

GLOBAL MULTI-CRITERIA ASSESSMENT OF LAND DEGRADATION: THE FIRST STEP TO A LAND DEGRADATION NEUTRAL WORLD

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**A partnership of
Conservation International, NASA, and Lund University**

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Land degradation

*Land degradation is defined as the
**reduction or loss of the biological or
economic productivity and complexity of**
rain fed cropland, irrigated cropland, or
range, pasture, forest and woodlands*

Sustainable Development Goal (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”*

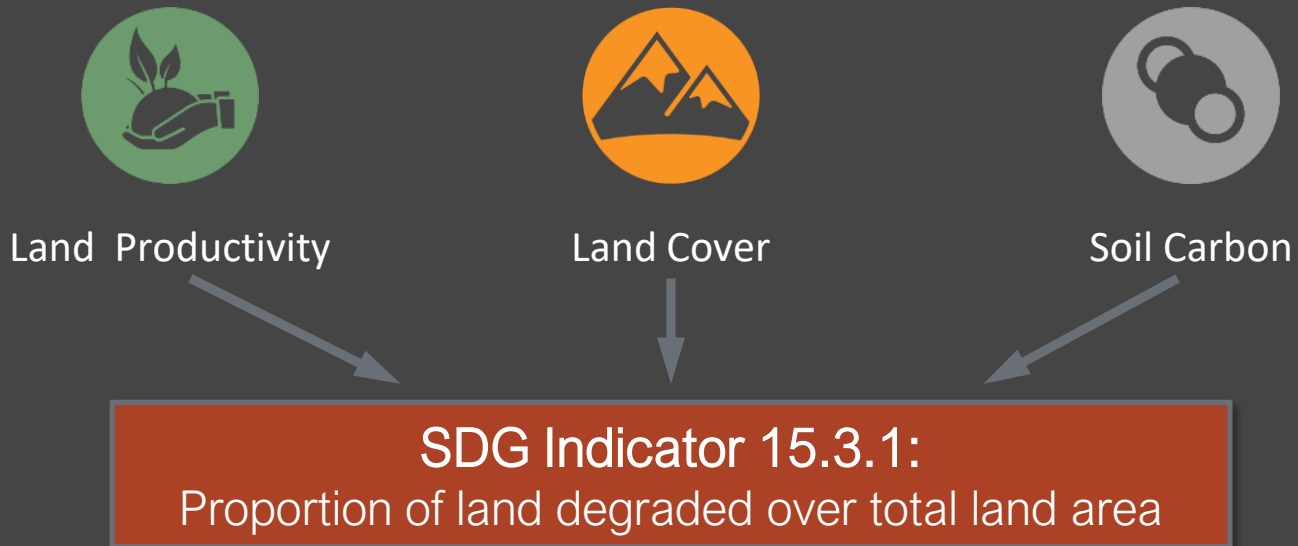




SDG indicator 15.3.1:

“proportion of land degraded over total land area”

Components of SDG Indicator 15.3.1



Some of the datasets we are using

NDVI

Sensor/Dataset	Temporal	Spatial	Extent	License
AVHRR/GIMMS	1982-2015	8 km	Global	Public Domain
MOD13Q1-coll6	2001-2016	250 m	Global	Public Domain

Soil moisture

Sensor/Dataset	Temporal	Spatial	Extent	License
MERRA 2	1980-2016	0.5° x 0.625°	Global	Public Domain
ERA I	1979-2016	0.75° x 0.75°	Global	Public Domain

Precipitation

Sensor/Dataset	Temporal	Spatial	Extent	License
GPCP v2.3 1 month	1979-2016	2.5° x 2.5°	Global	Public Domain
GPCC V7	1901-2016	1° x 1°	Global	Public Domain
CHIRPS	1981-2016	5 km	50N-50S	Public Domain
PERSIANN-CDR	1983-2015	25 km	60N-60S	Public Domain

Evapotranspiration

Sensor/Dataset	Temporal	Spatial	Extent	License
MOD16A2	2000-2014	1 km	Global	Public Domain

Land cover

Sensor/Dataset	Temporal	Spatial	Extent	License
ESA CCI Land Cover	1992-2015	300 m	Global	CC by-SA 3.0

Soil carbon

Sensor/Dataset	Temporal	Spatial	Extent	License
Soil Grids (ISRIC)	Present	250 m	Global	CC by-SA 4.0

Administrative Boundaries

Sensor/Dataset	Temporal	Spatial	Extent	License
Natural Earth Administrative Boundaries	Present	10/50m	Global	Public Domain

TRENDS.EARTH (QGIS plugin)

The screenshot shows the QGIS 2.18.15 interface with the Trends.Earth plugin toolbar highlighted in red. The toolbar includes icons for a wrench, calculator, tree, line graph, globe, and help. An Excel spreadsheet titled 'uganda_table.xlsx' is overlaid on the map, displaying a summary table for SDG 15.3.1 indicators. The table includes columns for Area (sq km) and Percent of total land area, with rows for Total land area, Land area improved, Land area stable, Land area degraded, and Land area with no data. A red banner across the table reads 'Summary of SDG 15.3.1 Indicator'. The spreadsheet also contains a disclaimer and contact information for Trends.Earth.

Summary of SDG 15.3.1 Indicator		
	Area (sq km)	Percent of total land area
Total land area:	204,548.3	100.00%
Land area improved:	55,585.7	27.17%
Land area stable:	98,038.5	47.93%
Land area degraded:	50,041.8	24.46%
Land area with no data:	882.3	0.43%

The boundaries, names, and designations used in this report do not imply official endorsement or acceptance by Conservation International Foundation, or its partner organizations and contributors. This report is available under the terms of Creative Commons Attribution 4.0 International License (CC BY 4.0).

For more information on Trends.Earth, see <http://trends.earth>, or contact the team at trends.earth@conservation.org.

Productivity indicators



Vegetation
Productivity

Trajectory

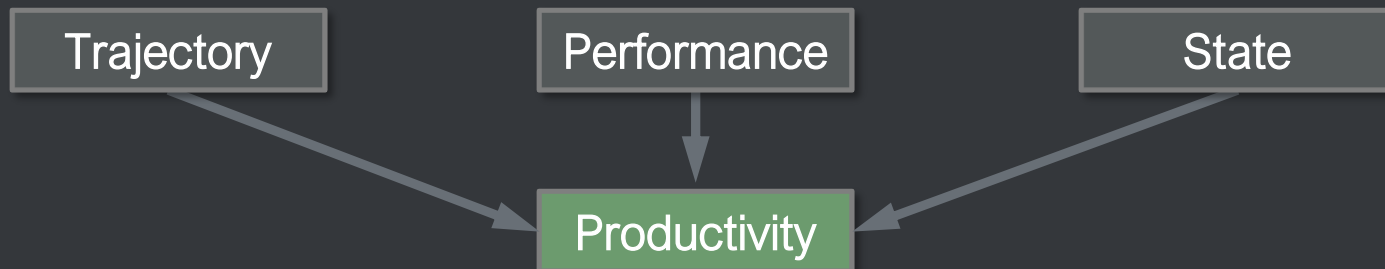
Measures the rate of change in primary productivity over time.

Performance

Compares present productivity relative to other similar vegetation types in similar land cover types or bioclimatic regions.

