How can countries improve estimations of SDG 15.3.1 and enhance national reporting of SOI?

**LESSONS LEARNT**  
from participatory approaches during PRAIS4 reporting

**WOCAT**

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Samarkand, November 2023

## Common challenges

- Default estimations and maps are usually not representative of countries' reality and **underestimate** the proportion of land degraded (SDG 15.3.1).
- Technical difficulties to integrate national data and local knowledge.
- Not enough time to implement a proper interinstitutional participatory process.
- Resources not available on time.

## Common interests

- Produce relevant maps and estimations of SDG indicator 15.3.1 that are consistent with the national knowledge.
- Conduct participatory processes that guarantee ownership and consensus.

# GENERAL APPROACH



WOCAT

Facilitation of participatory workshops with diverse stakeholders that were **NOT necessarily GIS experts.**

Use of cloud computing for co-development of tools and easy to use applications to explore, compare, integrate and validate maps.

Panama



Colombia



Türkiye



Bhutan



Ecuador



Bosnia and Herzegovina



# TRENDS IN LAND COVER (SO1-1)



01

**CHOOSE BEST AVAILABLE DATA**  
Pre processing of alternative data sets

02

**SELECT A LEGEND**  
That allows monitoring of  
key degradation processes

03

**TRANSITION MATRIX**  
Changes lead to degradation,  
improvement or are neutral

04

**VALIDATE**  
Field validation, error  
adjusted area estimates

# Choosing the Best available Land cover data

## Land Cover Transition Analysis Apps

These apps allow users to compare alternative land cover datasets and re-categorizations as well as alternative land cover transition matrixes. With just a few clicks the transitions for different periods can be explored, as well as the final degradation due to land cover change maps (SO1-1). Statistics at different spatial scales, and for different periods, as well as resulting maps are easily obtained. For example, **Bhutan** experts used the app to compare alternative re-classifications of ESA CCI Land cover National, and alternative global land cover maps. **Colombia** compared alternative reclassifications of their national land cover maps.



**Colombia Land Cover Transitions Tool - Co-developed with IDEAM and the Ministry of Environment for PRAIS4 National Report. Languages: Spanish and English.**



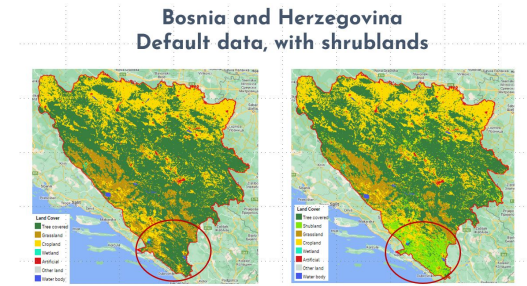
**Bhutan Land Cover Transitions Tool - Co-developed with the National Soil Services Centre during PRAIS4 National Reporting. Languages: English**



**Panama tool to compare Degrdation due to Land Cover transitions using national data and expert knowledge. Languages: Spanish and English.**

# Improving estimations of SOI-1.

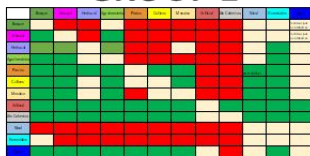
Use of default data can be improved by a more in depth analysis and reclassification. BiH, for example, identified shrublands as a separate category. This is an important and particular Mediterranean ecosystem that is also a hotspot of degradation.



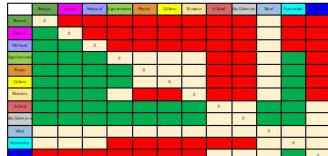
COUNTRY	DATA USED	LC CLASSES
Panama	National data – 2000, 2012, 2020	9 categories – e.g.: Mangroves
Colombia	National data -2001, 2012, 2019	12 categories – e.g.: Snow and glaciers
Ecuador	National data - 2000, 2014, 2018	7 categories
BiH	Global (ESA CCI) reclassified	8 categories e.g.: shrublands
Türkiye	Regional data (CORINE) – 2000, 2012, 2018	7 categories
Bhutan	Global (ESA CCI) reclassified	7 categories e.g.: Shrublands

# Transition matrix

GROUP 1



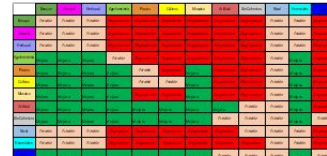
GROUP 2



GROUP 3



GROUP 4



	Forests	Shrublands	Grasslands	Agroforestry	Pastures	Cropland	Productive Mosaics	Artificial	Bareland	Snow and glaciers	Wetlands	Water
Forests	4n	2-2n	2n2-	3-1n	4-	4-	4-	4-	4-	3n1+	3n1-	3-1n
Shrublands	1+3n	4n	2-2n	3-1+	4-	4-	4-	4-	4-	3n1+	3n1-	3-1n
Grasslands	2+2n	2n2+	4n	1+3-	4-	3-1n	2n2-	4-	4-	3n1+	2-1n1+	3-1n
Agroforestry	4+	4+	2+1n1-	4n	3-1n	3-1n	2n2-	4-	4-	4n	3+1-	3-1n
Pastures	4+	4+	3+1n	4+	4n	1+1-2n	3+1n	4-	4-	4n	3+1-	3-1n
Cropland	4+	4+	2+2n	4+	4n	4n	3+1n	4-	4-	4n	3+1-	3-1n
Productive Mosaics	4+	4+	3+1n	2+2n	4-	3-1n	4n	4-	4-	4n	3+1-	3-1n
Artificial	4+	4+	4+	4+	4+	4+	4+	4n	2n1-1+	4n	3+1-	3-1n
Bareland	4+	4+	4+	4+	4+	4+	4+	3n1+	4n	4n	4+	2-2n
Snow and glaciers	2n2-	2n2-	2n2-	3-1n	3-1n	3-1n	3-1n	3-1n	3-1n	4n	3n1-	2-2n
Wetlands	4+	3n1-	2n2-	4-	4-	4-	4-	4-	4-	4n	4n	4n
Water	4+	2-2+	2-2+	2-2+	2-2+	2-2+	2-2+	3n1-	3n1-	4n	3+1-	4n

