25 YEARS

United Nations
Convention to Combat
Desertification

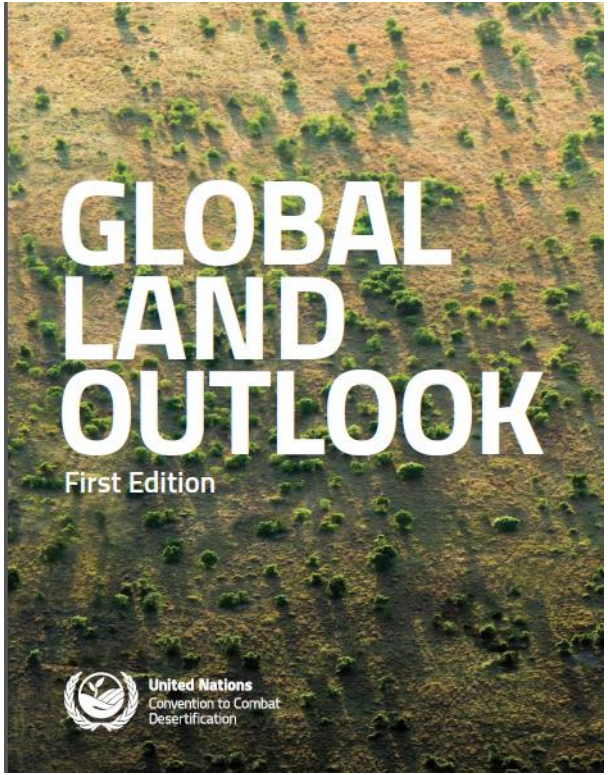
Land use change and drivers of degradation: Global developments and implications for conservation

Barron Joseph Orr, Lead Scientist

World Wildlife Fund
Magnus-Haus Berlin
4 June 2019

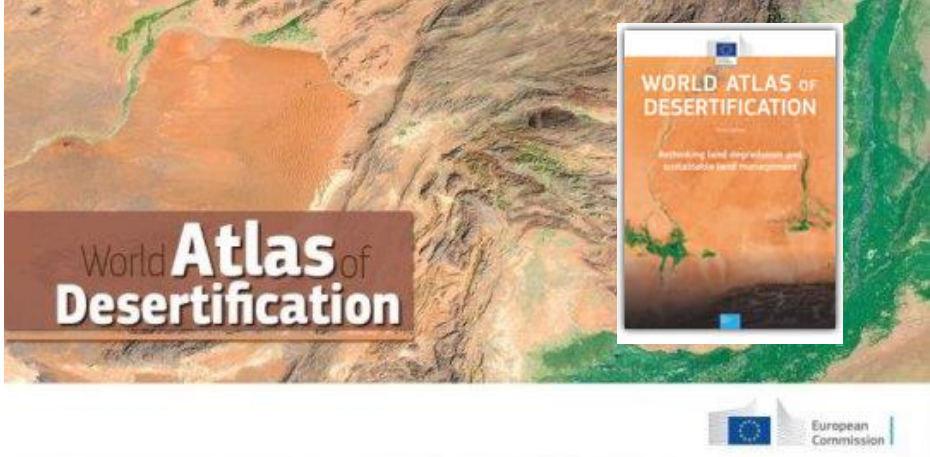
Barriers to achieving Agenda 2030:

- **Land is finite** in quantity. Competing demands for its goods and services are increasing pressures on land resources in virtually every country.
- **Over 1.3 billion people trapped** on degrading agricultural land
- **Land transformation** in **rural areas** is **unprecedented** in terms of both speed and scale
- **70 per cent of agricultural land** is now used to grow **feed crops and livestock production**
- **Consumption** of natural resources **doubled in 30 years**
- **3 planets to meet 2050 natural resource demands**



https://www.unccd.int/actions/global-land-outlook-glo

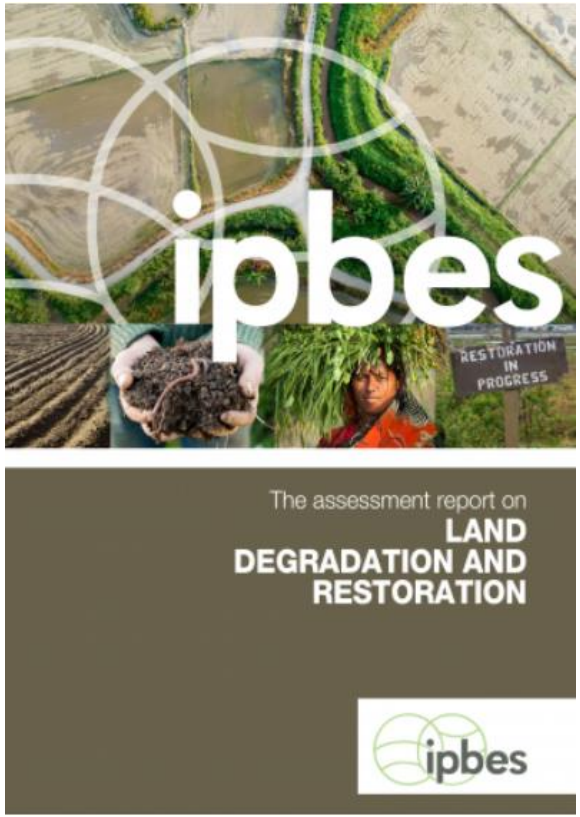
Barriers to achieving Agenda 2030:



- Between **1998-2013**, **20-30 per cent of Earth's vegetated land surface** showed persistent declining trends in productivity: 20% of cropland, 16% forest land, 19% grassland, and 27% rangeland.
- In 2000, a projected **2% (30 million ha) of croplands** globally were in areas that would be **urbanized by 2030**
- Some old some new **drivers of land degradation** at a global scale. Urbanization, climate change and dietary changes, which will exacerbate the demand for natural resources are part of these underlying trends.

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

Barriers to achieving Agenda 2030:



- Wellbeing of over **3.2 billion people undermined** by land degradation
- **Biodiversity loss** to reach **38–46%** by 2050**. Leading causes** are habitat transformation (i.e., **conversions, to farmland and settlements**) and habitat **degradation**.
- **Land restoration and rehabilitation** can have **significant co-benefits** for all SDGs
- There is a **difference in the co-benefits** of the **restoration *process*** and of the ***restored land*.**
- **A landscape approach,** which includes targeting investments, **is the key** to increasing the total return on land restoration investments.

https://www.ipbes.net/deliverables/3bi-land-degradation

Barriers to achieving Agenda 2030:

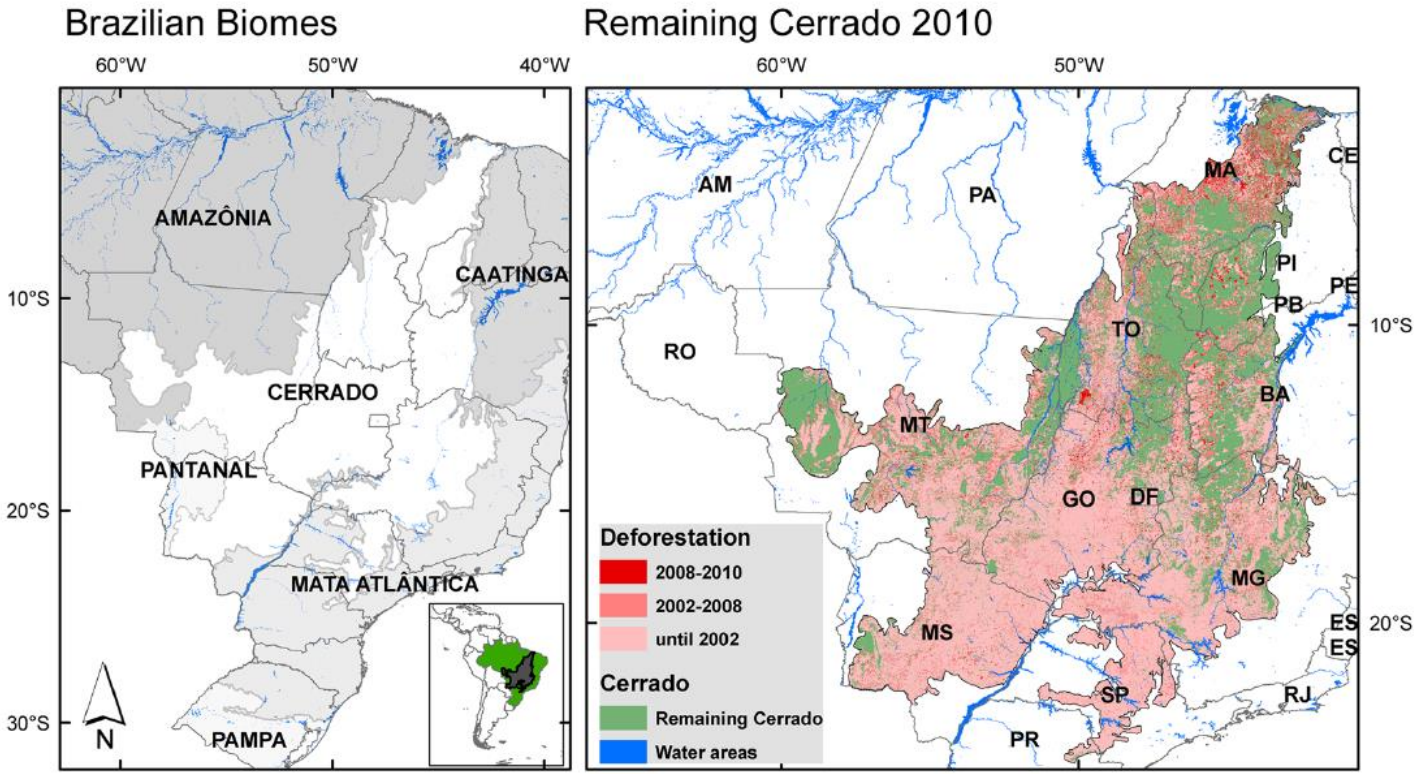
- **1 million species** are threatened by extinction largely because **75% of the land surface has been altered**
- These **(negative) transformational changes** are creating the conditions for a biological evolution **so rapid**, it is **visible just over a few years**.

