THE ECONOMICS OF LAND DEGRADATION

ELD CAMPUS

Module: Land degradation versus sustainable land management

In this module you will learn about:

- *Definition, dimension and causes of land degradation;*
- *Sustainable land management (SLM) practices;*
- *Barriers for SLM adoption and gender concerns;*
- *Instruments to incentivise SLM and necessary action on different levels;*
- *International policy framework of action against land degradation*
  - *The United Nations Convention to Combat Desertification (UNCCD)*
  - *The land degradation neutrality (LDN) policy framework, and*
  - *The UN Decade (2021-2030) on Ecosystem Restoration.*

If you want to deepen your know-how on land degradation and sustainable land management, further information is provided in the script on this module and links are provided at the end of this presentation.

Definitions

Land degradation

Defined by the United Nations as a reduction or loss of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland or range, pasture, forest, and woodland.

Soil degradation

Soil degradation is described by physical, chemical, and biological degradation processes acting upon the soil and impacting soil resources and environmental quality, as well as human well-being and livelihoods (FAO E-learning Centre 2019, glossary).

Dimension of land degradation

During the past decade, several studies and reports altered the perspective of society's perception of land degradation, i.e. the loss of soil productivity.

The ELD Value of Land report (2015) concludes that worldwide, **52% of land used for agriculture is moderately or severely affected by land and soil degradation**.

According to an IPBES (2018) report, more than **75% of the Earth's land areas are substantially degraded, undermining the well-being of 3.2 billion people.**

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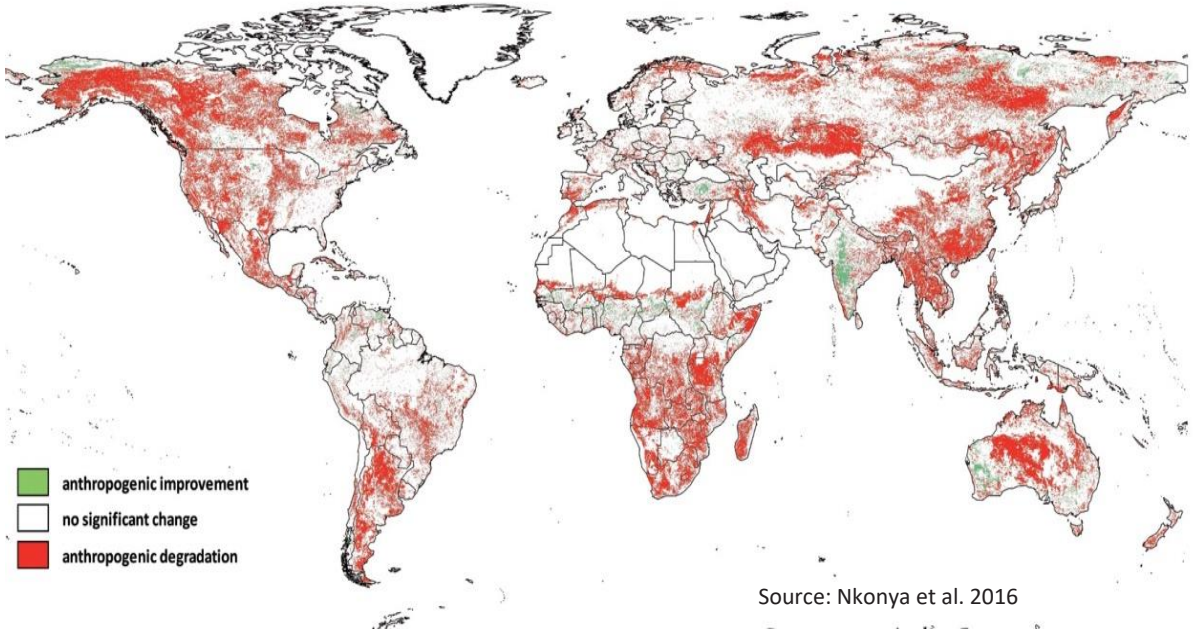
Loss of soil productivity

According to Nkonya et al. (2016), the total global area affected by declining soil productivity over the last 30 years globally is around ~30% (see map).

Over 10 million hectares of arable land worldwide are degrading every year- an area roughly 1/3 the size of Germany (Pimentel 1995). The UNCCD indicates a higher figure of 12 million ha/year.