n NEUTRAL + POSITIVE - NEGATIVE

Results in Colombia

# TRENDS IN LAND PRODUCTIVITY (SOI-2)



01

## **CHOOSE BEST AVAILABLE DATA**

Trade off between temporal and spatial resolution

02

## **EXPLORE DIFFERENT ANALYSIS**

SAVI, EVI, NDVI, ESPI, algorithms, periods, trends in precipitation, etc

03

## **EXPERT KNOWLEDGE**

Choose the most representative result via a participatory process

04

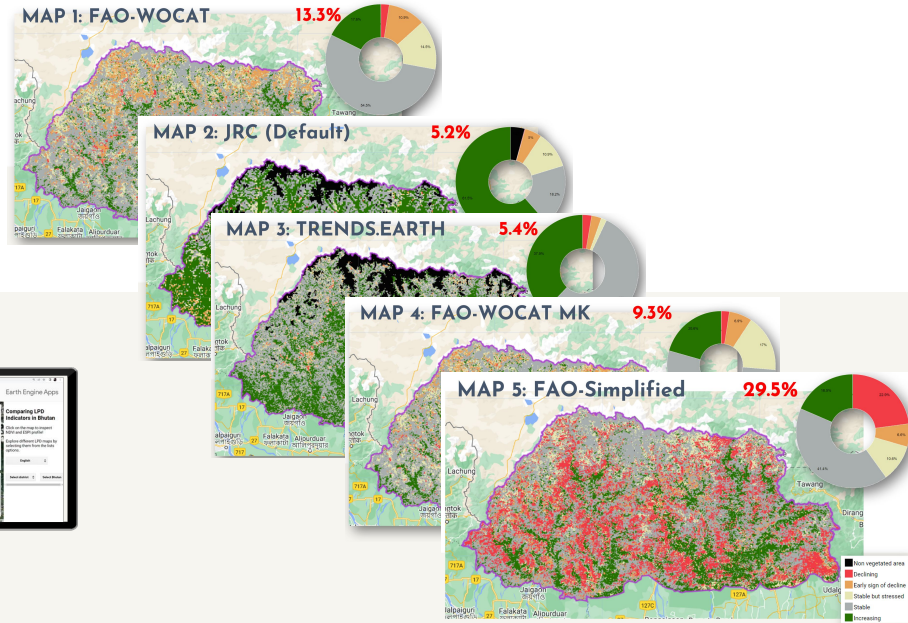
## **VALIDATE**

Field validation, identification of false positives and negatives



# National Expert Assessments

- 5 LPD Maps were explored and compared
- Experts from different sectors use their knowledge and data to compare results

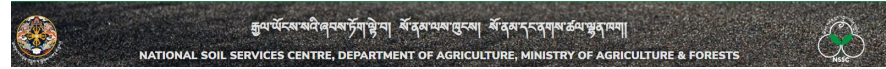


# Types of sites for the comparison of maps



## Degraded Forests

1. Forest fires: forest fire near Thimphu
2. Bark beetle infestation in Uruk
3. Timber Extraction Area
4. Timber extraction area using cable
5. Hydroelectric plant



## SLM in Agricultural lands

- 1- SLM project Wangphu Gewog
- 2- Borangma, Norbugang rehabilitation site
- 3- Namlaythang, Tsangkha rehabilitation site
- 4- Wangphu land management site



## Mining sites

- 1- Marug ri, Nganglam 2015
- 2- Gumtu, limestone mine
- 3- Paro, Gebjana Stone Quarry 2010-2019

## Overgrazed grasslands

1. Longzhi Grassland, overgrazing in northern mountainous areas with grazing by yaks
2. Grasslands and wetlands with overgrazing, grazed by cattle during summer months and during the winter by yaks, so all year long grazing.



Department of Livestock  
Ministry of Agriculture & Forests  
Royal Government of Bhutan



NATIONAL STATISTICS BUREAU  
Towards Supporting Evidence-Based Decision Making



1. Toorsa developing area
2. Thimphu district statistical analysis

# The most representative LPD map

- 1.- Which model is best for your country?
- 2.- Which processes relate with the “Red areas”?
- 3.- Which processes relate to “Green areas”?
- 4.- What is the model that provides the worst results?

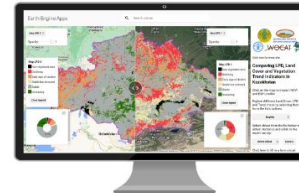


## Land Productivity Dynamics (LPD) Comparison Apps

These apps allow users to interactively compare and validate alternative LPD maps (SO1-2). Statistics at different spatial scales are shown in the app, and experts can use their own knowledge to validate the different LPD maps (for example FAO-WOCAT LPD, JRC, Trends.Earth, etc) by looking at known areas that are hotspots of brightspots. Stakeholders from different sectors can discuss in groups and vote for the most representative LPD map. For example, Panama experts compared 5 different LPD maps using the LPD Comparison Tool and chose an LPD map obtained with Trends.Earth, whereas experts from Bhutan chose WOCAT-FAO LPD map for PRAIS4 report.