- The **conversion of land** for agriculture is the leading driver of land-use change, with **meeting the demand for food, feed, fibre and bioenergy** production in the lead. **Forests, wetlands and grasslands and savannas are paying the price.**

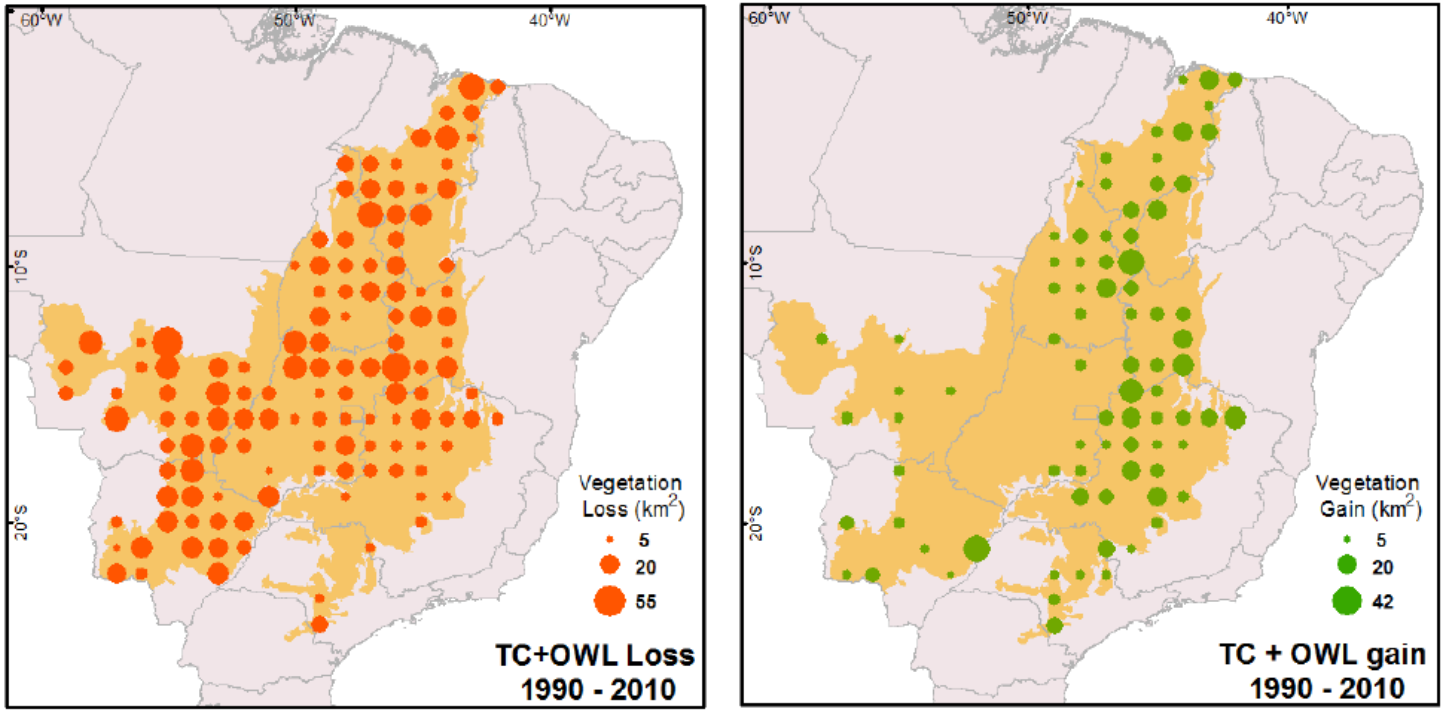
https://www.ipbes.net/news/ipbes-global-assessment-preview

An example: Land use change in the Brazilian savanna

An example: Land use change in the Brazilian savanna



Land use change in the Brazilian savanna



(a) (b)

(a) Cerrado had a net loss of natural vegetation of about 12 million hectares between 1990 and 2010. By 2010, the percentage of natural vegetation cover was 47%, yet increase in some cover types also detected (Grecchi et al. 2015. INPE Symposio)

Land use change in the Brazilian savanna

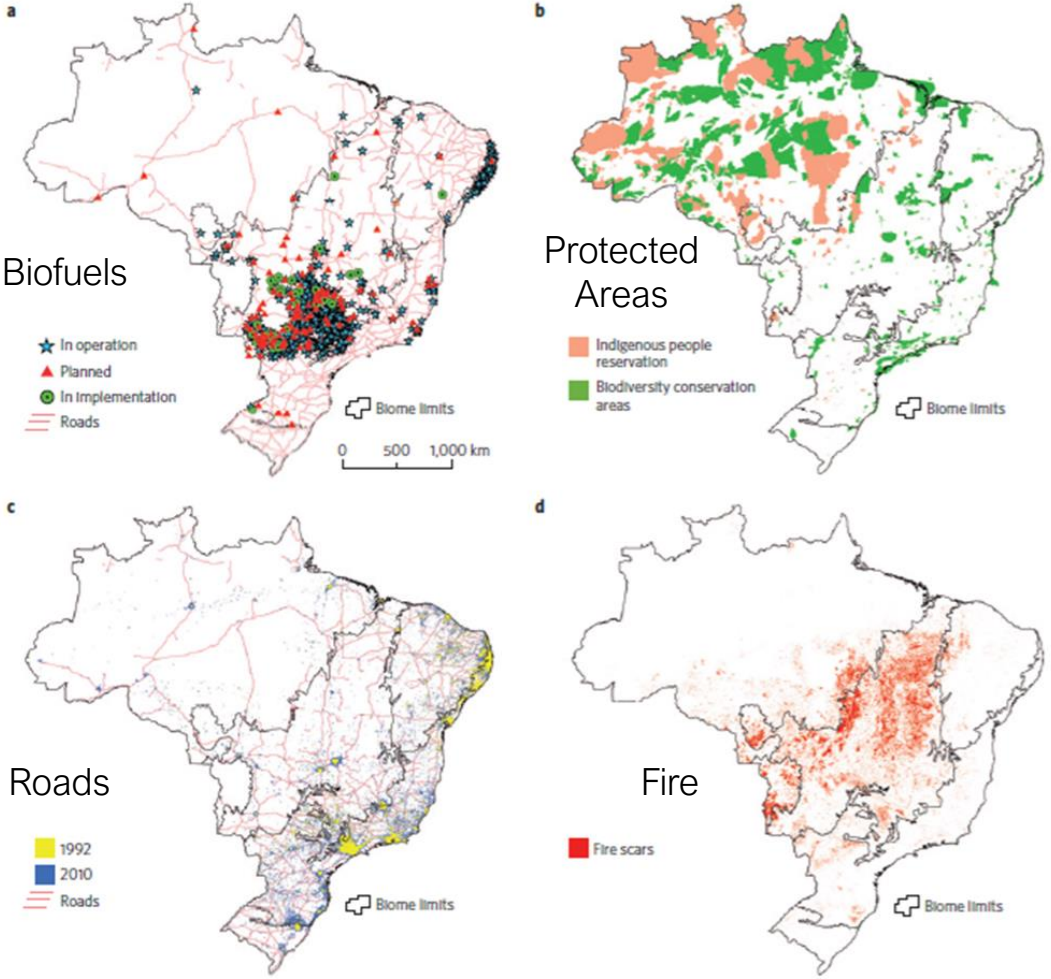


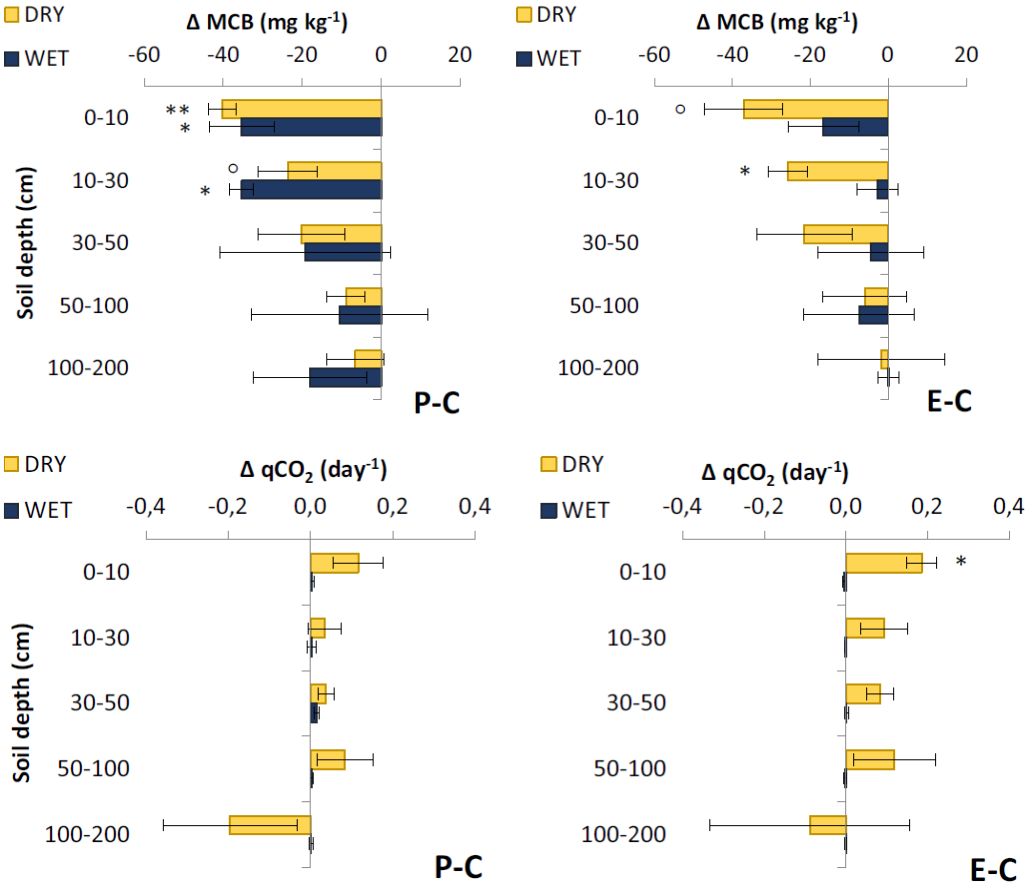
Figure 3 | Biofuels, roads, protected areas and fire in Brazilian biomes. a, Bioenergy (ethanol) plants and road infrastructure[5]. **b**, Protected areas. **c**, Urban areas in 1992 and 2010 (as detected from nightlight glow)[93]. **d**, Fire spots detected in the period 2002–2012[75]. The scale bar in **a** applies to all panels.