Source: Nkonya et al. 2016

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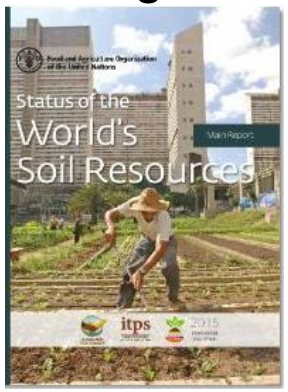
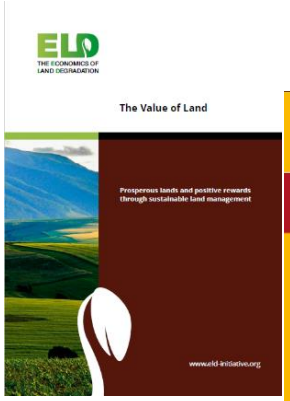
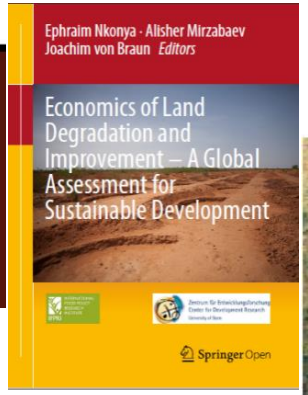
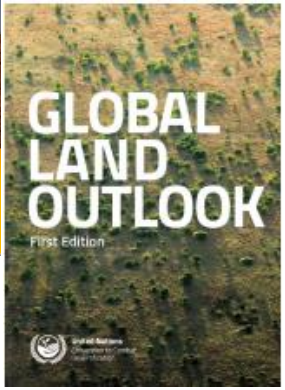
Recent studies on land degradation

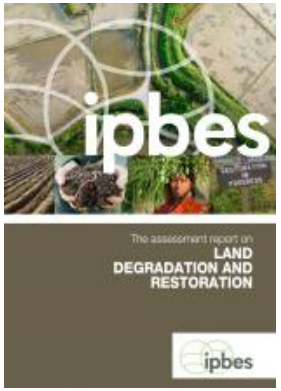
In the script, you will find more details on the reports and their findings.

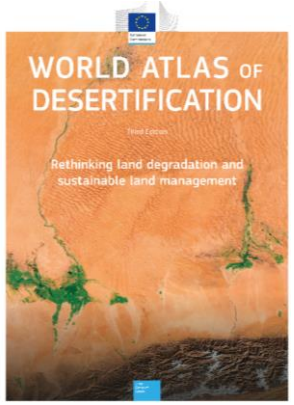












Causes of land degradation

According to IPBES 2018, the underlying drivers of land degradation are:

- **High and rising per capita consumption**, amplified by continued **population growth…**;
- the **high-consumption lifestyles** in most developed economies, combined with rising consumption in developing and emerging economies;
- Unsustainable levels of **agricultural expansion**, **natural resource and mineral extraction, and urbanisation**;
- The **growing demand for food, fodder, fuel, and raw materials….**

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Causes of land degradation

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Drivers related to land degradation

Driver	Proximate	Underlying	Natural	Anthropogenic
Topography	✔		✔	
Land Cover	✔		✔	✔
Climate	✔		✔	
Soil Erodibility	✔		✔	
Pest and Diseases	✔		✔	
Unsustainable Land Management	✔			✔
Infrastructure Development	✔			✔
Population Density		✔		
Market Access		✔		
Land Tenure		✔		
Poverty		✔		
Agricultural Extension Service Access		✔		
Decentralization		✔		
International Policies		✔		
Non-farm Employment		✔		

Source: ELD Initiative 2013, adapted from von Braun et al. 2013

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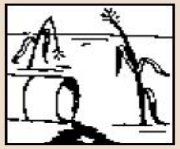
Categories of land degradation

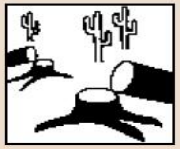

Soil erosion by water
(e.g. gully erosion, mass movements/ landslides, loss of topsoil/ surface erosion)


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, waterlogging)