**PRAIS4 Comparison App - Co-developed with FAO and Conservation International to support countries in choosing the most appropriate datasets for PRAIS4 reporting**



**Kazakhstan Expert Knowledge Comparison Tool - Linked to a survey this tool allows experts to compare and choose the most appropriate Land Cover and LPD maps. Languages: Russian and English**



**Panama LPD Comparison Tool - Co-developed with the Ministry of Environment for PRAIS4 national reporting process, to support integration of expert knowledge. Languages: Spanish and English**



**Bhutan Land Productivity Dynamics Comparison Tool - Co-developed with the National Soil Services Centre during PRAIS4 National Reporting**



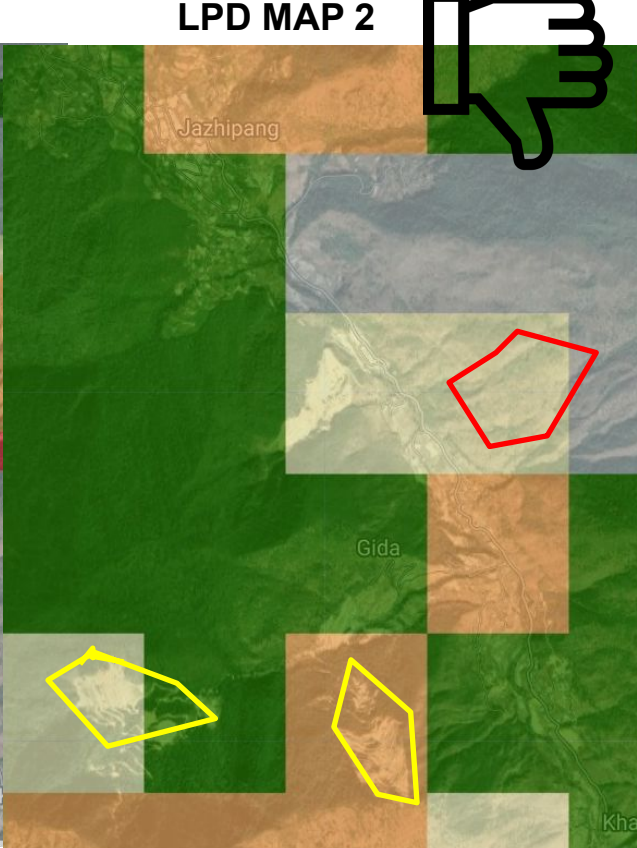
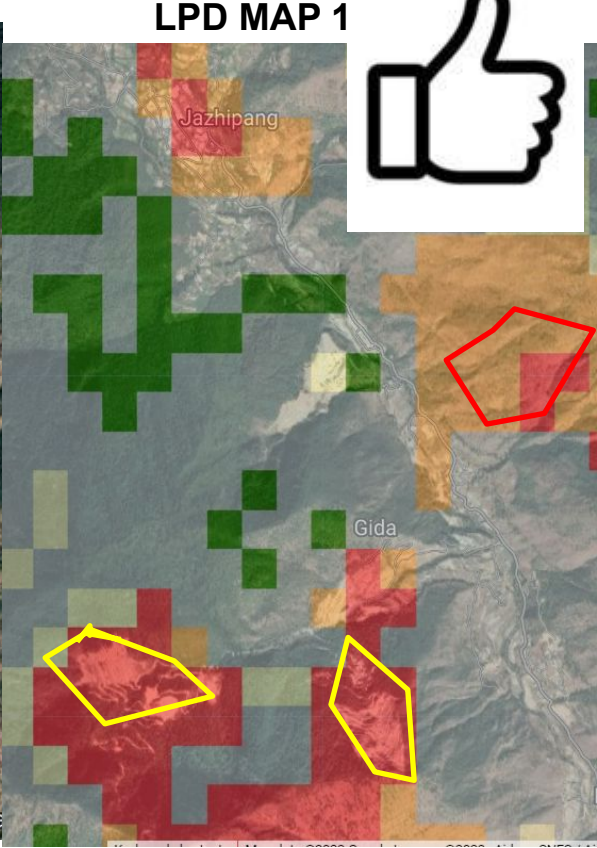
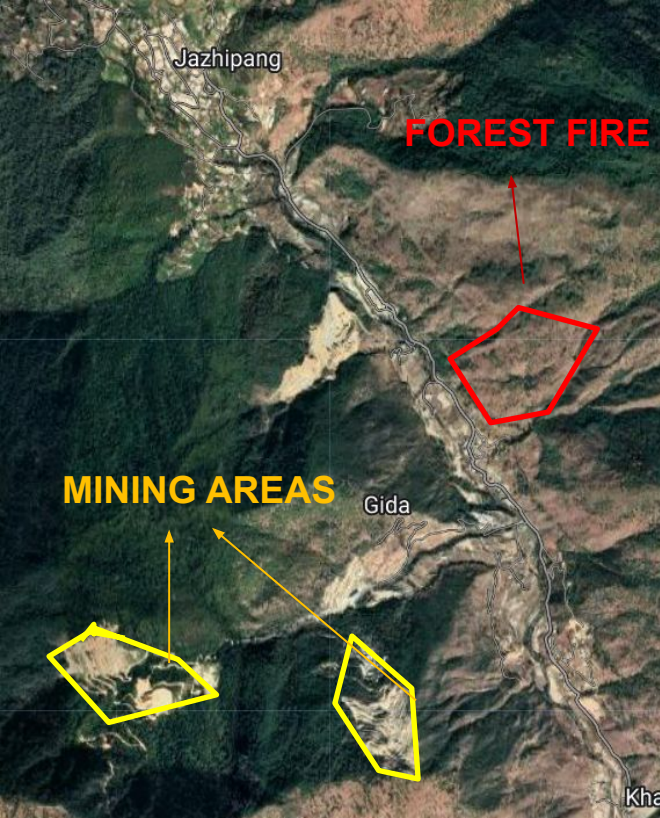
**Ecuador LPD comparison tool - Co-developed with CONDESAN and the Ministry of Environment, Water and Ecological transition to integrate expert knowledge during the PRAIS4 national reporting process. Languages: Spanish and English.**