- High suitability of Cerrado topography and soils for mechanized agriculture
- Reduced number and extent of protected areas
- Lack of a well-established deforestation surveillance
- Potential leakage pressure resulting from declining deforestation in Amazonia

→ Cerrado will continue to be a principal region of land use change in Brazil.

Lapola et al. 2013. PNAS

Land use change in the Brazilian savanna: Impacts



Cerrado conversion to Pastures (C-P) or *Eucalyptus* forestry (C-E):

Decreased Microbial Biomass and increased metabolic quotient qCO_2 (dry season)

(deBrito et al. 2019. *Biogeochemistry*)

Land use change in the Brazilian savanna: Impacts

Increased overland flow, ponding, soil loss, lateral agrochemical displacement and potential gully formation

(Hunke et al. 2015. *Ecohydrology* 8)

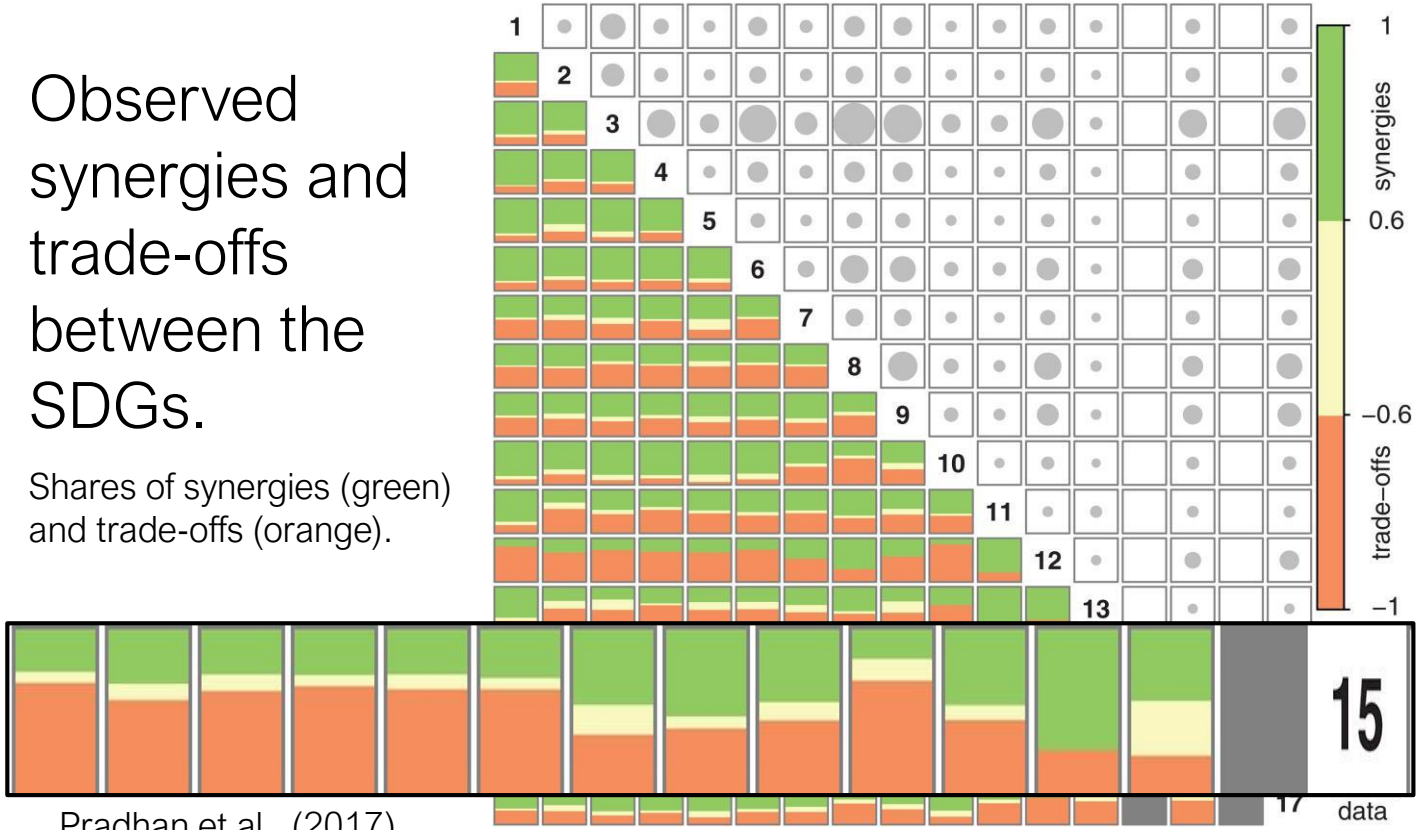
Land can accelerate many SDGs...

...but SDGs compete for the same land resources.

Synergies also mean trade-offs

Observed synergies and trade-offs between the SDGs.

Shares of synergies (green) and trade-offs (orange).

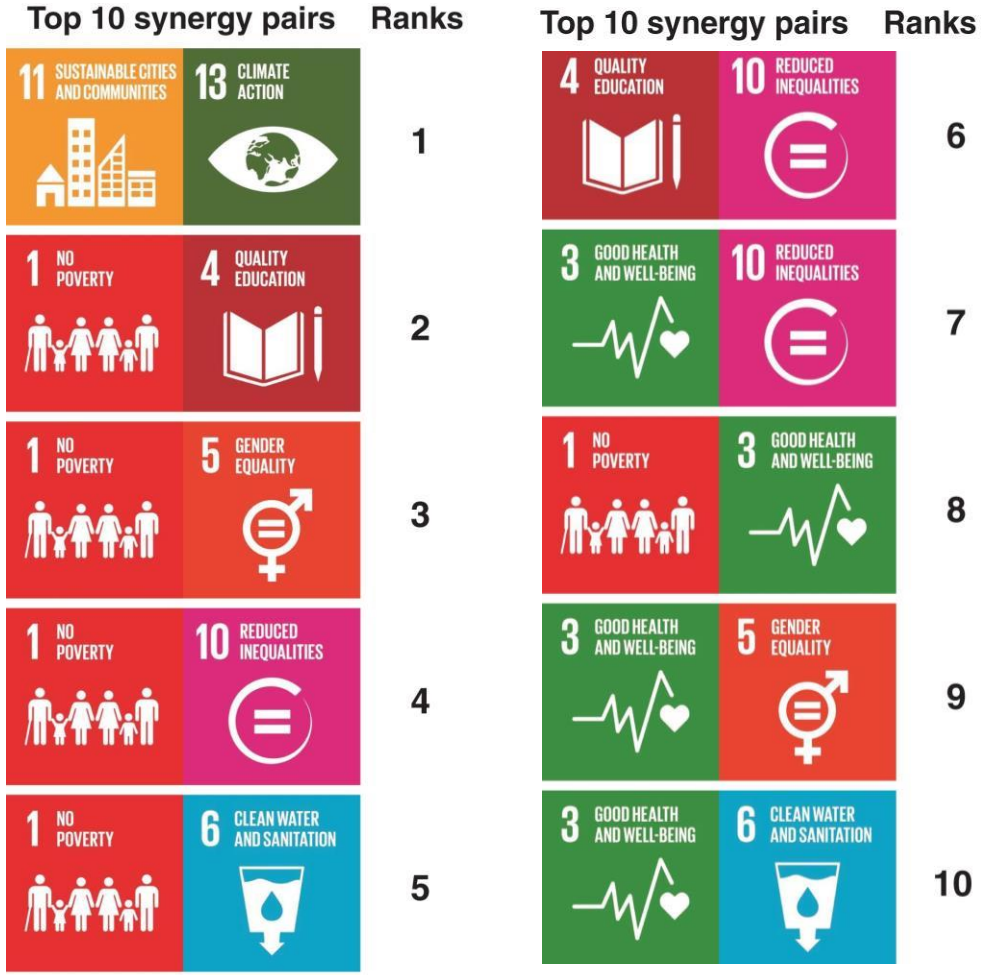


Pradhan et al. (2017)

Source: Figure 2 doi:10.1002/2017EF000632

The top synergies among SDGs are not surprising

Pradhan et al. (2017)



United Nations
Convention to Combat Desertification

Source: Figure 3 doi:10.1002/2017EF000632

…and the top trade-offs should not be surprising either

Pradhan et al. (2017)

Source: Figure 3 doi:10.1002/2017EF000632

United Nations
Convention to Combat Desertification

Telecoupling anyone?