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

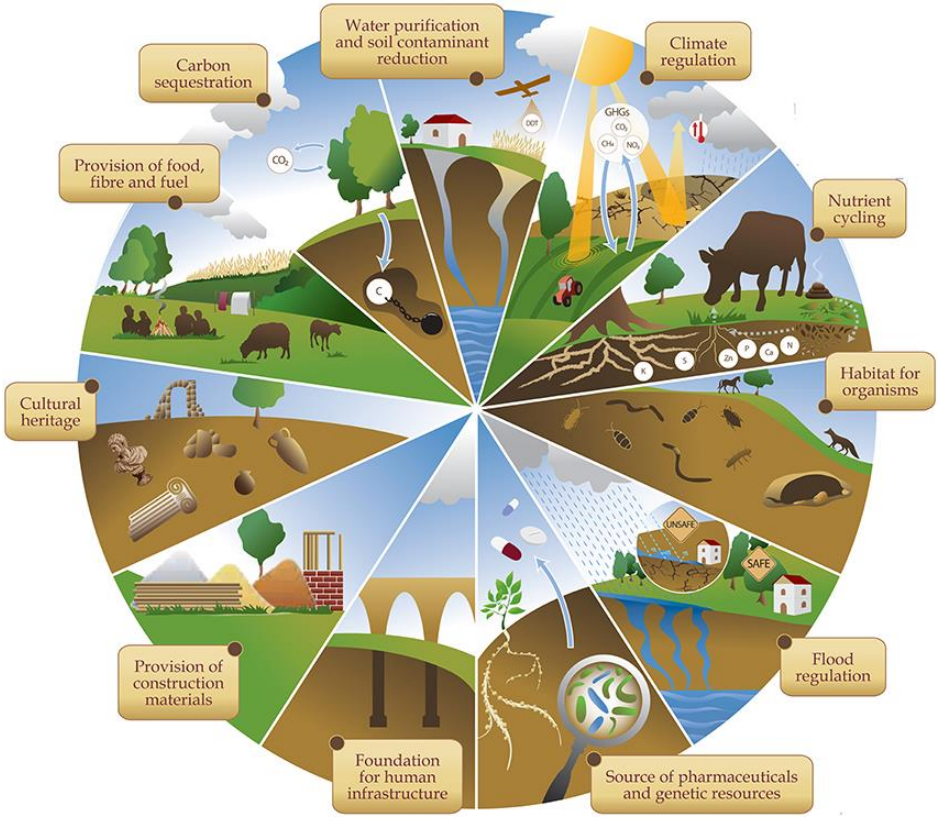

Water degradation
(e.g. change in quantity of surface water, decline of surface water quality)

Source: *Harari, N., Gavilano, A. and Liniger, HP.. 2017. Where people and their land are safer: A Compendium of Good Practices in Disaster Risk Reduction. Bern and Lucerne, Switzerland: Centre for Development and Environment (CDE), University of Bern, and Swiss NGO Disaster Risk Reduction (DRR) Platform, with Bern Open Publishing.*

Loss of environmental services

Land degradation negatively affects the provision of ecosystem services, for example

- water availability
- groundwater recharge
- productivity
- habitats/biodiversity
- carbon sequestration…



Source: http://www.fao.org/3/a-ax374e.pdf

Land degradation also negatively affects

- food security
- resilience to climate shocks

and it causes

- further negative environmental effects in the region and,
- finally, migration, hunger, poverty…

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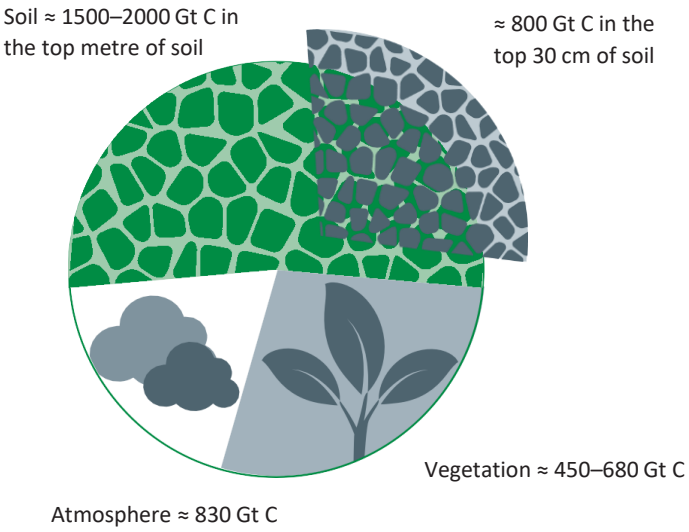
Acceleration of climate change

Land degradation is a major contributor to climate change, while climate change can exacerbate the impacts of land degradation and reduce the viability of some options for avoiding, reducing and reversing land degradation (IPBES 2018).