**Colombia LPD Comparison Tool - Co-developed with IDEAM and the Ministry of Environment for PRAIS4 National Report. Languages: Spanish and English.**

# Example: Hotspots of degradation

## Forest Fire and mining areas



# DATA SETS USED FOR TRENDS IN LAND PRODUCTIVITY

	LPD Data used
Panama	Trend.Earth default LPD
Colombia	WOCAT-FAO LPD
Ecuador	Trends.Earth climate correction
Bosnia and Herzegovina	WOCAT-FAO LPD
Türkiye	WOCAT-FAO LPD
Bhutan	WOCAT-FAO LPD

# TRENDS IN CARBON STOCKS (SO1-3)



01

CHOOSE BEST AVAILABLE DATA

02

ESTIMATE NATIONAL  
CONVERSION FACTORS

03

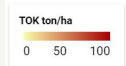
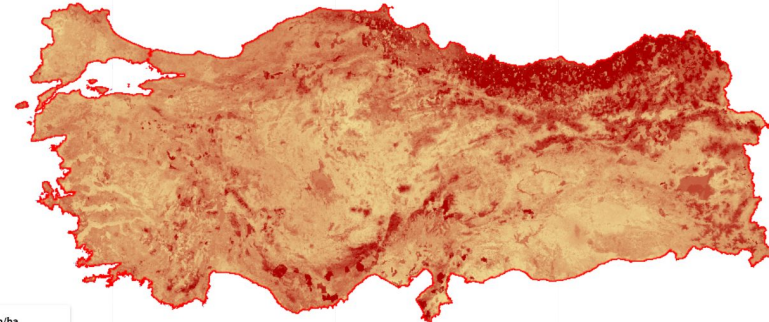
DIFFERENT MODELS

04

VALIDATE

# Nationally determined Conversion Factors in Türkiye + National SOC Map + Regional Land Cover

Original LC	Target LC	Turkey CF	Upper Sakarya CF	Trends.Earth					Diff	Suna CF	New CF
				Temp. Dry 0.8	Temp. Moist 0.69	Trop. Dry 0.58	Trop. Moist 0.48	Trop. Montain 0.64			
Tree-covered	Tree-covered	1	1	1	1	1	1	1	0	1	1
Grassland	Tree-covered	1.024009897	1.092408273	1	1	1	1	1	0.024009897	1.118746233	1.1
Cropland	Tree-covered	1.419386335	1.390235443	1.25	1.449275362	1.724137931	2.083333333	1.5625	0.169386334	1.548387097	1.4
Wetland	Tree-covered	0.943901304	1.019856677	1	1	1	1	1	-0.05609869	1.12009656	1
Artificial	Tree-covered	1.363875132	1.293507248	2	2	2	2	2	-0.63612486	3.454094293	3
Other land	Tree-covered	0.880028970	1.104399939	2	2	2	2	2	-1.1997103	4.356807512	2
Water body	Tree-covered	1.118744965	1.027985411	1	1	1	1	1	0.118744965	1.12009656	1
Tree-covered	Grassland	0.976553061	0.915408663	1	1	1	1	1	-0.02344693	0.893857758	0.9
Grassland	Grassland	1	1	1	1	1	1	1	0	1	1
Cropland	Grassland	1.38610607	1.272633573	1.25	1.449275362	1.724137931	2.083333333	1.5625	0.136106070	1.38403782	1.3
Wetland	Grassland	0.921769708	0.9335856406	1	1	1	1	1	-0.07823029	1.001207001	1
Artificial	Grassland	1.331896436	1.184087744	2	2	2	2	2	-0.66810356	3.087468983	2.5
Other land	Grassland	0.859394985	1.010977275	2	2	2	2	2	-1.14060501	3.894366197	2
Water body	Grassland	1.092513821	0.9410267545	1	1	1	1	1	0.092513820	1.001207001	1
Tree-covered	Cropland	0.704529820	0.7193026223	0.8	0.69	0.58	0.48	0.64	-0.09547017	0.645833333	0.6
Grassland	Cropland	0.721445509	0.7857721351	0.8	0.69	0.58	0.48	0.64	-0.07855449	0.722523608	0.7
Cropland	Cropland	1	1	1	1	1	1	1	0	1	1
Wetland	Cropland	0.665006616	0.7335855822	0.71	0.71	0.71	0.71	0.71	-0.04499338	0.723395695	0.7
Artificial	Cropland	0.960890702	0.9304231552	2	2	2	2	2	-1.03910929	2.337633333	2
Other land	Cropland	0.620006652	0.794397772	2	2	2	2	2	-1.37999334	2.337633333	2
Water body	Cropland	0.78818919	0.7394326021	1	1	1	1	1	-0.21181081	0	1
Tree-covered	Wetland	1.059432798	0.9805299338	1	1	1	1	1	0.059432798	0	1
Grassland	Wetland	1.084869671	1.071139011	1	1	1	1	1	0.084869670	0	1
Cropland	Wetland	1.503744436	1.363167467	1.4084507	1.408450704	1.408450704	1.408450704	1.408450704	0.095293732	1	1
Wetland	Wetland	1	1	1	1	1	1	1	0	1	1
Artificial	Wetland	1.444934048	1.268322576	2	2	2	2	2	-0.555065953	3	2
Other land	Wetland	0.932331554	1.082897199	2	2	2	2	2	-1.067668443	3	2