…the elephant in the room

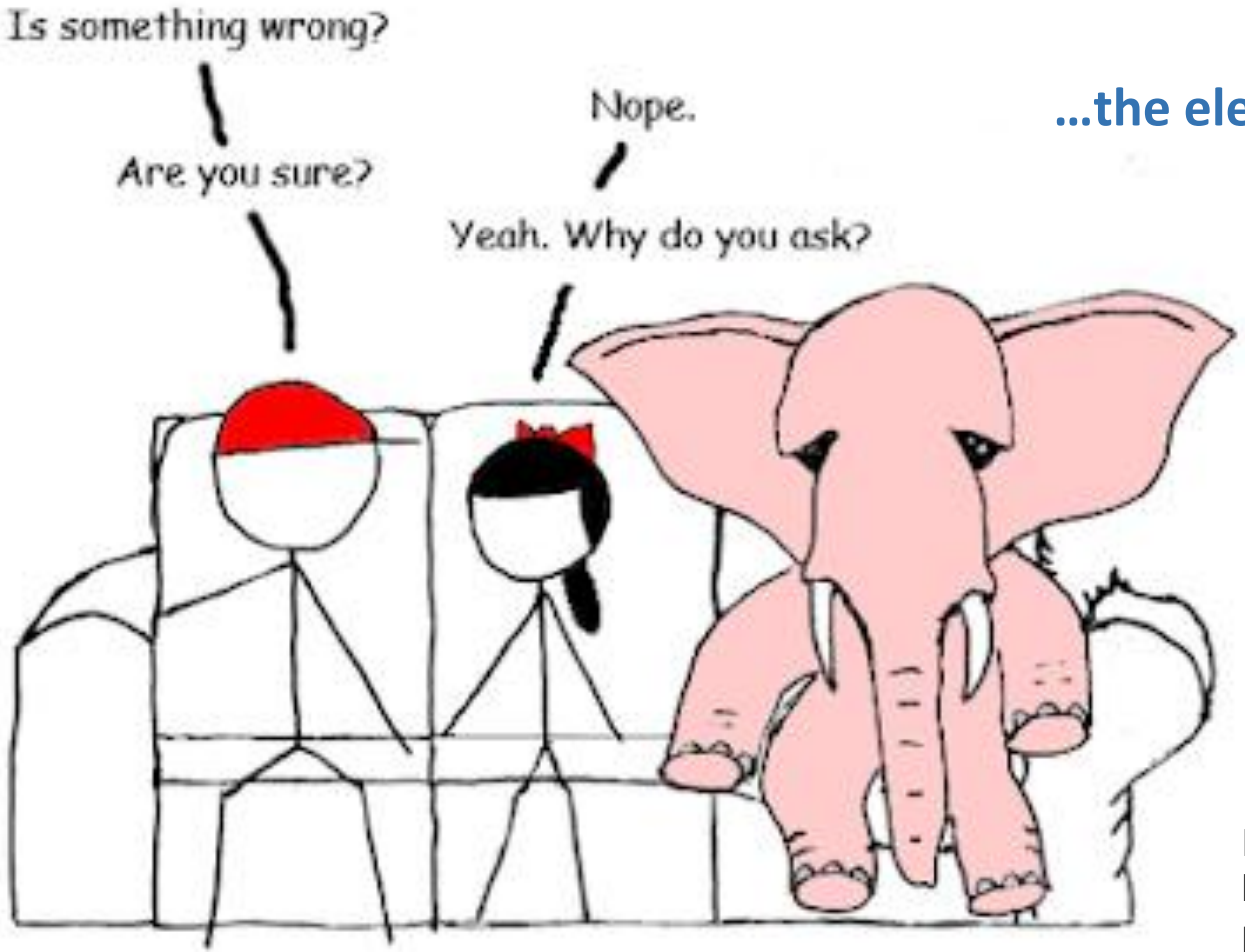


Image source: https://wethinkingtheclassroom.wordpress.com/

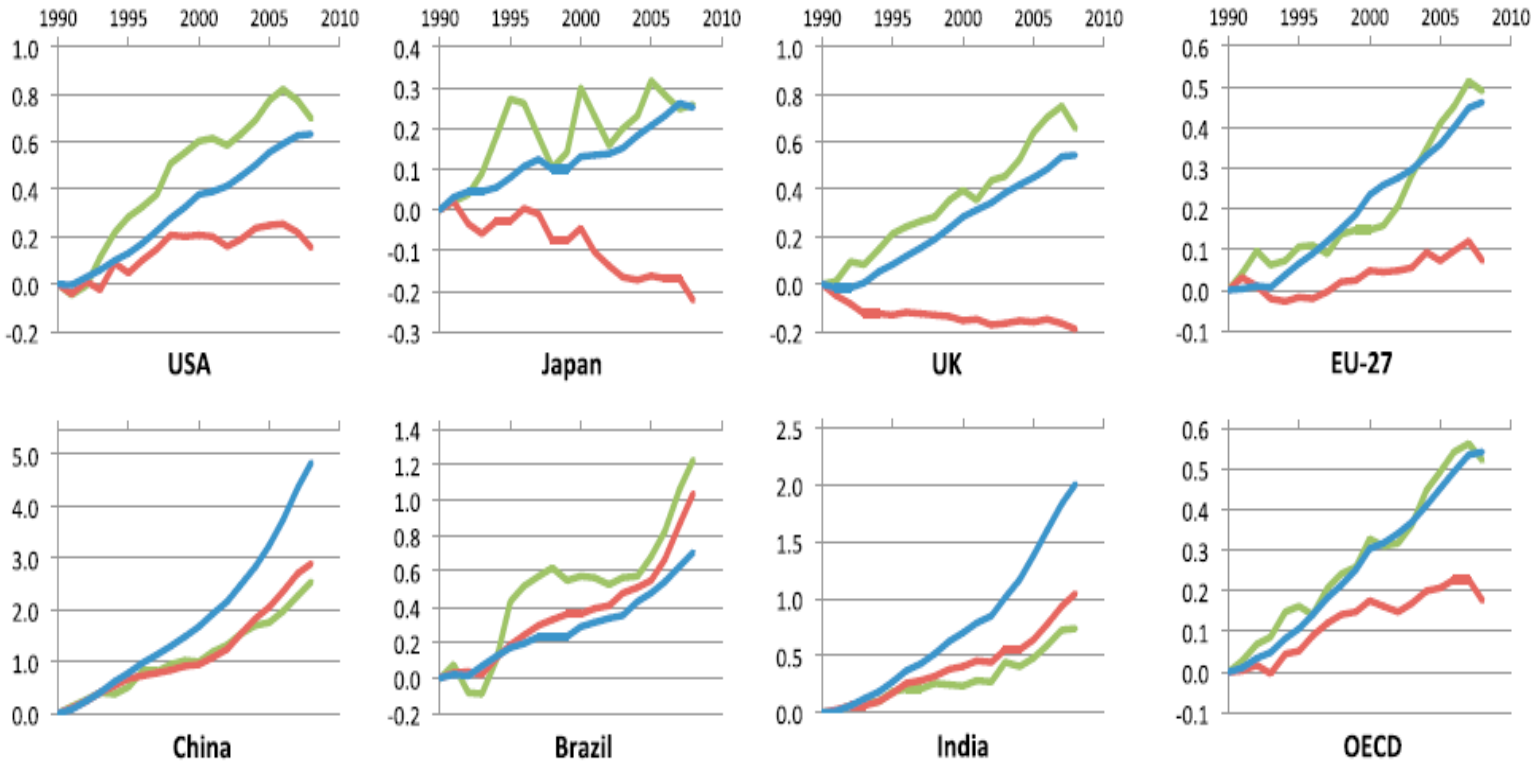
Are developed countries actually practicing sustainability?
Are they actually using natural resources at a slower rate than economic growth?

United Nations
Convention to Combat Desertification

- The currently used metrics (e.g. *domestic material consumption DMC*) suggest YES.
- The *material footprint (MF),* a consumption-based indicator of resource use suggests NO.
- **The difference?** Countries' use of **nondomestic resources** is, on average, three times larger than the physical quantity of traded goods.
- As wealth grows, countries tend to reduce their domestic portion of materials extraction through international trade, whereas the overall mass of material consumption generally increases.

Source: Thomas Wiedmann et al. 2015 *PNAS*

Relative changes in total resource use (MF and DMC) and GDP



MF = Material footprint DMC = domestic material consumption

GDP is expressed in purchasing power parity (PPP-2005)

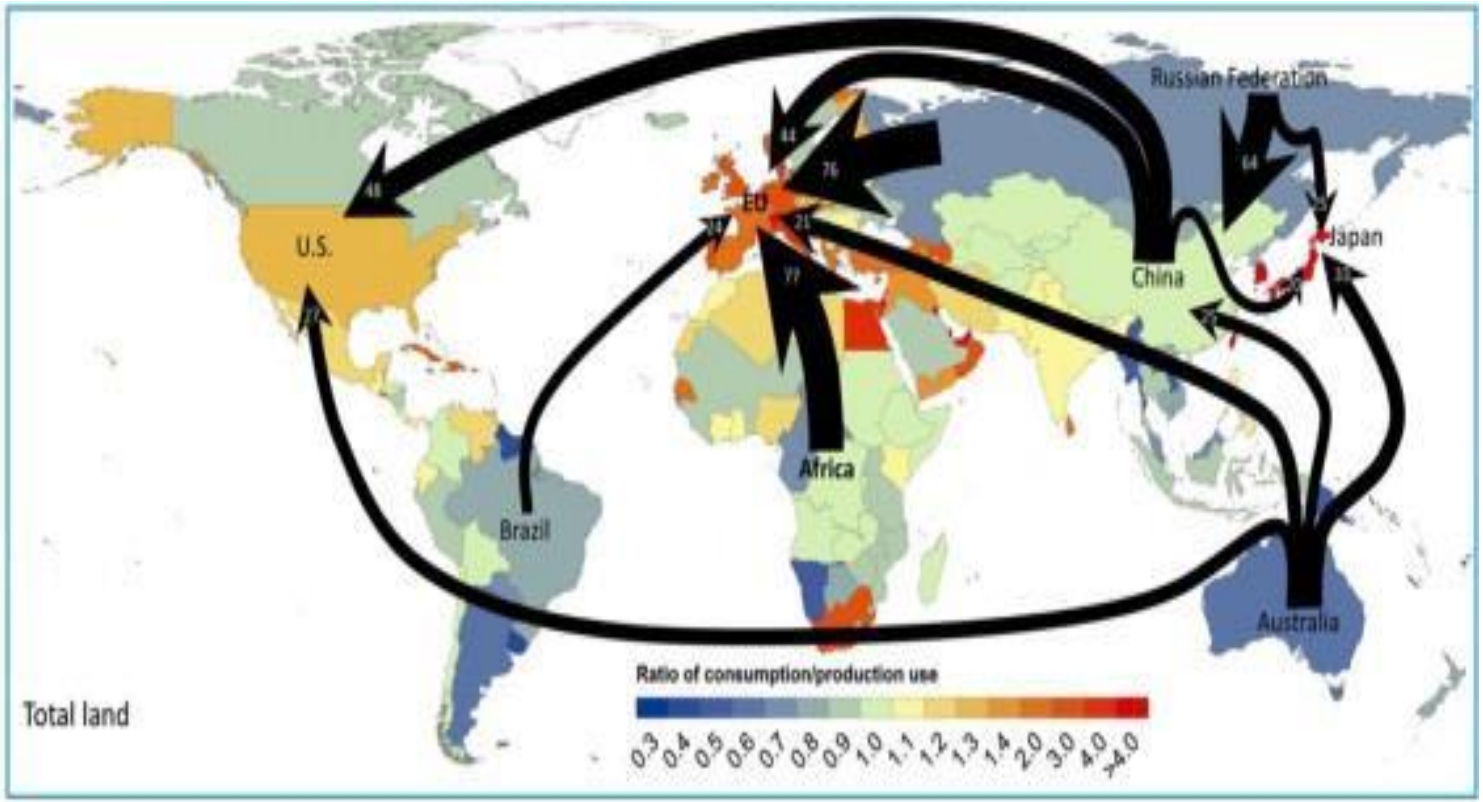
Source: Thomas Wiedmann et al. 2015 *PNAS*