After the oceans, soils act as biggest carbon sink in the biosphere! (more than the atmosphere + the earth's vegetation combined)



All the greenhouse gas emissions generated by human activity could be offset by an annual increase of 0.4% in the global amount of soil carbon (*Idea of the 4per1000-Initiative*)

Source (adapted from): https://knowledge.unccd.int/sites/default/files/2018-09/2015_PolicyBrief_SPI_ENG_0_0.pdf

Sustainable land management (SLM) practices

SLM is a solution to halt and reverse the above-mentioned degradation trends.

- SLM practices are those that serve to **maintain ecological resilience and the stability of ecosystem services**…
- SLM does not refer to a single method or practice, but is rather a **portfolio of possible technologies, practices, and approaches** to land management…
- SLM involves all relevant and affected stakeholders and their needs in a participatory manner.

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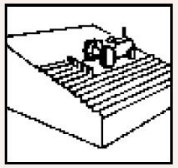
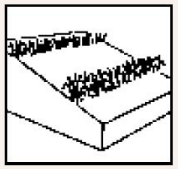
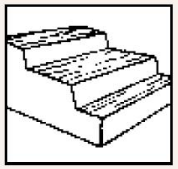
Categories of sustainable land management

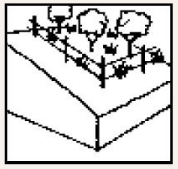
agronomic measures
- are associated with annual crops
- are repeated routinely each season or in a rotational sequence
- are of short duration and not permanent

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

You can find more details on these measures in the script!

Source: *Harari, N., Gavilano, A. and Liniger, HP. (2017) where people and their land are safer: A Compendium of Good Practices in Disaster Risk Reduction. Bern and Lucerne, Switzerland: Centre for Development and Environment (CDE), University of Bern, and Swiss NGO Disaster Risk Reduction (DRR) Platform, with Bern Open Publishing*

Benefits of SLM

SLM have proven positive socio-economic, ecological, economic and institutional benefits, for instance:

- Higher crop yields, diversification; high-value market produce;
- Increased household income;
- Improved soil health and biodiversity;
- Increased water holding capacity and groundwater recharge;
- Increased soil organic matter / less erosion;
- Improved resilience to CC/extreme weather events;
- Higher carbon storage;
- Improved organisational structures / local governance systems…

Learn more about the benefits of SLM in the script!

Barriers for SLM adoption

Even though beneficial, there are limiting factors for SLM:

- Many SLM practices are investment or labour-intensive (terracing, stone lines, water spreading weirs, etc.)
- Economic returns are not always achieved immediately, but in the medium-/ long-term
- Agricultural service providers and extension often focus on short-term gains and neglect sustainable soil and resources management
  → lack of know-how
- Weak tenure security and limited access to finances, inputs and machinery
- Social and cultural barriers to innovations

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Gender dimension

- Less than 15% of agricultural land is held by women globally.
- Many lack or are denied rights to the land. This discourages women from investing time into sustainable practices for land.
- Integrating gender aspects in the planning, design, implementation, and evaluation of projects and investments in SLM is thus very important.
- The ultimate goal should be to **reduce gender inequalities** and ensure that men and women can equally benefit from any intervention.

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Instruments to incentivise SLM

Unfortunately, a lot of disincentives (adverse incentives) that prevent or divert investment from SLM exist until today, so that a **change of framework conditions** is needed.

Positive incentives shall catalyse a large-scale and enduring adoption of soil protection measures and sustainable agricultural practices

They should ideally be effective beyond the immediate intervention area of government or donor-funded projects.

Only a certain **combination of different instruments** might create an enabling environment, for example formal (policy), informal (social), technical (know-how transfer) and/or private sector instruments (access to inputs, etc.).

Necessary action to promote SLM (local level)

- **Ensure access to land** (incl. young entrepreneurs and women)
- Facilitate the definition and implementation of **locally accepted regulations** for the use of land and natural resources
- **Put SLM high on the local agendas** / include SLM into budgets
- Increase **awareness** on environmental issues
- Encourage farmer-to-farmer visits and **local prizes and awards for SLM**
- Provide effective, accessible **extension services** and knowledge transfer
- Enhance **community collaboration** to reduce labour intensity
- Conduct **participatory land use planning** and harmonise inter-sectoral planning

Necessary action to promote SLM (national level)

- Ensure **tenure security**/legal rights
- Create a favouring **regulatory framework**, incl. standards and guidelines and the possibility to conclude informal user agreements
- Facilitate access to **finance and/or incentives** (for example credits, subsidies, inputs, carbon credits, payment for environmental services, grant schemes, taxing privileges)
- Increase **awareness** (through mass media)
- Set-up effective and accessible **extension services** and know-how transfer (re-education of extension workers, farmer-to-farmer, ICT, soil testing, etc.)