# Colombia: BASELINE

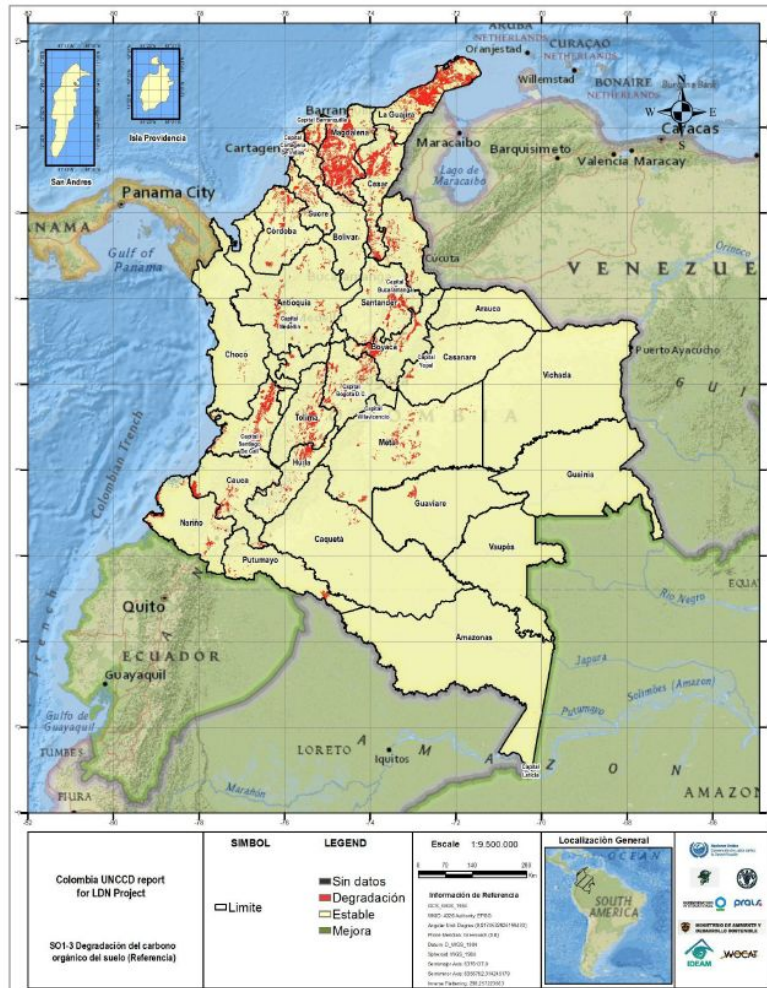
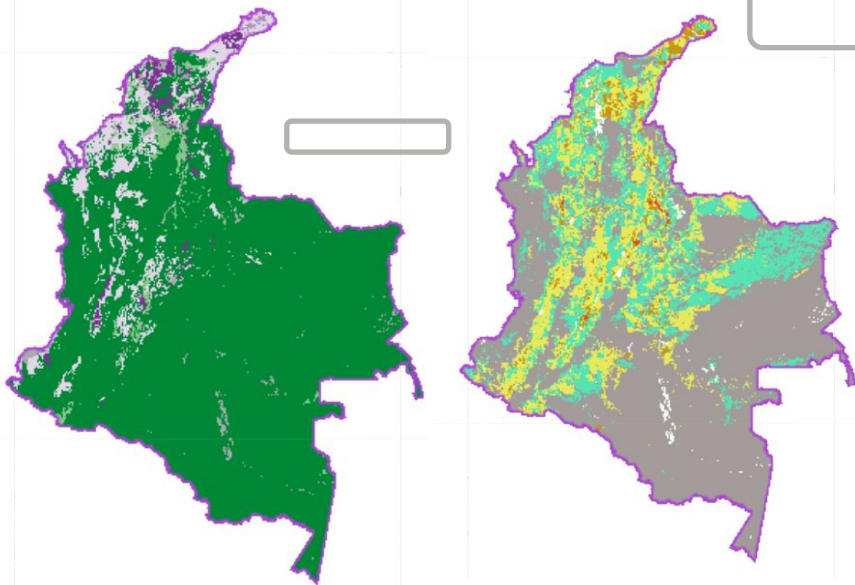
**Salinization (2017):**  
very severe

**Erosion (2011):**  
Severe and very severe

Grado de salinización (2017)