Goal 12: Ensure sustainable consumption and production patterns

Consumption and production tend to be measured in flows – but now also in terms of material footprint…

But where do those flows originate from and where do they end up?

Total land displaced through export production



The thickness of the arrows and numbers next to the arrows represent the amount of land (in Mha) used as inputs for the production of imported and exported goods.

Source: Yang Yu et al. 2013

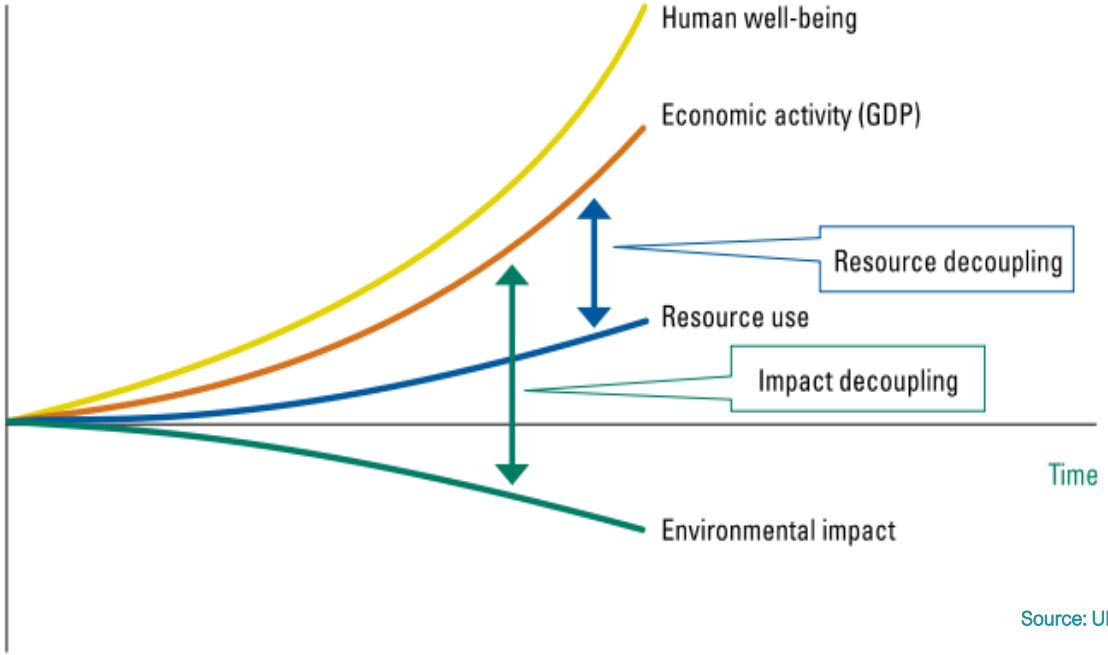
United Nations
Convention to Combat Desertification

How can navigate the inevitable SDG trade-offs?

United Nations
Convention to Combat Desertification

On one side of the equation:

Decoupling natural resource use and environmental impacts from economic growth



Source: UNEP IRP 2011

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Indicator 12.2.1: Material Footprint

Here decoupling means using less resources per unit of economic output and reducing the environmental impact of any resources that are used or economic activities that are undertaken

United Nations
Convention to Combat Desertification

Is decoupling possible?

If the flows of consumption and production can be linked to land, policies to minimize impact are much more feasible

United Nations
Convention to Combat Desertification

Trase.Earth seeks to transform our understanding of commodity supply chains by increasing transparency, revealing the links to environmental and social risks in tropical forest regions, and creating opportunities to improve the sustainability of how these commodities are produced, traded and consumed.

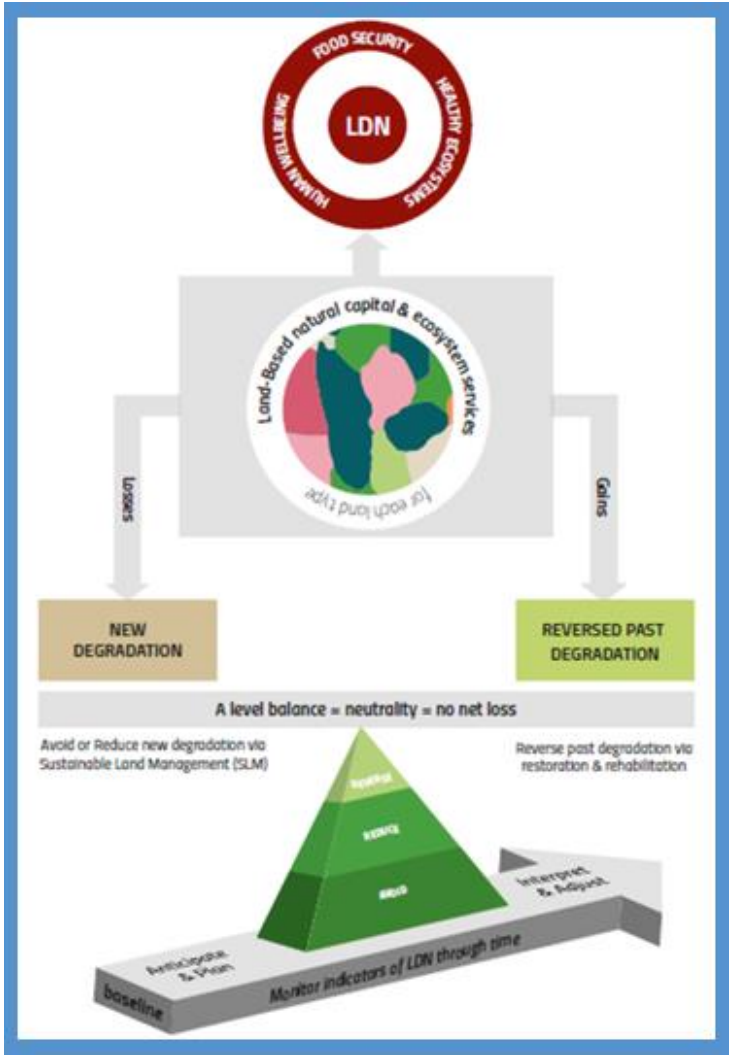
On the other side of the equation

United Nations
Convention to Combat Desertification

A balanced approach is needed.

- One that **anticipates new degradation** even as we plan to reverse past degradation
- One that **considers tradeoffs** among competing interests across the landscape

LDN provides the framework for this.



What is LDN?

United Nations
Convention to Combat Desertification

Land Degradation Neutrality is

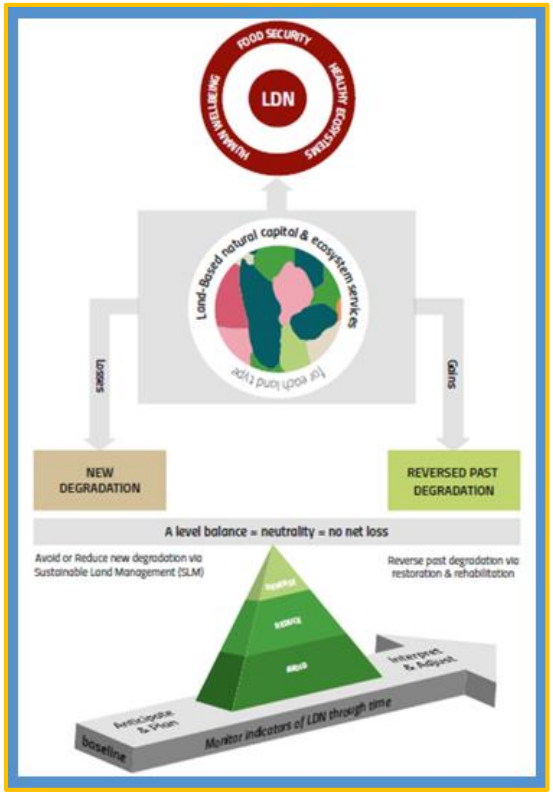
"A state whereby the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specified temporal and spatial scales and ecosystems"