State

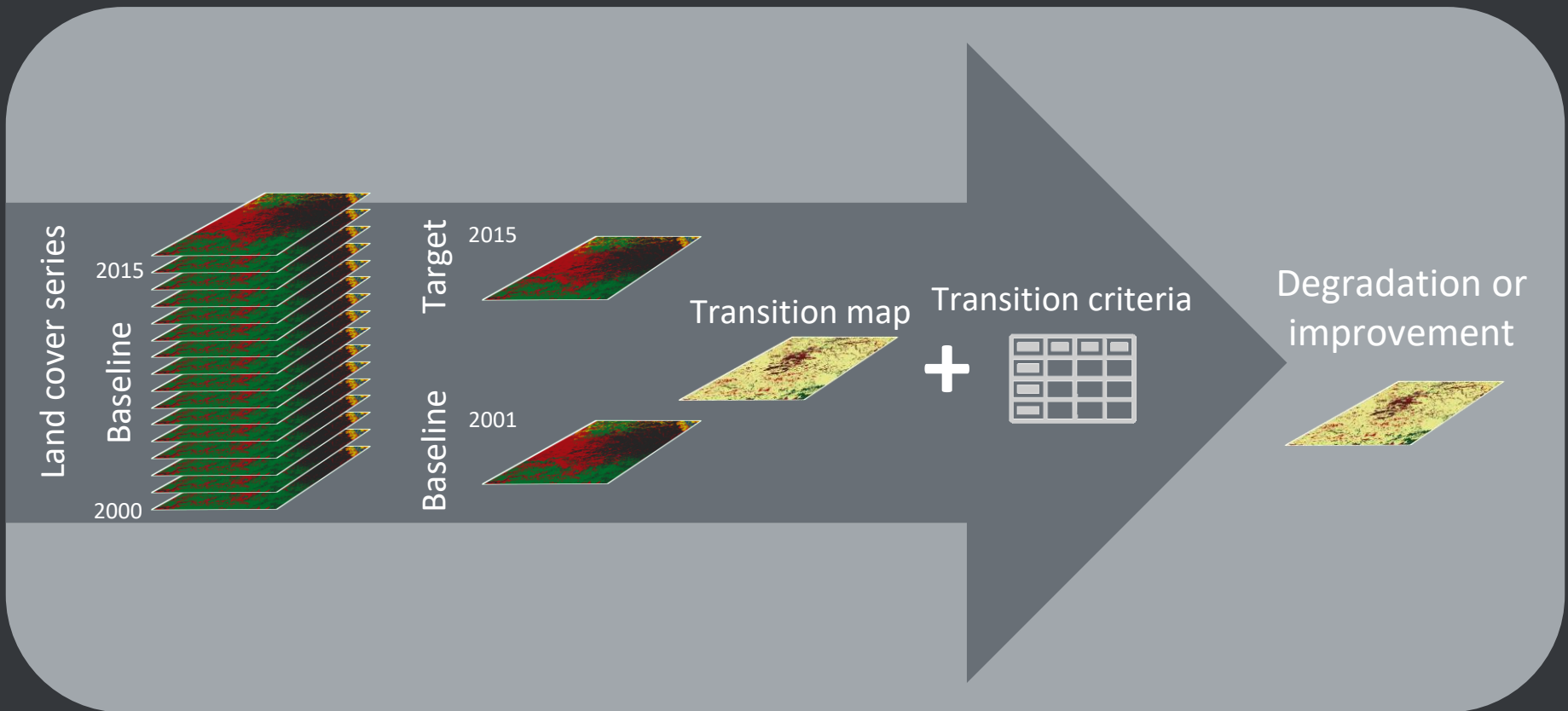
Compares the current productivity level to historical observations of productivity.



Land cover change



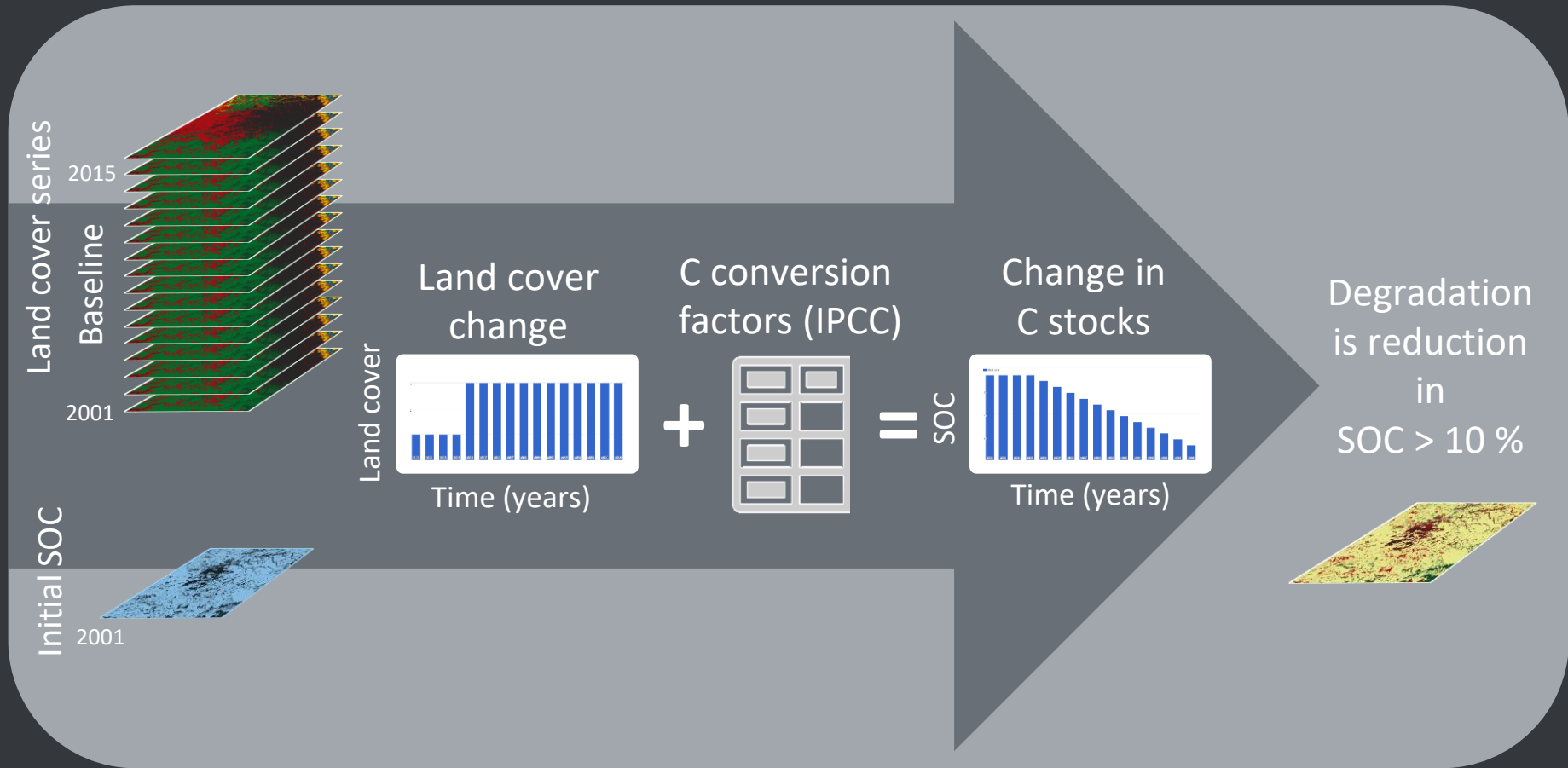
Land
Cover



Soil organic carbon (SOC) indicator



Soil Organic Carbon



Tabulating results

AutoSave On ETH_TE_Table.xlsx - Last Saved 6/18/2018 15:17 Alex Zvoleff

File Home Insert Draw Page Layout Formulas Data Review View Help Tell me what you want to do