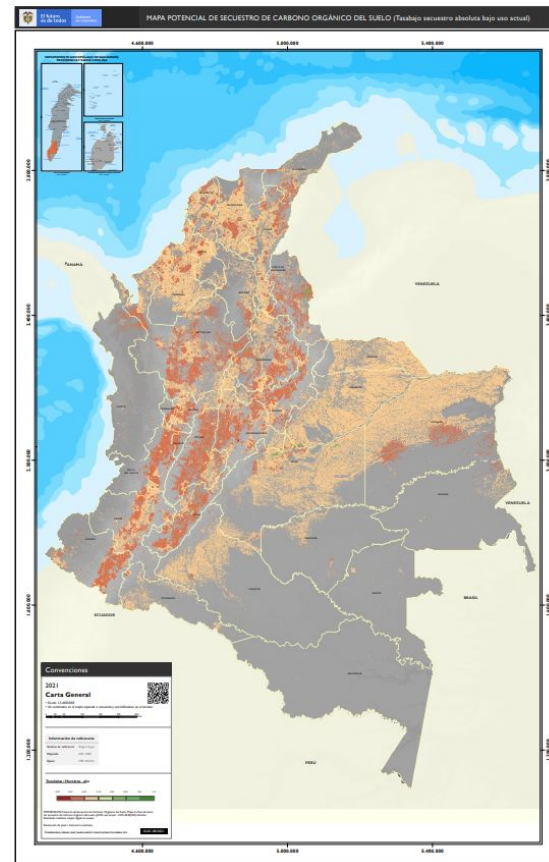
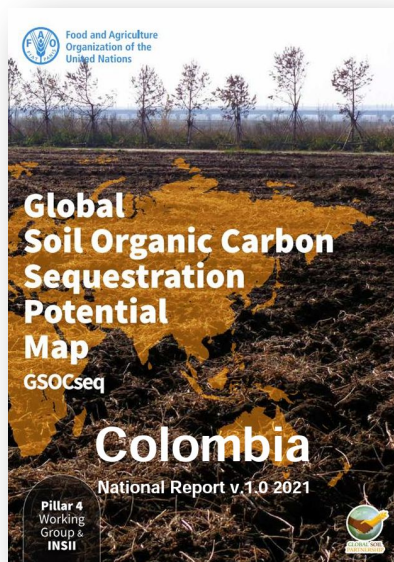
Grado de erosión (2011)





# Colombia: REPORTING PERIOD

1. SOC degradation: rate of loss higher than 5% (compared to initial value) in BAU.
2. SOC improvement: rate of SOC gains higher than 5% (compared to initial value) in BAU.



# COMPARING DEFAULT vs REPORTED SDG 15.3.1

Countries used alternative data sources  
and integrated expert knowledge

There were BIG differences...



# COLOMBIA



S01-4.T1: National estimates of the total area of degraded land (in km<sup>2</sup>), and the proportion of degraded land relative to the total land area

	Total area of degraded land (km <sup>2</sup> )	Proportion of degraded land over the total land area (%) ⓘ
Baseline Period ⓘ	85348	7.6
Reporting Period ⓘ	98370	8.8
Change in degraded extent ⓘ	13022	

Default

S01-4.T1: Estimaciones nacionales de la superficie total de las tierras degradadas (en kilómetros cuadrados), y proporción de tierras degradadas en comparación con la superficie terrestre total

	Superficie total de las tierras degradadas (km <sup>2</sup> )	Proporción de tierras degradadas en comparación con la superficie terrestre total (%)
Período de Referencia	331 897	28,8
Período sobre el que se informa	343 934	29,8
Variación de la extensión de las tierras degradadas	12037	

Reported

# SDG 15.3.1: DEFAULT AND REPORTED

REPORTED DEGRADATION WAS USUALLY HIGHER THAN DEFAULT ESTIMATIONS

	BASELINE		REPORTING PERIOD	
	Default	Reported	Default	Reported
Panama	9.4	35.2	10.4	32.2
Colombia	7.6	28.8	8.8	29.8
Ecuador	8	21.9	10	12.8
Bosnia and Herzegovina	7.9	8.5	7.9	6.8
Turkey	1.4	14.3	3.4	13.4
Bhutan	2.7	11.9	11.1	13.5



# PARTICIPATORY PROCESSES TO MAP LD

- ✓ allowed for inclusive, participatory, inter-institutional, multi-stakeholder processes versus an individual/consultant-based reporting process
- ✓ developed long-term capacities for LDN within the Ministries, using the reporting process as an opportunity and momentum
- ✓ developed a country-owned maps and systems useful beyond the reporting process to guide decisions in land management and restoration overall, also in relation to the climate and biodiversity targets

remote sensing | MDPJ

Article  
Combining Earth Observations, Cloud Computing, and Expert Knowledge to Inform National Level Degradation Assessments in Support of the 2030 Development Agenda

An interactive system to map land degradation and inform decision-making to achieve Land Degradation Neutrality via convergence of evidence across scales: a case study in Ecuador

CLOUD COMPUTING | LAND PRODUCTIVITY | PARTICIPATORY MAPPING | POVERTY | REMOTE SENSING

Ingrid Trinch , Nicole Harari, Pablo Caza, Juan Pablo Henao Henao, Juan Carlos Lopez, Eugenia Raybón, Ana María Oña-González, Hernán González, Soledad Bastidas, Cristian Morales-Ospino, César Luis García



Environmental Science and Policy

Journal homepage: [www.elsevier.com/locate/ees](http://www.elsevier.com/locate/ees)

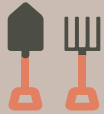
Land degradation assessment in the Argentinean Puna: Comparing expert knowledge with satellite-derived information