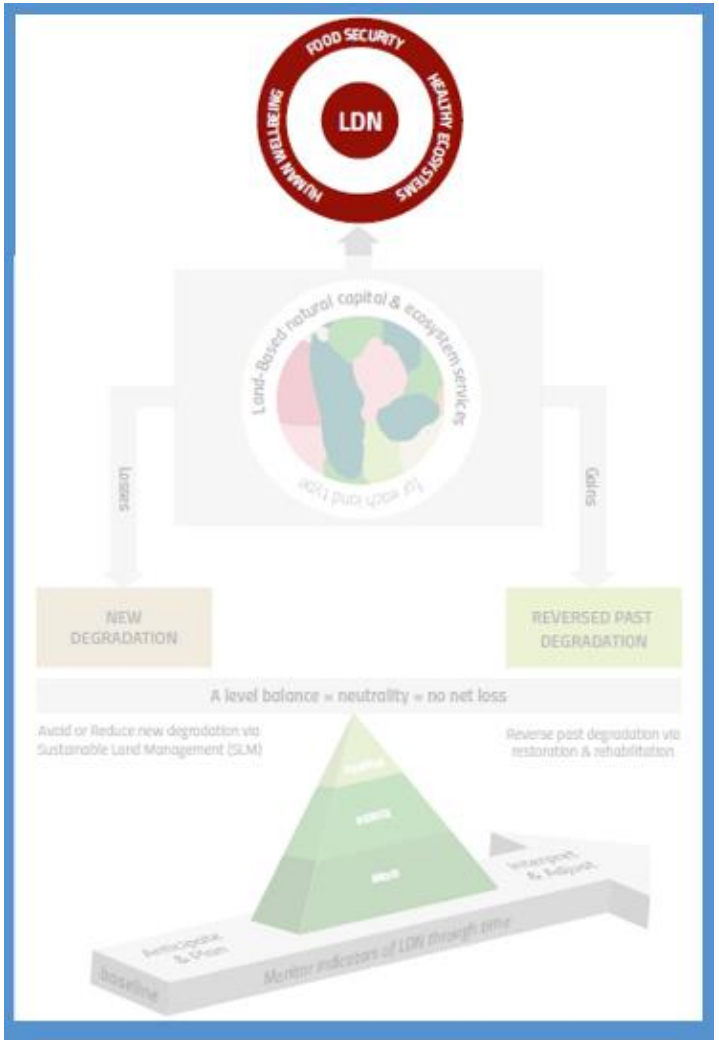
UNCCD COP12 October 2015

The objectives of LDN

- Maintain or improve the sustainable delivery of ecosystem services
- Maintain or improve productivity, in order to enhance food security
- Increase resilience of the land and populations dependent on the land
- Seek synergies with other social, economic and environmental objectives
- Reinforce responsible and inclusive governance of land.

LDN seeks to maintain natural capital and the ecosystem services that flow from it.





The Vision of LDN

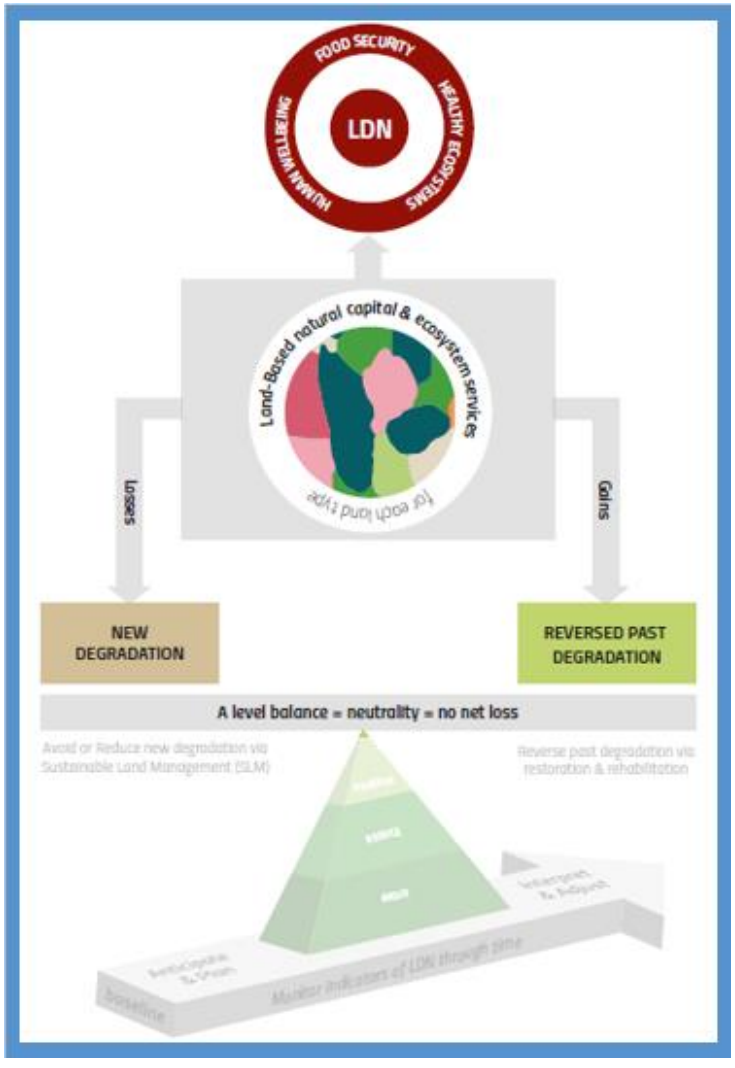
United Nations
Convention to Combat Desertification

Human wellbeing

Food security

Healthy ecosystems

The goal of LDN is maintaining or enhancing the land resource base - in other words, the stocks of natural capital associated with land resources and the ecosystem services that flow from them



Mechanism for achieving neutrality

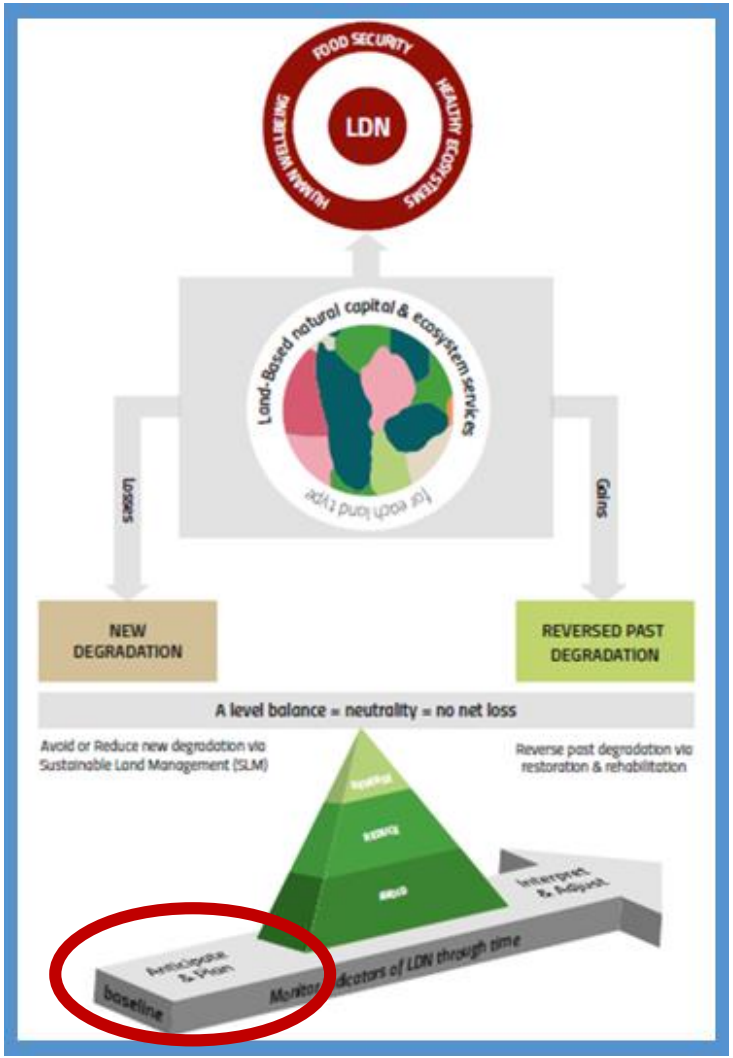
United Nations
Convention to Combat Desertification

Neutrality = ***no net loss*** compared to the reference state (baseline)

Baseline is NOW (current condition)

Counterbalancing future land degradation (anticipated **losses**) through planned measures to achieve equivalent **gains** elsewhere within the same **land type**

“like for like”