Normal Page Break Page Custom Ruler Formula Bar Gridlines Headings Zoom 100% Zoom to Selection New Window Arrange All Freeze Panes Hide Synchronous Scrolling Switch Windows Macros

A3 Summary of change in productivity

Trends.Earth productivity summary table							TRENDS.EARTH tracking land change			
Summary of change in productivity										
					Area (sq km)	Percent of total land area				
				Total land area:	1,119,715.5	100.00%				
				Land area with improved productivity:	194,973.5	17.41%				
				Land area with stable productivity:	682,744.8	60.97%				
				Land area with degraded productivity:	241,452.1	21.56%				
				Land area with no data for productivity:	545.2	0.05%				
* For the SDG indicator, areas are considered to be improved if they have "Improving" productivity, to be stable if they have "stable" productivity, and to be "degraded" if they are classified as "stressed", in "moderate decline" or "declining".										
Area of land with improving productivity by type of land cover transition (sq. km)										
Land cover type in target year										
		Tree-covered areas	Grasslands	Croplands	Wetlands	Artificial areas	Other lands	Water bodies	Total:	
baseline year	Tree-covered areas	43,449.60	376.69	108.74	3.38	1.65	0.06	0.00	43,940.12	
	Grasslands	2,289.67	124,214.54	224.03	4.23	11.34	5.11	0.00	126,748.94	
	Croplands	568.47	68.20	20,866.01	2.15	8.86	0.08	0.18	21,515.02	

Ready SDG 15.3.1 Productivity Soil organic carbon Land cover UNCCD Reporting 149%

Tabulating results

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 Preview Layout Views Gridlines Headings Selection Window All Panes Unhide Reset Window Position Windows Macros

A3 Summary of change in land cover

Trends.Earth land cover summary table							TRENDS.EARTH tracking land change			
Summary of change in land cover										
						Area (sq km)	Percent of total land area			
Total land area:						1,119,715.5	100.00%			
Land area with improved land cover:						16,106.9	1.44%			
Land area with stable land cover:						1,099,277.4	98.17%			
Land area with degraded land cover:						4,331.2	0.39%			
Land area with no data for land cover:						0.0	0.00%			
Land cover change by cover class										
		Baseline area (sq. km)	Target area (sq. km)	Change in area (sq. km)	Change in area (percent)					
	Tree-covered areas	214,837.84	225,398.21	10,560.37	4.92%					
	Grasslands	631,179.18	622,187.69	-8,991.50	-1.42%					
	Croplands	199,875.46	198,529.36	-1,346.10	-0.67%					
	Wetlands	2,535.34	2,539.33	3.99	0.16%					
	Artificial Lands	400.76	878.78	478.02	119.16%					

Ready | SDG 15.3.1 | Productivity | Soil organic carbon | Land cover | UNCCD Reporting | 149%

Tabulating results

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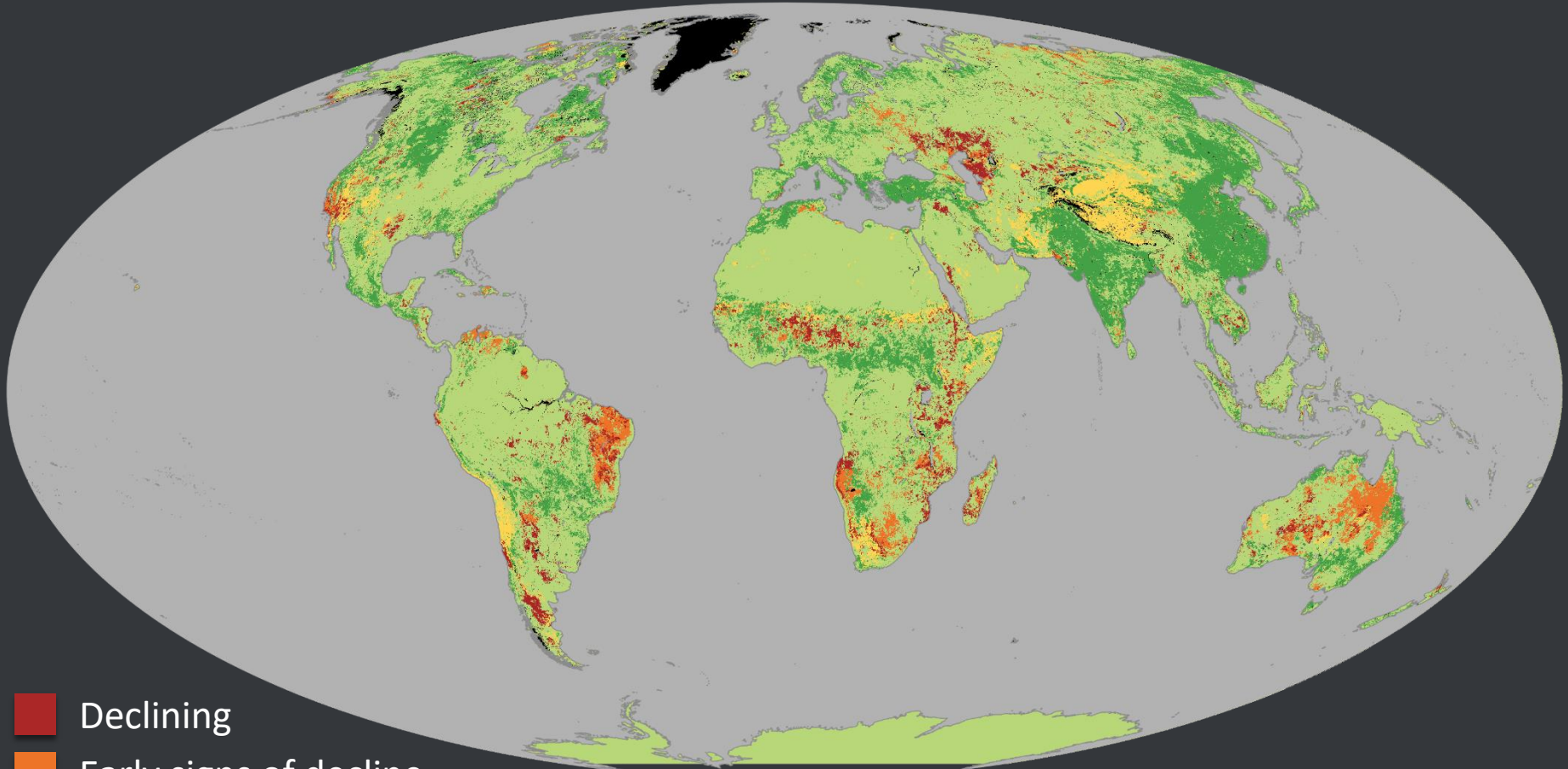
Normal Page Break Page Custom Ruler Formula Bar Zoom 100% Zoom to New Arrange Freeze Split View Side by Side Synchronous Scrolling Switch Macros Workbook Views Show Zoom Selection Window All Panes Unhide Reset Window Position Windows Macros