Necessary action to promote SLM (national level)

- Provide **risk insurance** (for example conversion/retention premiums, insurances, etc.)
- Improve **market infrastructure and access**, i.e. for ecological labelling/bio-markets
- Improve **access to machinery / improved community collaboration** to reduce labour intensity; food for work/cash for work schemes
- **Reduce perverse and adverse incentives** = review fertiliser subsidies, harmonise inter-sectoral planning, etc.

You can find more details on suitable (policy) instruments for SLM promotion and upscaling in the script!

Necessary action to promote SLM (international level)

On the international level, the following can be done by policy makers to promote sustainable land management:

- Put land degradation higher on the (cross-sectoral) **political agendas**
- Link **climate adaptation and mitigation with SLM**
- **Adapt trade conditions and eliminate perverse subsidies** in the agricultural sector which promote unsustainable land use
- **Change the way economic accounting is done** / valuate ecosystem services within plans and strategies (=Natural Capital Accounting)
- Open up **more funding mechanisms for SLM**, by including SLM into payment for environmental services schemes and climate funds (i.e. Green Climate Fund)

Land degradation neutrality (LDN)

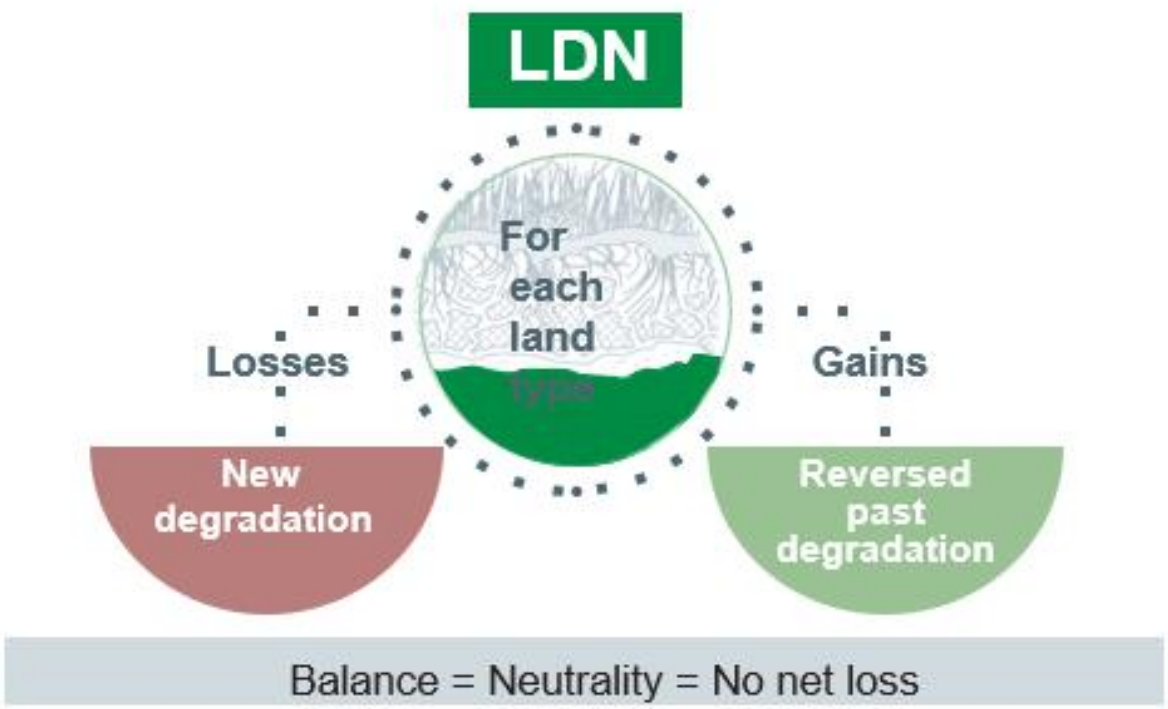
Based on SDG 15.3, 121 countries have meanwhile set themselves voluntary targets to stop and reverse land degradation….