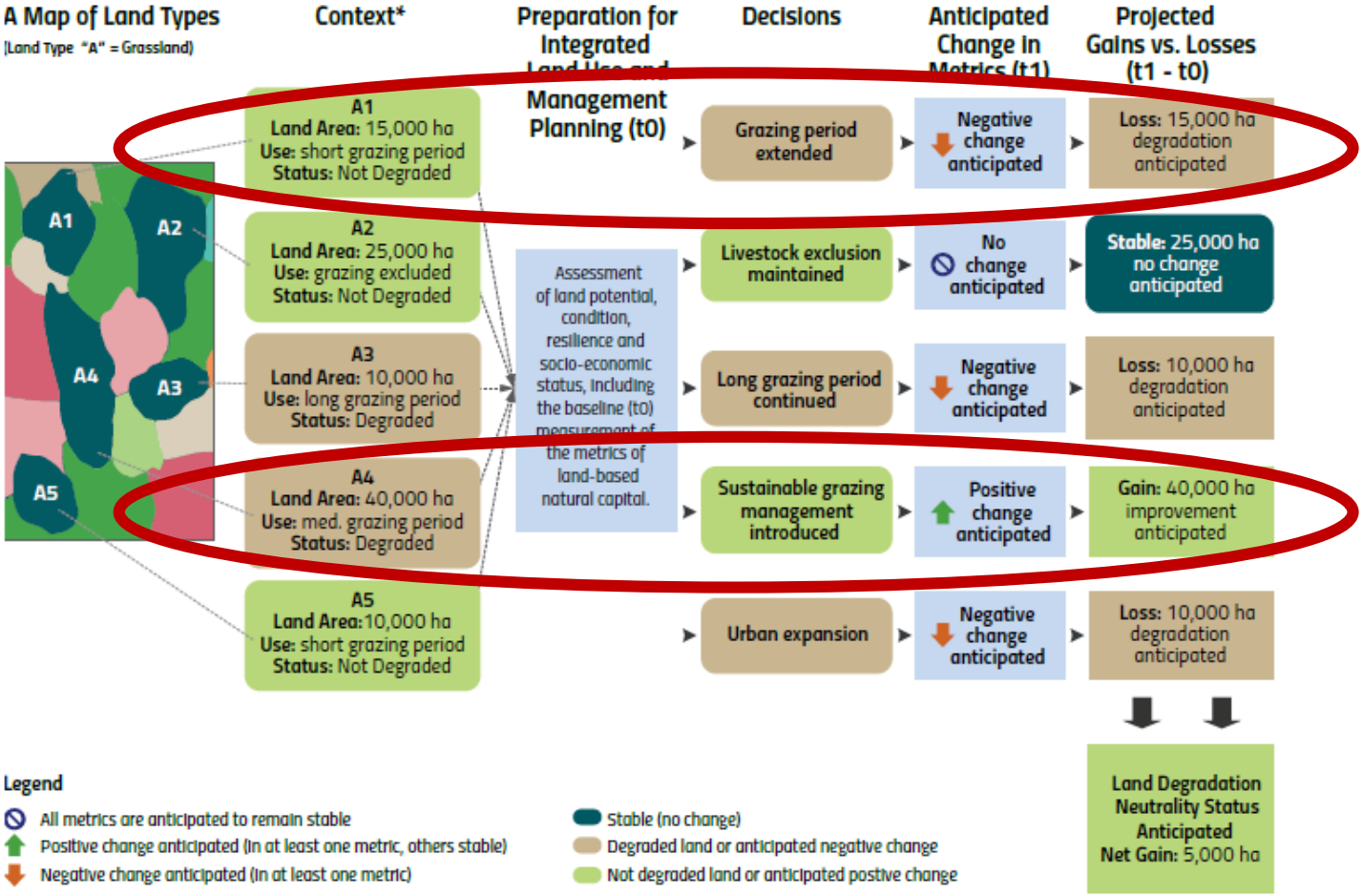
Integrated land use planning

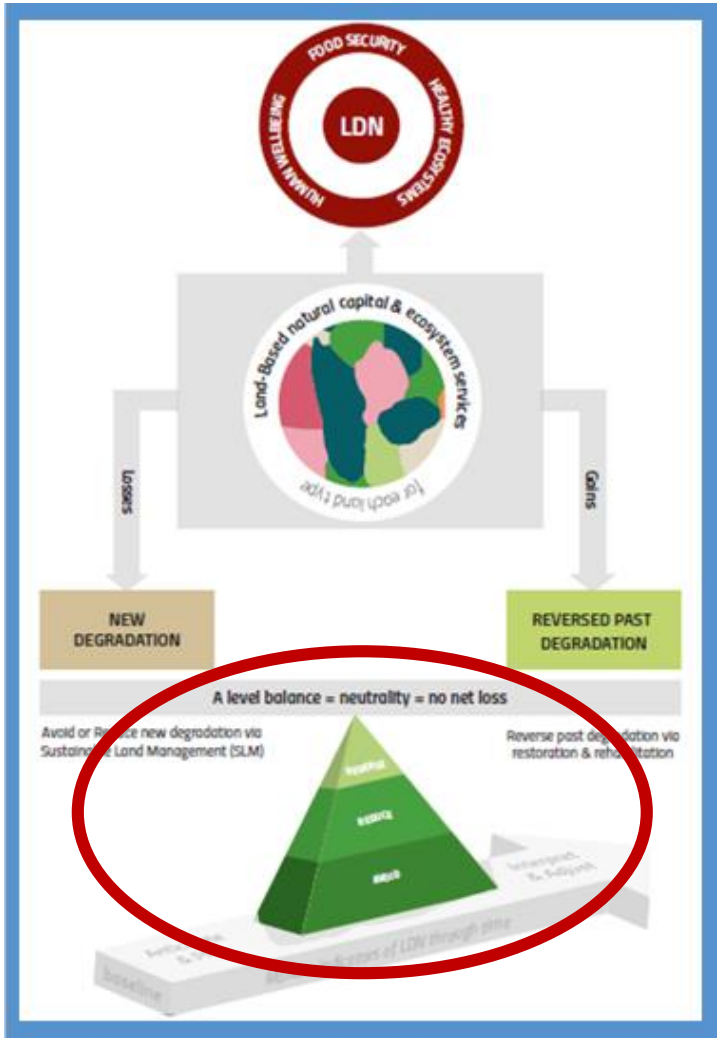
United Nations
Convention to Combat Desertification

LDN planning (target setting) involves anticipating where degradation is likely so that the optimal mix of interventions across the landscape to achieve neutrality can be pursued.

Leverage existing land use planning

Optimizing land use planning and management decisions across the landscape

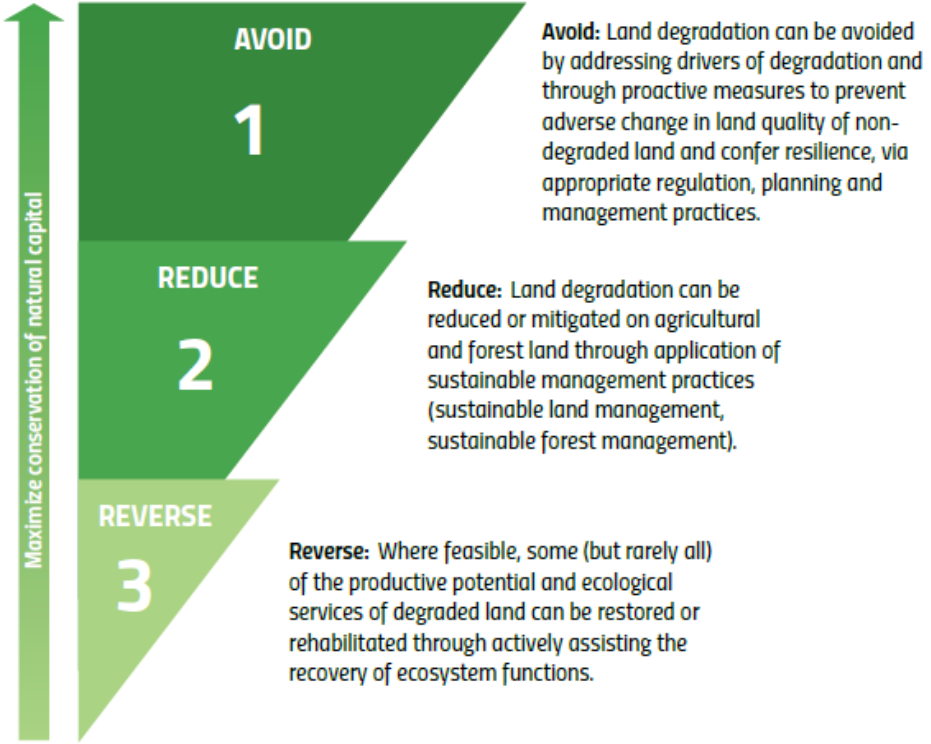




Response Hierarchy

Prevention is better than cure

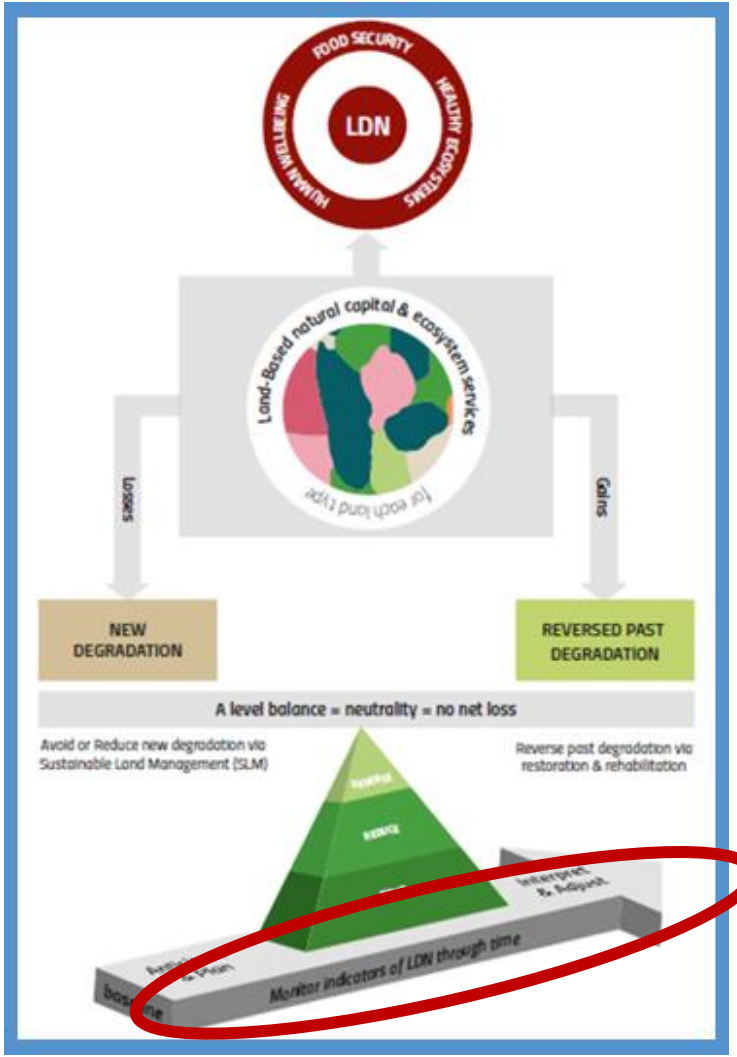
United Nations
Convention to Combat Desertification



Avoid: Land degradation can be avoided by addressing drivers of degradation and through proactive measures to prevent adverse change in land quality of non-degraded land and confer resilience, via appropriate regulation, planning and management practices.

Reduce: Land degradation can be reduced or mitigated on agricultural and forest land through application of sustainable management practices (sustainable land management, sustainable forest management).