A3 Summary of change in soil organic carbon

	A	B	C	D	E	F	G	H	I	J	
1	Trends.Earth soil organic carbon summary table							TRENDS.EARTH tracking land change			
2											
3	Summary of change in soil organic carbon										
4						Area (sq km)	Percent of total land area				
5	Total land area:					1,119,715.5	100.00%				
6	Land area with improved soil organic carbon:					3,337.9	0.30%				
7	Land area with stable soil organic carbon:					1,113,565.7	99.45%				
8	Land area with degraded soil organic carbon:					2,563.2	0.23%				
9	Land area with no data for soil organic carbon:					248.8	0.02%				
10											
11	<i>Percent change in soil organic carbon storage from baseline to target:</i>						0.47%				
12											
13	Soil organic carbon change from baseline to target										
14											
15		Baseline soil organic carbon (tonnes / ha)	Target soil organic carbon (tonnes / ha)	Baseline area (sq. km)	Target area (sq. km)	Baseline soil organic carbon (tonnes)	Target soil organic carbon (tonnes)	Change in soil organic carbon (tonnes)	Change in soil organic carbon (percent)		
16	Tree-covered areas	84.04	84.01	214,833.86	225,384.93	1,805,532,712.39	1,893,504,974.86	87,972,262.47	4.87%		
17	Grasslands	51.90	51.87	631,153.45	622,163.08	3,275,674,882.62	3,227,305,171.49	-48,369,711.13	-1.48%		
18	Croplands	81.04	81.13	199,837.70	198,503.10	1,619,460,702.57	1,610,387,006.31	-9,073,696.25	-0.56%		

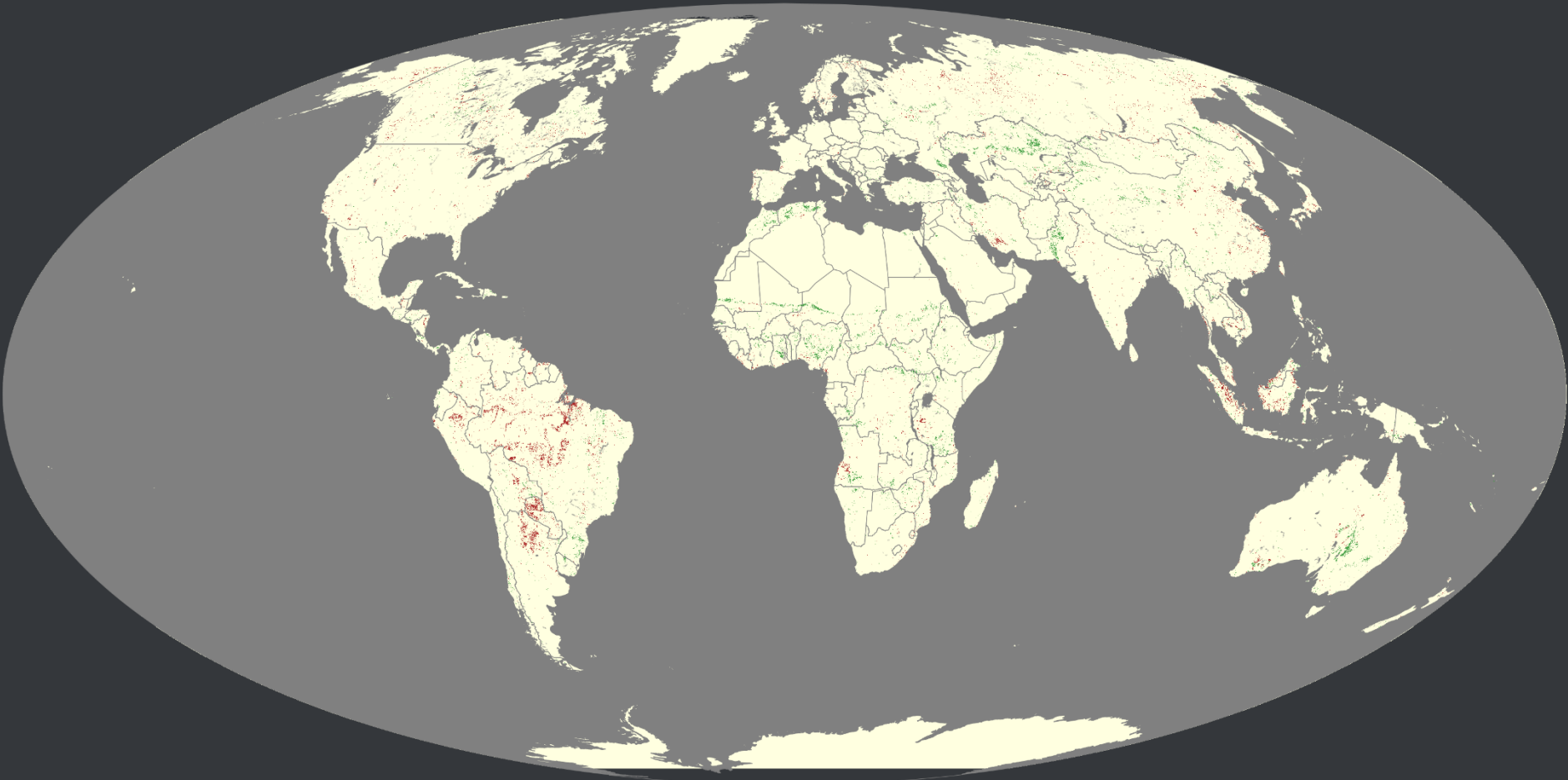
Ready SDG 15.3.1 Productivity Soil organic carbon Land cover UNCCD Reporting 149%




Productivity degradation (2001 – 2015)



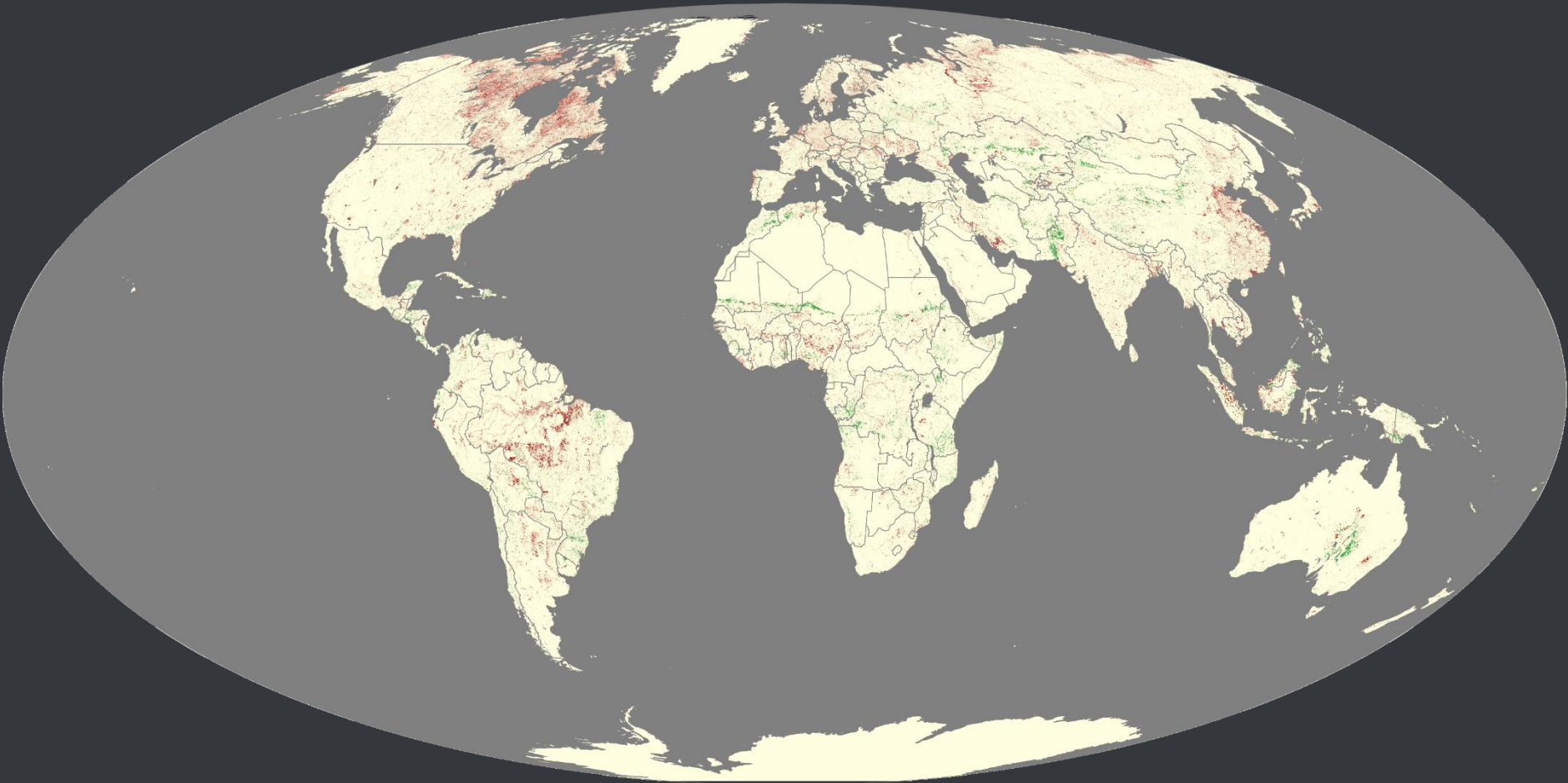
- Declining
- Early signs of decline
- Stable but stressed
- Stable
- Increasing