LOCAL

NATIONAL

GLOBAL

**ACHIEVE LDN**

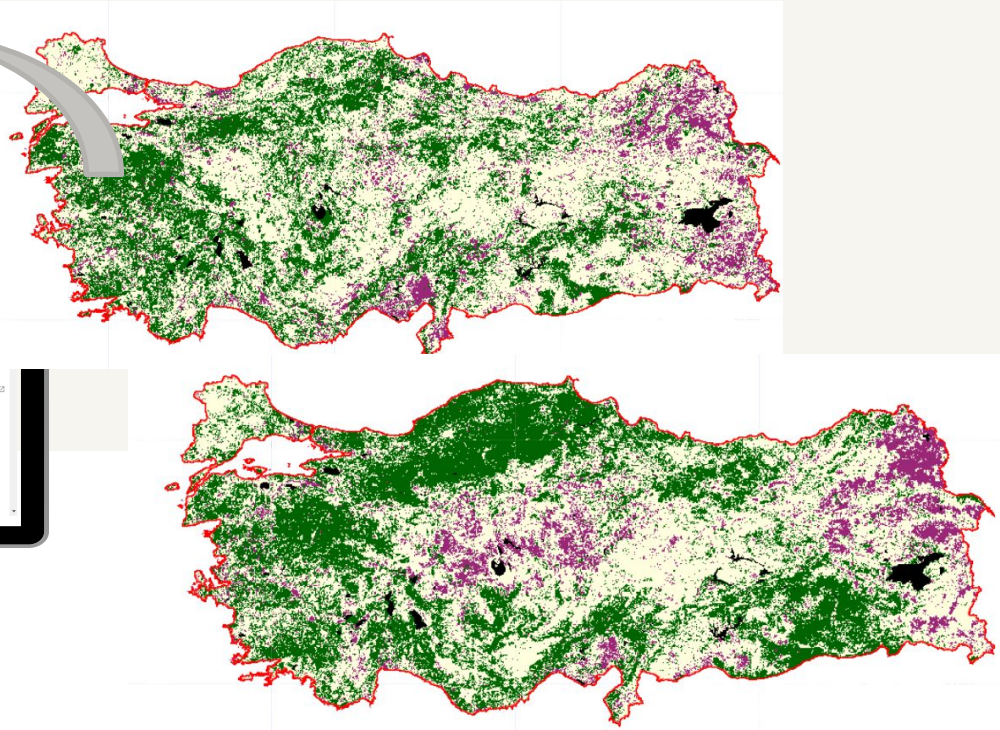
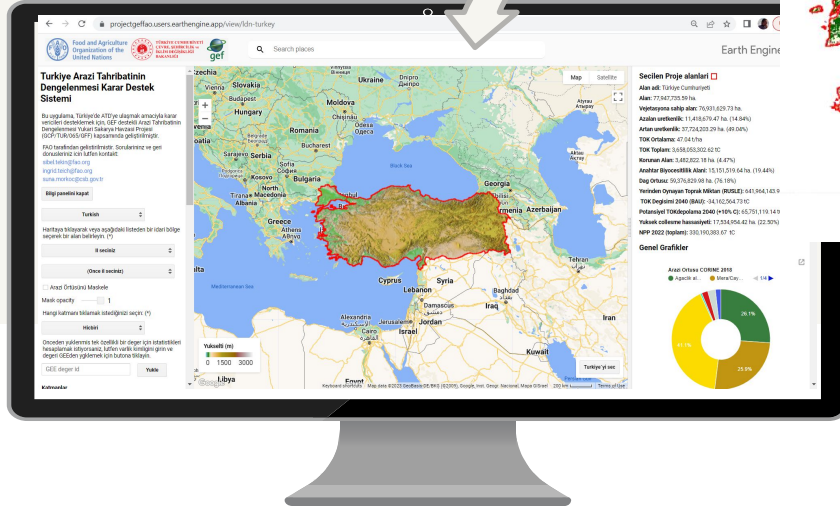


Field scale  
Sites selection  
ILUP  
Sinergies

**REPORT LDN**

Global scale  
Satellite derived  
data

# Türkiye LDN DSS



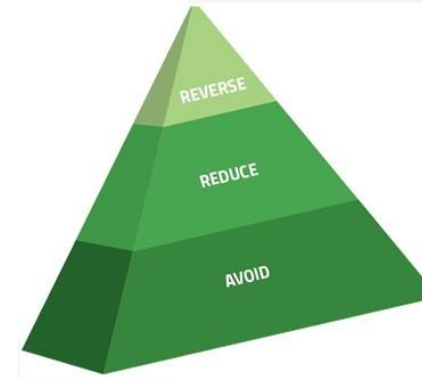
# Türkiye LDN ACTION PLAN: where to avoid, reduce or reverse LD?

SOC	
high	>40 tonnes/ha
low	<40 tonnes/ha

Erosion	
low	<2 tonnes/ha
medium	2-10 tonnes/ha
severe	>10 tonnes/ha

LPD	
Declining	declining + early signs of decline
Stable	stable + stable but stressed
Increasing	increasing

SOC	Erosion	Land Productivity Dynamics		
		Declining	Stable	Increasing
high	low	AVOID	AVOID	AVOID
high	medium	REDUCE	AVOID	AVOID
high	severe	REDUCE	REDUCE	AVOID
low	low	REDUCE	REDUCE	AVOID
low	medium	REVERSE	REDUCE	REDUCE
low	severe	REVERSE	REVERSE	REDUCE