SDG 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 (LDN)***

"A state whereby the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems."

Land degradation neutrality framework

LDN means no net loss of healthy land.
„Neutrality“ implies that degradation processes cannot be stopped completely, but counteracted by restoration of degraded land to achieve a **net balance**.



Source: UNCCD 2017. The Global Land Outlook (layout modified)

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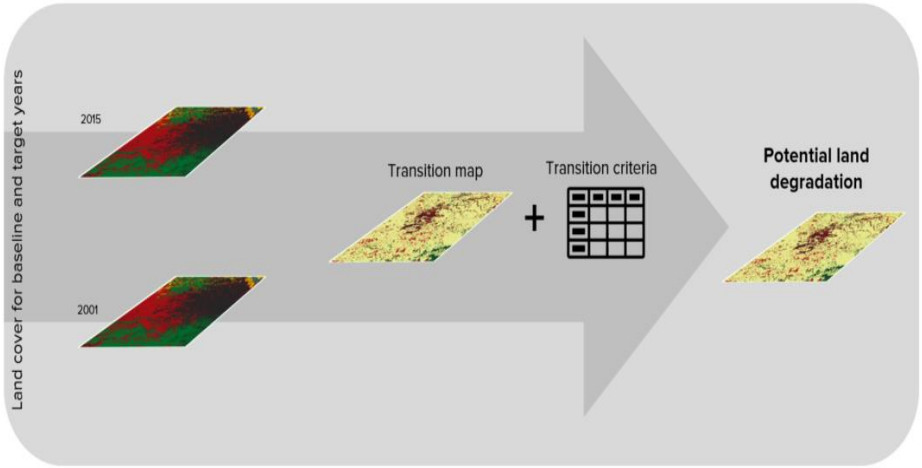
Monitoring of land degradation

Indicators to measure land degradation:

- Land cover
- Land productivity
- Soil carbon stocks



Source: http://trends.earth/docs/en/background/understanding_indicators.html

Degradation occurs when

a. negative land cover change occurs, and/or
b. the net primary production (NPP) decreases significantly and/or
c. the soil carbon (SOC) decreases significantly.

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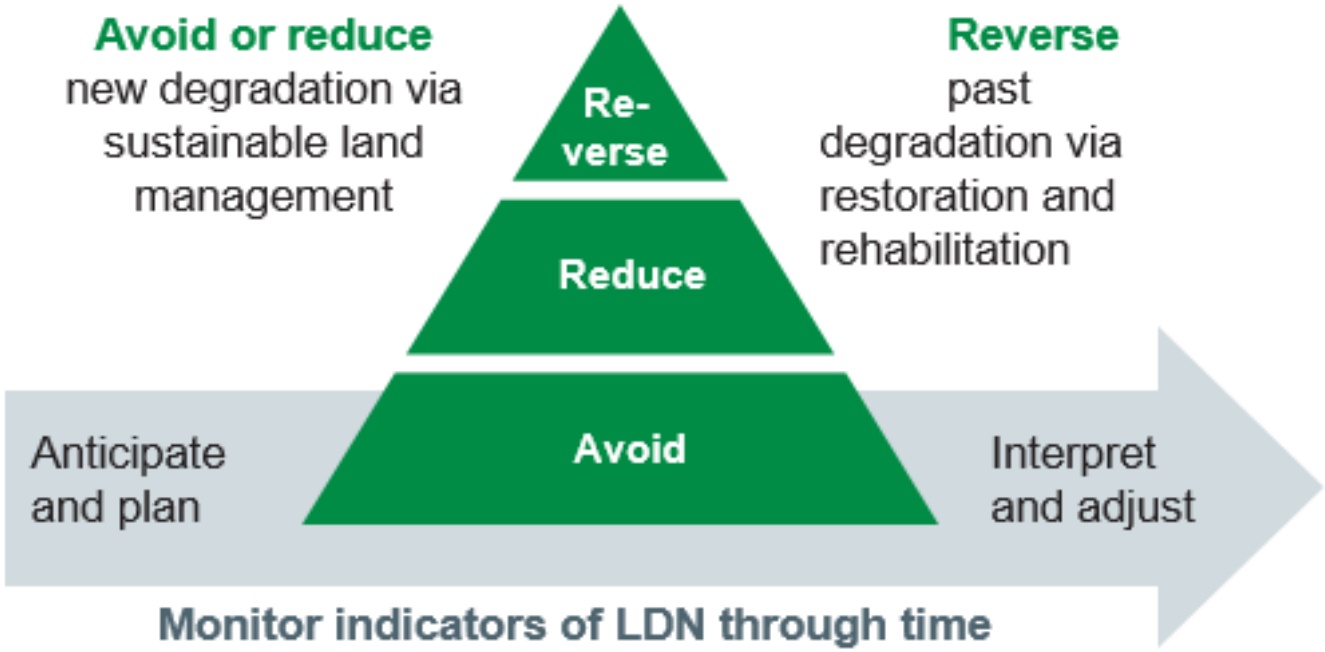
LDN response hierarchy