Land cover degradation (2001 – 2015)



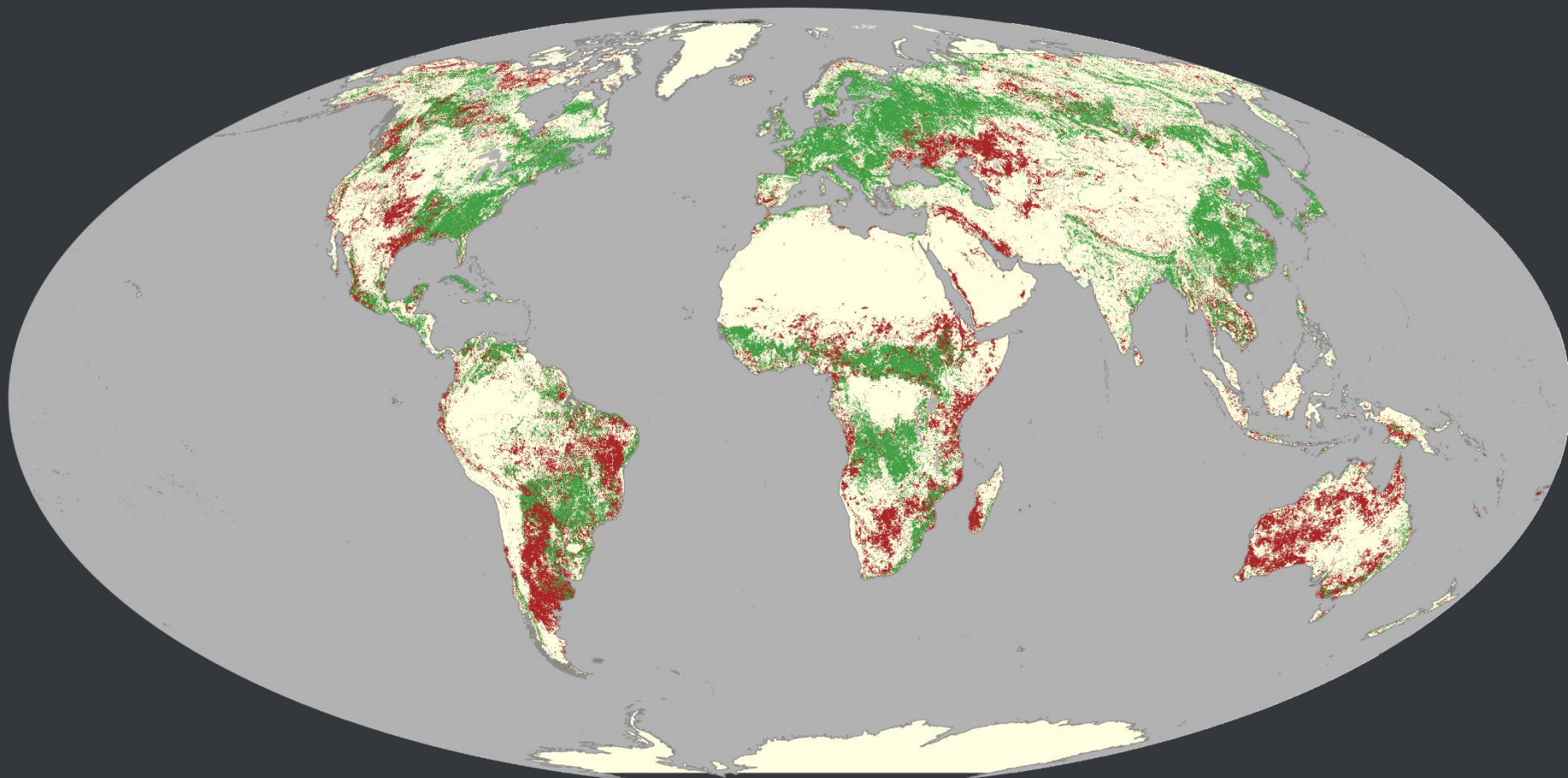
-  Degradation
-  Stable
-  Improvement

Soil organic carbon degradation (2001 – 2015)



-  Degradation
-  Stable
-  Improvement

SDG 15.3.1 indicator (2001 – 2015)



- Degradation
- Stable
- Improvement

Preliminary – do not quote

The impacts



United Nations
Convention to Combat
Desertification

- 3 project workshops
- 5 regional workshops with the UNCCD
- Over 700 users from 142 countries trained
- Over 800 users registered



Conclusions and Upcoming Work

Many global processes, players at work to support achievement of LDN – but continued need to connect these efforts to local data, knowledge