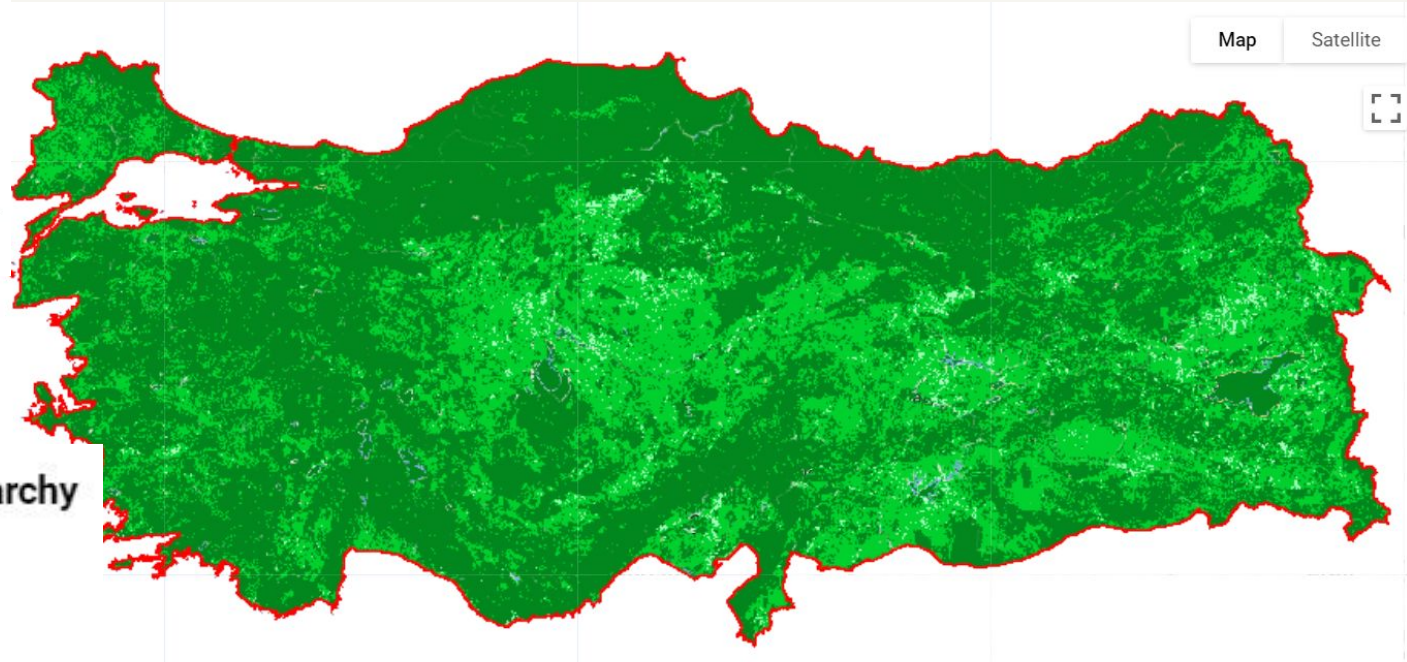


# LDN ACTION PLAN in the LDN DSS



## Response Hierarchy

-  Avoid
-  Reduce
-  Reverse

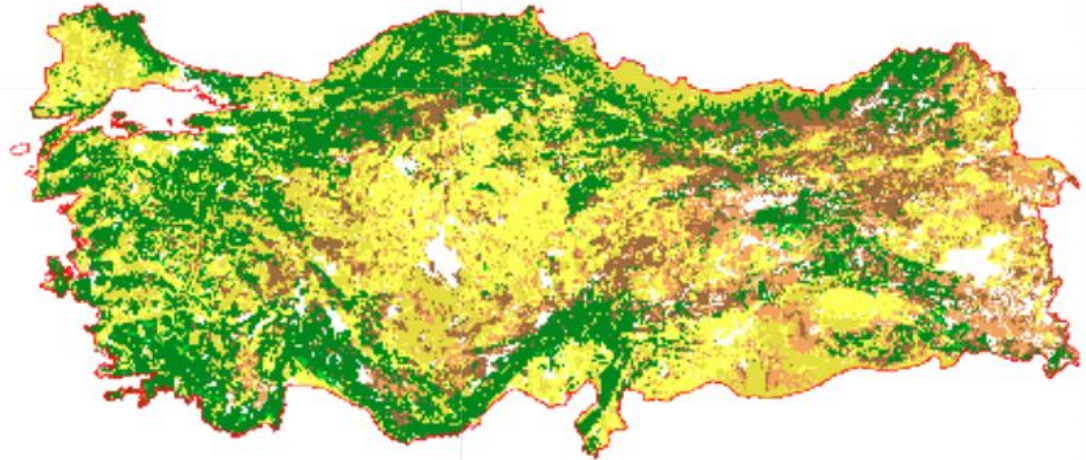



# LDN ACTION PLAN in the LDN DSS


## Suggested actions


No data


- Forest Conservation
- Forest Management
- Forest Rehabilitation
- Grassland Conservation
- Grassland Management
- Grassland Rehabilitation
- Cropland Conservation
- Cropland Management
- Cropland Rehabilitation



 Food and Agriculture  
Organization of the  
United Nations

 WOCAT  
World Overview of Conservation Approaches and Technologies


 REPÚBLICA DE PANAMÁ  
GOBIERNO NACIONAL

 MINISTERIO DE  
AMBIENTE

**Using national data and  
expert knowledge to map  
land degradation, to  
estimate SDG 15.3.1 and to  
report to UNCCD: successful  
stories from 6 countries**

16-Nov, 18:00 - 20:00  
Conference room: **MET - 10**

South-South Knowledge Exchange to achieve  
Land Degradation Neutrality (LDN)

 United Nations  
Convention to Combat  
Desertification

**CRIC 21, Samarkand, Uzbekistan, 2023**

More Information from  
the countries:

Come to the side event!

Today, at 18 hs, MET10



**THANK YOU!**