Source: UNCCD 2017. The Global Land Outlook (layout modified)

It is to be noted that prevention (avoid) measures are usually less costly than reduction or restauration measures!

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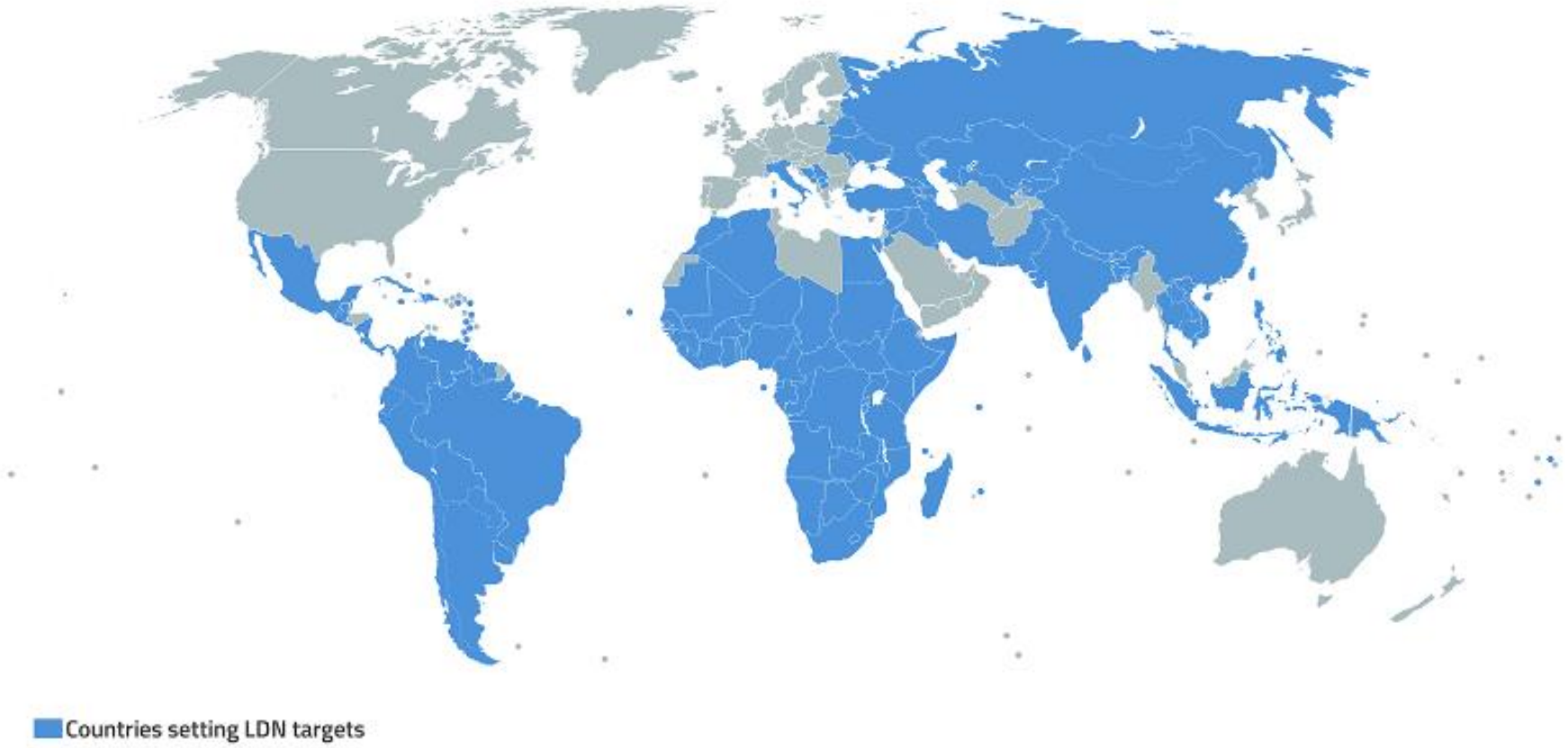
121 countries already set their LDN targets