- Open data and software tools can support integration

- Capacity-development a key need

Support UNCCD and countries on LDN

Enhance tools for forest cover, biomass, and emissions



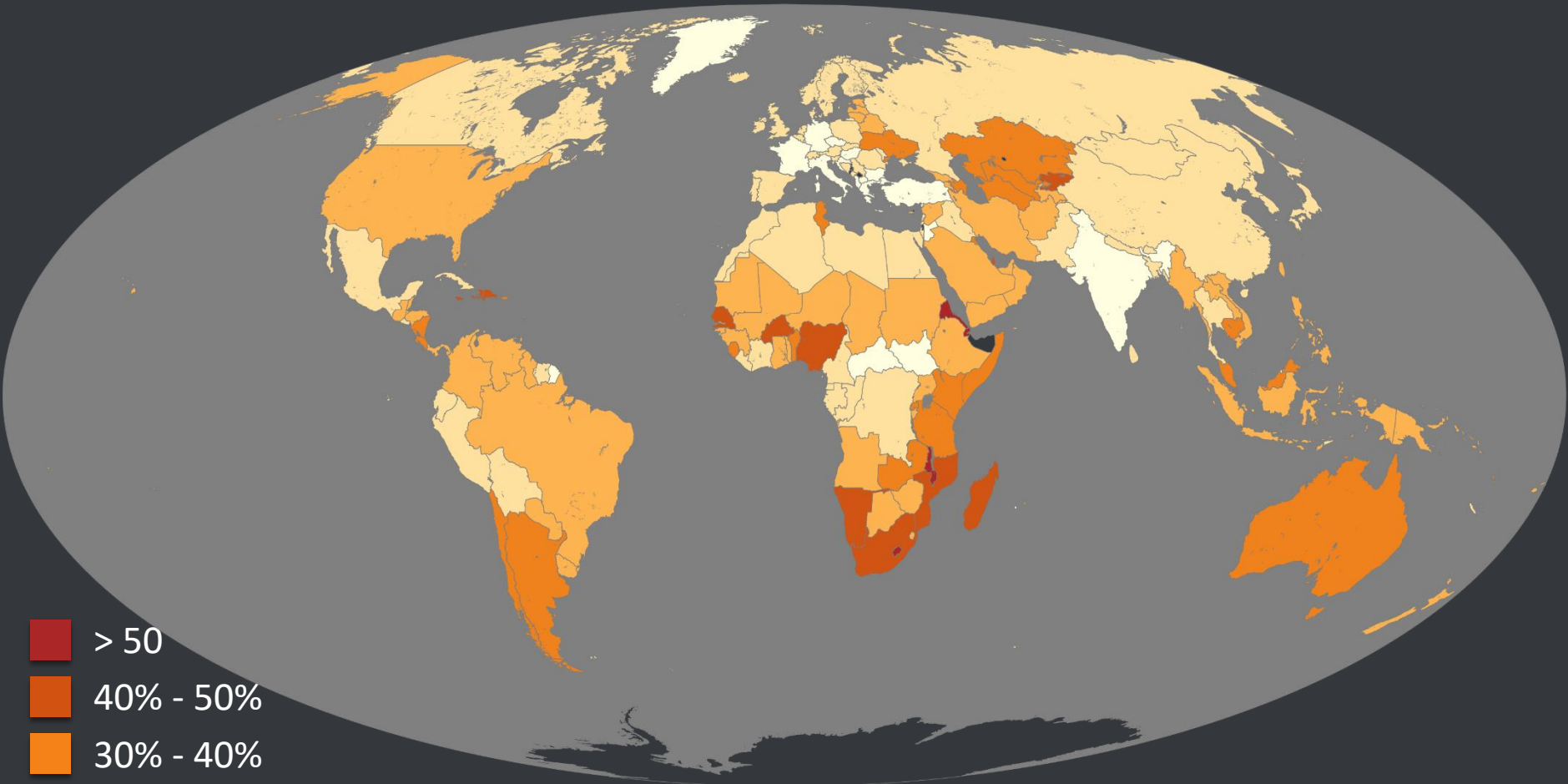
THANK YOU!!

Timothy Max Wright¹, Mariano Gonzalez Roglich¹, Alex Zvoleff¹, and
Monica Noon¹

¹Moore Center for Science, Conservation International

Photo by Alex Zvoleff

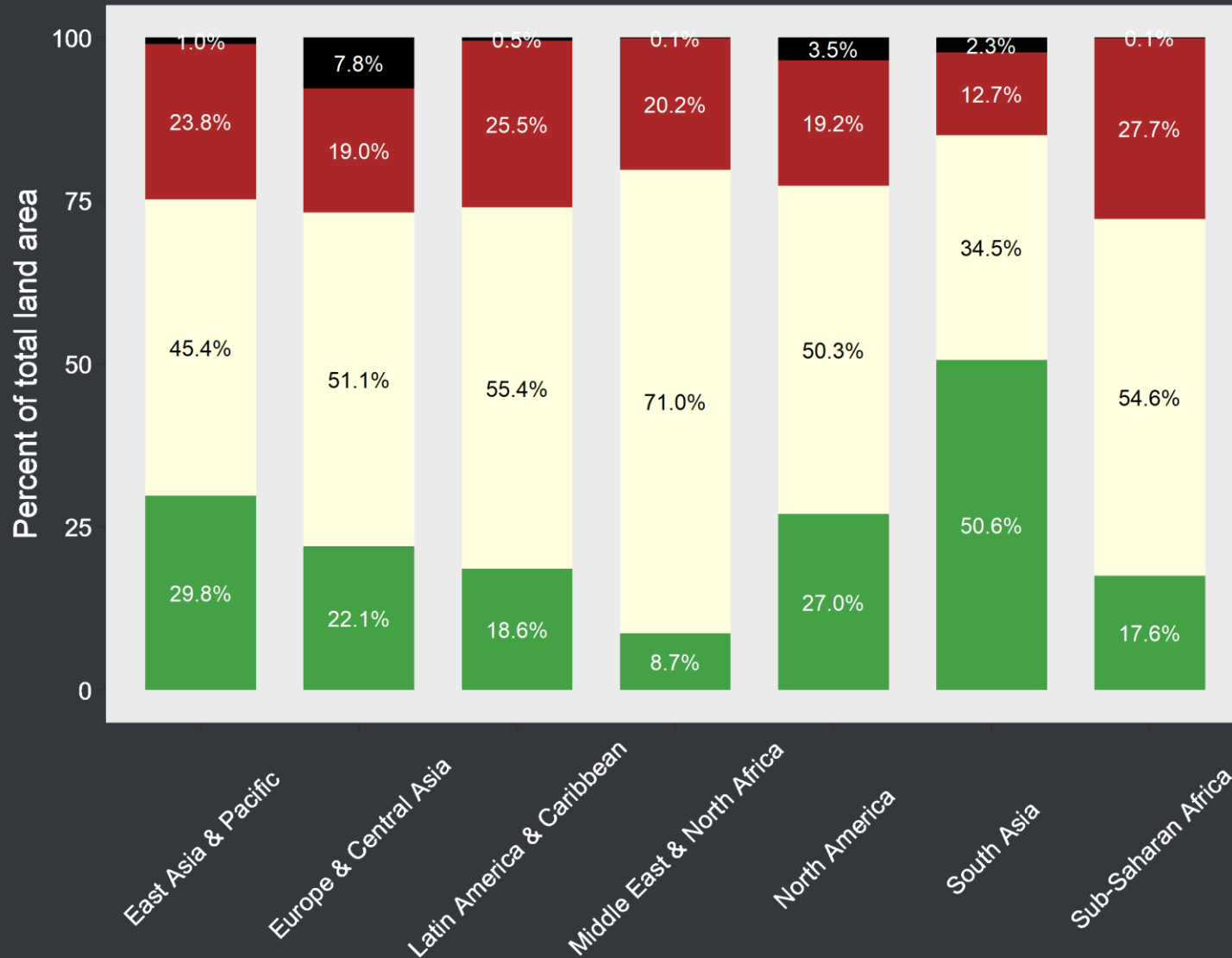
Percent land area degraded (2001 – 2015)



- > 50
- 40% - 50%
- 30% - 40%
- 20% - 30%
- 10% - 20%
- 0% - 10%

Preliminary – do not quote

Percent land area degraded (2001 – 2015)

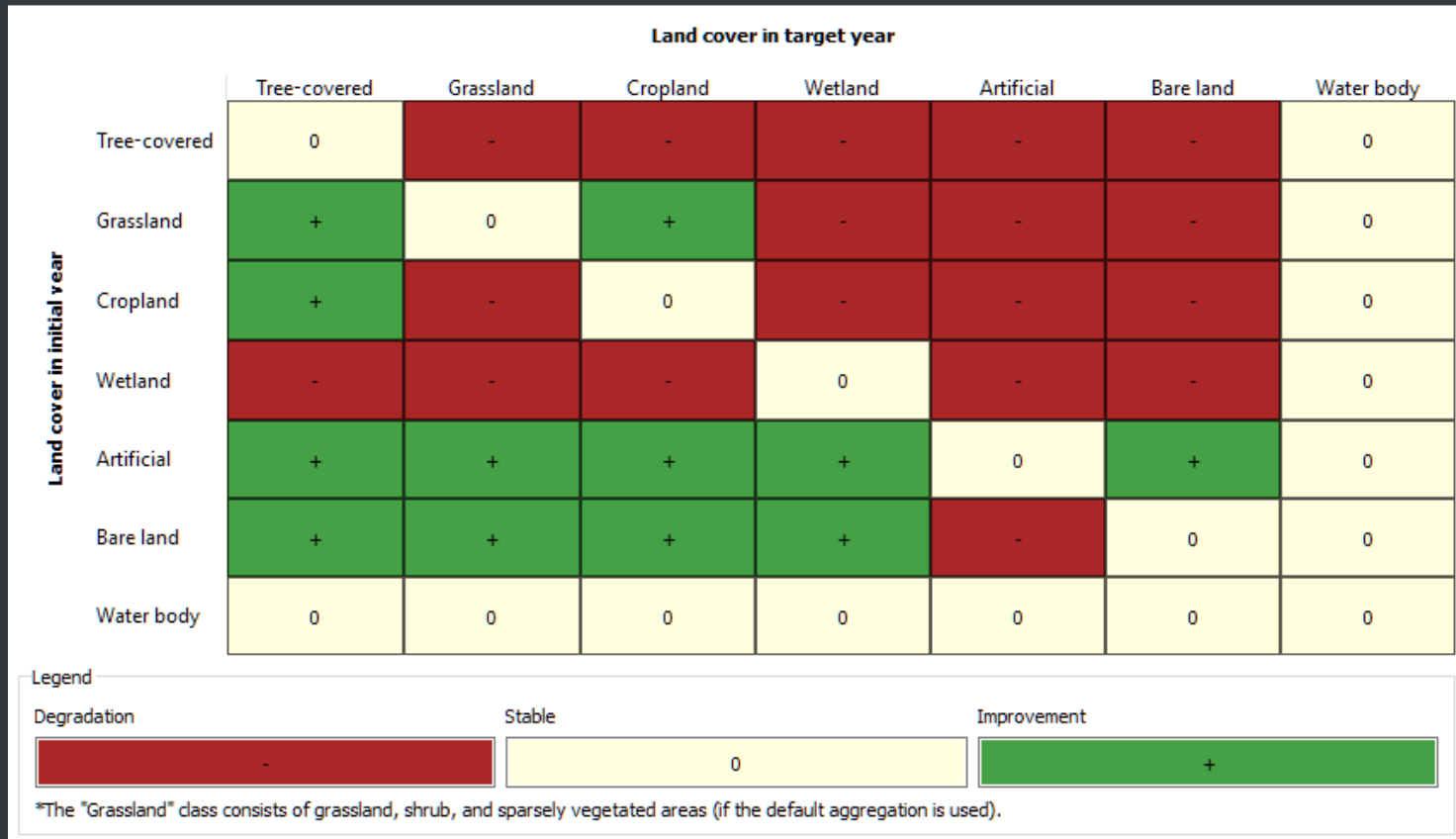


Preliminary – do not quote

Land cover change



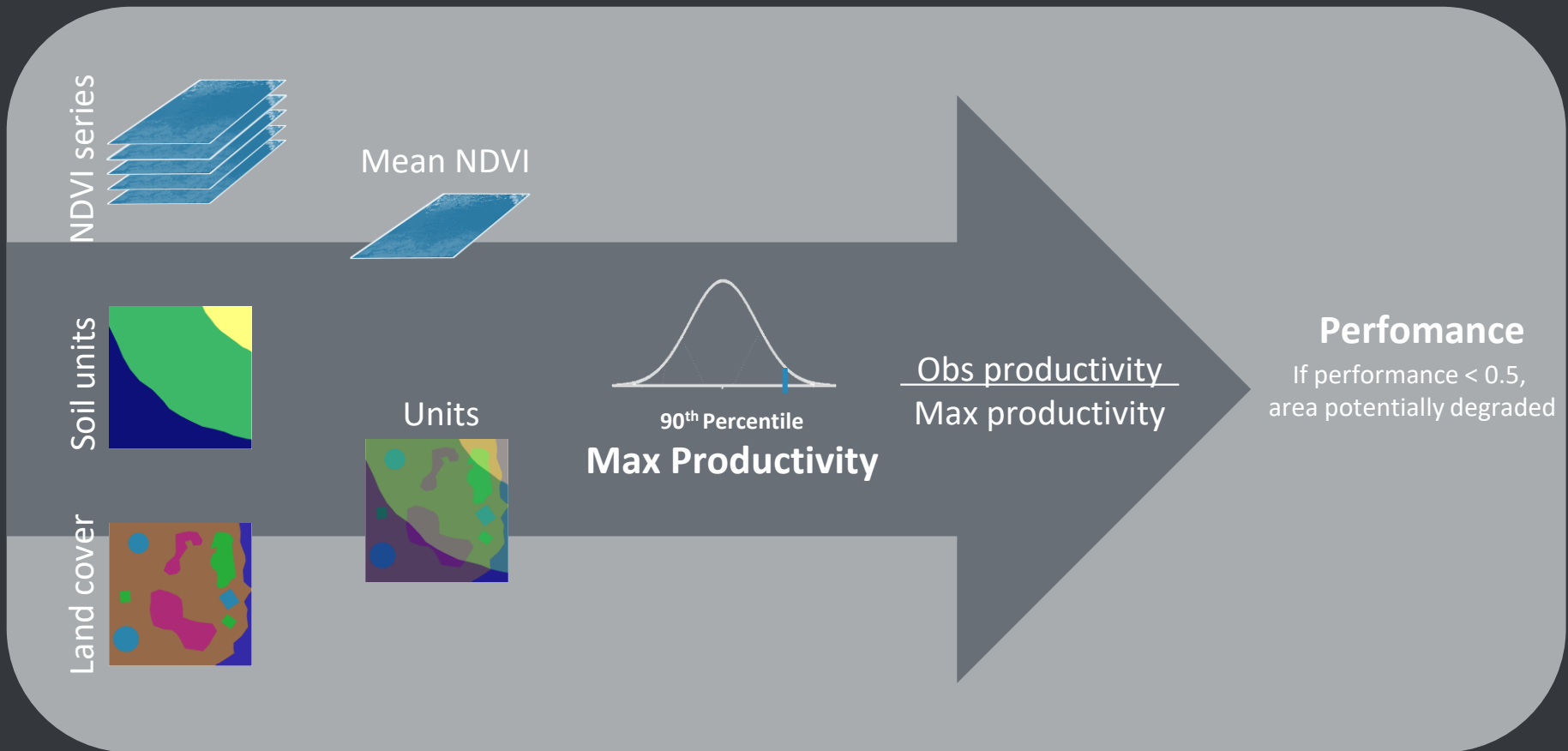
Land
Cover



Productivity indicators: Performance



Vegetation
Productivity

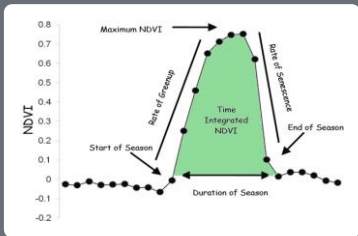


Productivity indicators: Trajectory



Vegetation
Productivity

Annual NDVI integrals

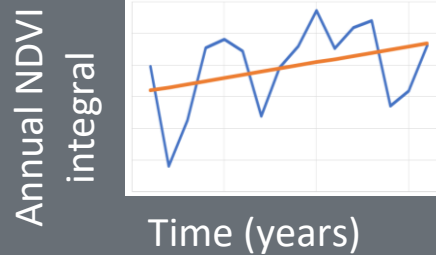


2015



2000

Linear regression
(Mann-Kendall significance test)