Source: https://www.unccd.int/actions/ldn-target-setting-programme

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Areas of action – The LDN Target Setting Programme (by UNCCD & The Global Mechanism)

Source: UNCCD 2017. The Global Land Outlook (supplemented)

UN Decade of Ecosystem Restoration

In March 2019, the UN General Assembly adopted a declaration on the UN Decade (2021-2030) on Ecosystem Restoration.

The declaration stresses

> "*the importance of the ecosystem approach for the integrated management of land, water and living resources and the need to step up efforts to tackle desertification, land degradation, erosion and drought, biodiversity loss and water scarcity, which are seen as major environmental, economic and social challenges for global sustainable development*".

It furthermore recognises the important linkages between climate change, biodiversity diversity and land use and highlights the importance of SDG 15.

All UN Member States are encouraged to:

- **foster political will**, the mobilisation of resources, capacity-building, scientific research and cooperation and momentum for ecosystem restoration….;
- **mainstream ecosystem restoration into policies and plans …**, thereby creating opportunities for ecosystems to increase their adaptive capacity and opportunities to maintain and improve livelihoods for all;
- **develop and implement policies and plans to prevent ecosystem degradation**…;
- build on and reinforce existing restoration initiatives in order to scale up good practices…

Further information and reading:

Script for this module

Further resources:

The Status of the World's Soil Resources Report (FAO, 2015)

The Value of Land (ELD Initiative, 2015)

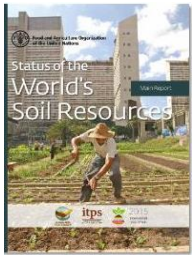
Economics of Land Degradation and Improvement (Nkonya et al., 2016)

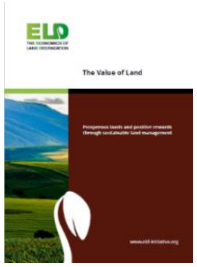
Global Land Outlook (UNCCD, 2017)

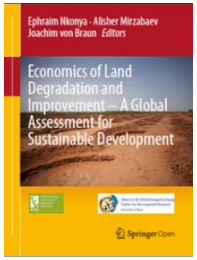
Assessment Report on Land Degradation and Restoration (IPBES, 2018)

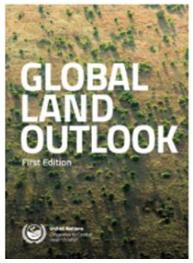
World Atlas of Desertification (JRC, 2018)

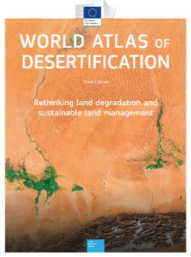
IPCC report – Climate Change and Land (IPCC, 2019)

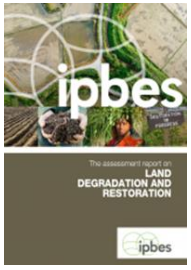












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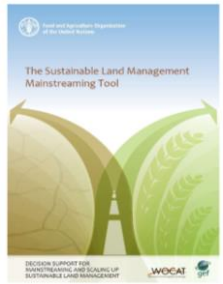
Further information and reading:

Further information:

SLM Mainstreaming Tool (WOCAT)



Video on desertification (UNCCD, 2011)
Video on LDN (UNCCD, 2015)

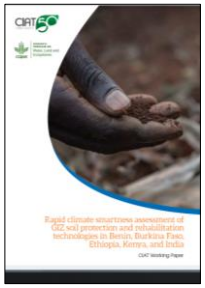
United Nations Convention to Combat Desertification

Video on LDN (BMZ, 2019)
Video on Land for life- India (UNCCD, 2014)

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Sustainable land management for upscaled climate action (GIZ, 2018)
Potentials for Greenhouse Gas Mitigation in Agriculture (GIZ, 2018)

Rapid climate smartness assessment of GIZ soil protection and rehabilitation technologies in Benin, Burkina Faso, Ethiopia, Kenya, and India (CIAT, 2017)



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