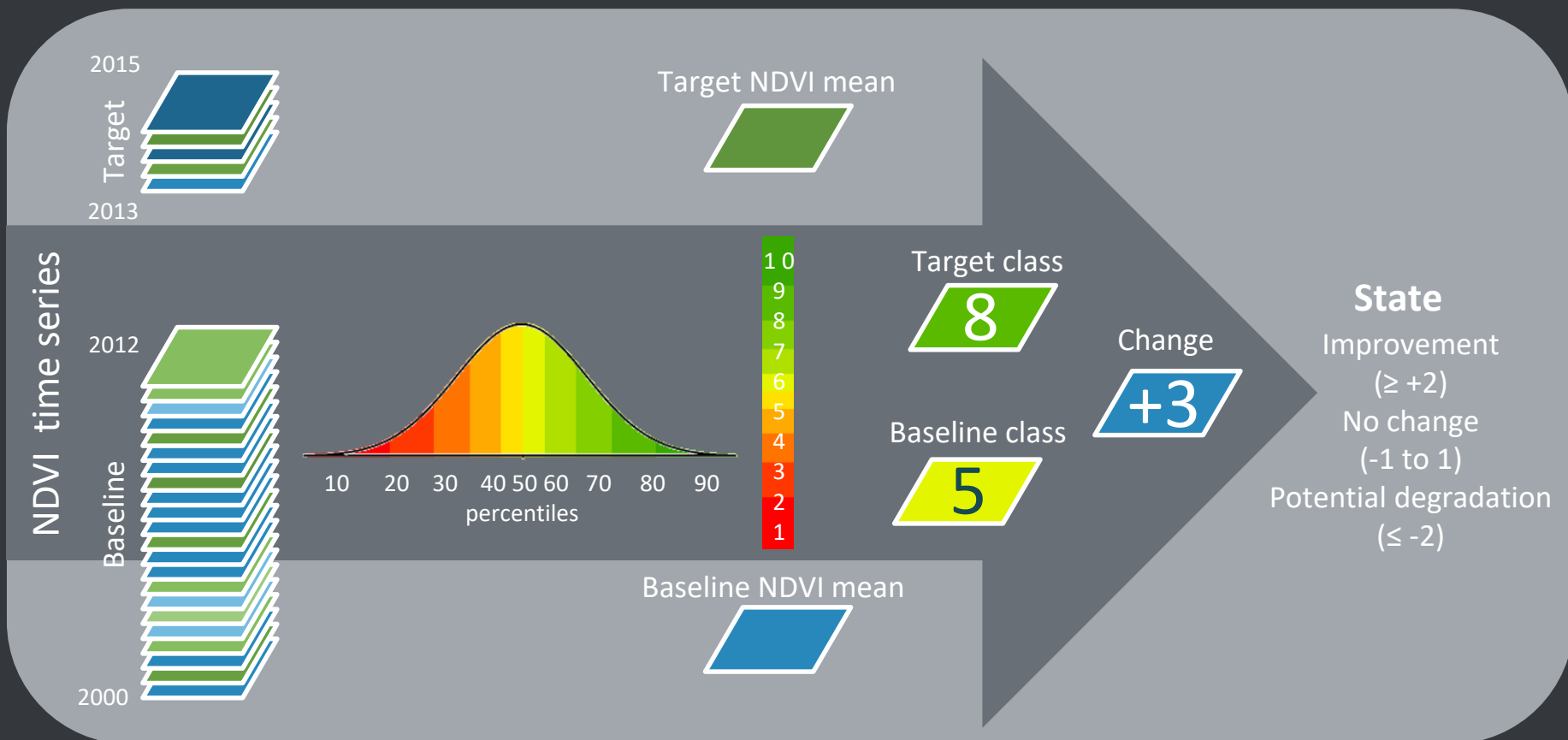


Improvement or
degradation
depending on
significance
of trends

Productivity indicators: State



Vegetation
Productivity



Combining the productivity sub-indicators

Trajectory	State	Performance	3 Classes	5 Classes
Improvement	Improvement	Stable	Improvement	Improving
Improvement	Improvement	Degradation	Improvement	Improving
Improvement	Stable	Stable	Improvement	Improving
Improvement	Stable	Degradation	Improvement	Improving
Improvement	Degradation	Stable	Improvement	Improving
Improvement	Degradation	Degradation	Degradation	Stable
Stable	Improvement	Stable	Stable	Stable
Stable	Improvement	Degradation	Stable	Stable
Stable	Stable	Stable	Stable	Stable
Stable	Stable	Degradation	Degradation	Stable but stressed
Stable	Degradation	Stable	Degradation	Early signs of decline
Stable	Degradation	Degradation	Degradation	Declining
Degradation	Improvement	Stable	Degradation	Declining
Degradation	Improvement	Degradation	Degradation	Declining
Degradation	Stable	Stable	Degradation	Declining
Degradation	Stable	Degradation	Degradation	Declining
Degradation	Degradation	Stable	Degradation	Declining
Degradation	Degradation	Degradation	Degradation	Declining

Combining the three primary indicators

Productivity	Land Cover	SOC	SDG 15.3.1
Improvement	Improvement	Improvement	Improvement
Improvement	Improvement	Stable	Improvement
Improvement	Improvement	Degradation	Degradation
Improvement	Stable	Improvement	Improvement
Improvement	Stable	Stable	Improvement
Improvement	Stable	Degradation	Degradation
Improvement	Degradation	Improvement	Degradation
Improvement	Degradation	Stable	Degradation
Improvement	Degradation	Degradation	Degradation
Stable	Improvement	Improvement	Improvement
Stable	Improvement	Stable	Improvement
Stable	Improvement	Degradation	Degradation
Stable	Stable	Improvement	Improvement
Stable	Stable	Stable	Stable
Stable	Stable	Degradation	Degradation
Stable	Degradation	Improvement	Degradation
Stable	Degradation	Stable	Degradation
Stable	Degradation	Degradation	Degradation
Degradation	Improvement	Improvement	Degradation
Degradation	Improvement	Stable	Degradation
Degradation	Improvement	Degradation	Degradation
Degradation	Stable	Improvement	Degradation
Degradation	Stable	Stable	Degradation
Degradation	Stable	Degradation	Degradation
Degradation	Degradation	Improvement	Degradation
Degradation	Degradation	Stable	Degradation
Degradation	Degradation	Degradation	Degradation