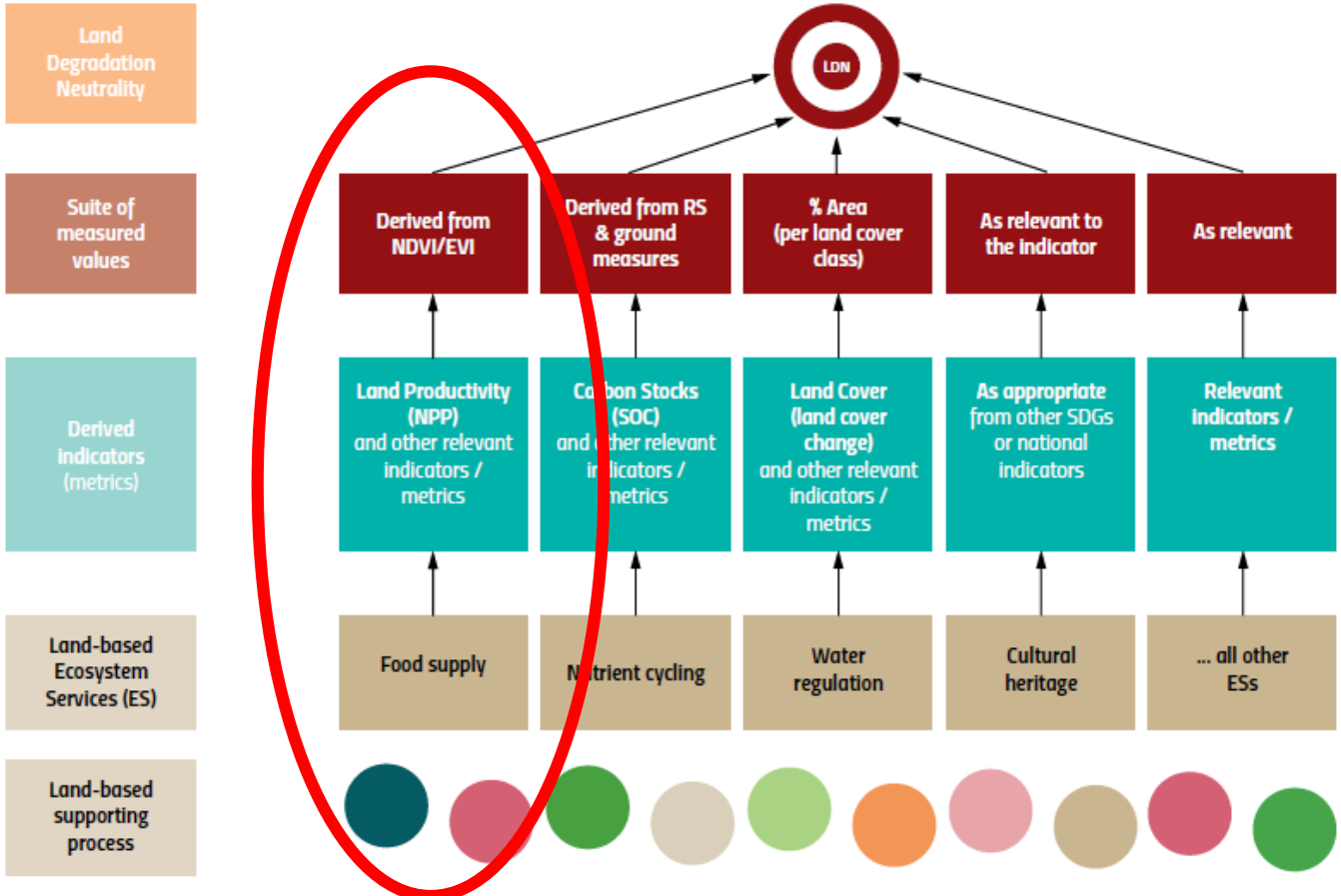
Reverse: Where feasible, some (but rarely all) of the productive potential and ecological services of degraded land can be restored or rehabilitated through actively assisting the recovery of ecosystem functions.



Monitoring and learning

- Global indicators: Land cover, land productivity and soil organic carbon
- “One out, all out”, area basis
- Complemented by:
  -Locally-relevant indicators
  -Process indicators
  -Outcome indicators
- Verified using local knowledge (multi-stakeholder platforms nested across scales)

Selection of indicators based on ecosystem functions that provide ecosystem services



The framework does not prescribe how to measure the indicators.

It recommends effort to achieve consensus on **common criteria** and **standards** to harmonize application.

Monitor indicators relative to the baseline

Guiding principles

Principles are provided to govern application of the framework and to help prevent unintended outcomes during implementation and monitoring of LDN.

These principles are central to how LDN can encourage responsible governance and help safeguard land tenure

Guiding Principles (1)

Principles govern application of the framework, and prevent unintended outcomes during implementation of LDN

1. Maintain or enhance land-based natural capital.
2. Protect the rights of land users.
3. Respect national sovereignty.
4. For neutrality, the LDN target equals (is the same as) the baseline.
5. Neutrality is the minimum objective: countries may be more ambitious.
6. Integrate planning and implementation of LDN into existing land use planning processes.
7. Counterbalance anticipated losses in land-based natural capital with interventions to reverse degradation, to achieve neutrality.
8. Manage counterbalancing at the same scale as land use planning.
9. Counterbalance “like for like” (within the same land type). Not between conservation and production areas.
10. Balance economic, social and environmental sustainability.

Guiding Principles (2)

11. Base land use decisions on multi-variable assessments, considering land potential, land condition, resilience, social, cultural and economic factors.

12. Apply the response hierarchy : Avoid > Reduce >Reverse.

13. Apply a participatory process including stakeholders in designing, implementing and monitoring LDN.

14. Reinforce responsible governance: protect human rights, including tenure; ensure accountability and transparency.

15. Monitor using the three UNCCD land-based global indicators: land cover, land productivity and carbon stocks.

16. Use “one-out, all-out” to interpret the three global indicators.

17. Use national and sub-national indicators to aid interpretation and fill gaps.

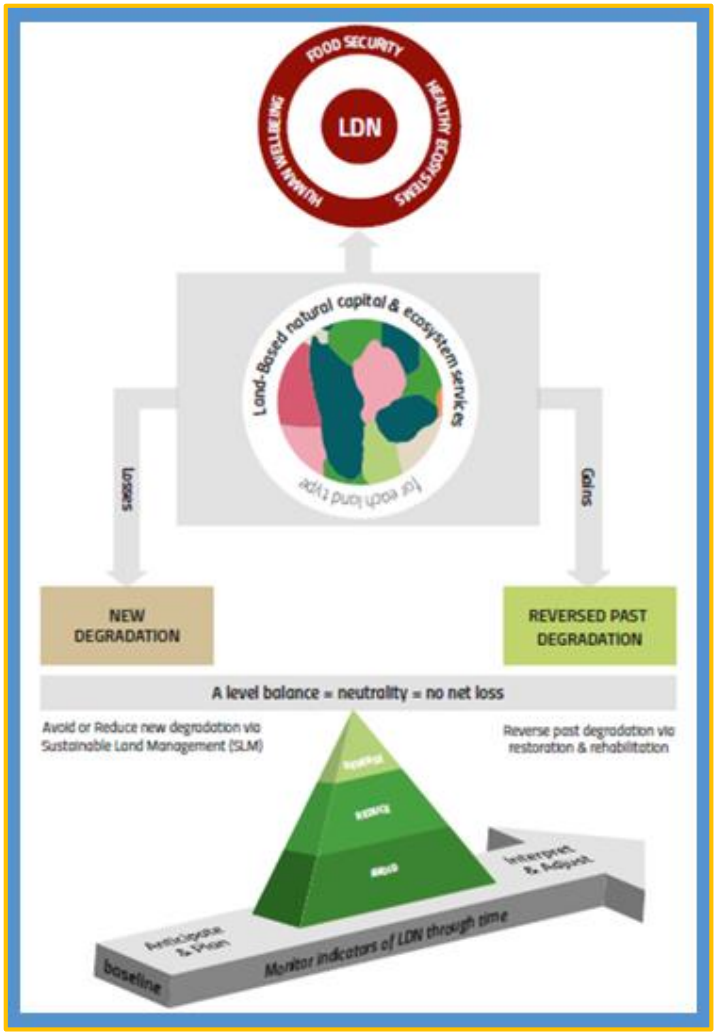
18. Apply local knowledge to verify and interpret monitoring data.

19. Apply a continuous learning approach: anticipate, plan, track, interpret, review, adjust, create the next plan

Land Degradation Neutrality

- LDN seeks to **maintain natural capital** and the **ecosystem services** that flow from it
- LDN is about keeping **land in balance**
- Keeping land in balance provides the basis for **keeping food, carbon and biodiversity in balance** as well
- LDN is about achieving **multiple benefits**
- LDN is about **navigating tradeoffs**
- LDN provides a framework with **multiple entry points** which facilitate **optimizing the synergies** among the Rio Conventions

https://knowledge.unccd.int/publication/ldn-scientific-conceptual-framework-land-degradation-neutrality-report-science-policy



The *Scientific Conceptual Framework for LDN* was endorsed by all 197 UNCCD Parties in COP 13

ICCD/COP(13)/21/Add.1

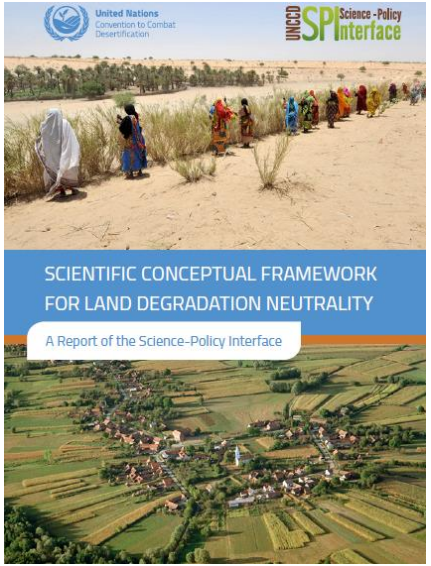
Decision 18/COP.13

Follow-up on the work programme of the Science-Policy Interface for the biennium 2016–2017

The scientific conceptual framework for land degradation neutrality

1. *Endorses* the scientific conceptual framework for land degradation neutrality summarized in document ICCD/COP(13)/CST/2 and *encourages* further conceptual elaboration and practical verification;

2. *Calls upon* Parties pursuing land degradation neutrality to consider the guidance provided by the scientific conceptual framework for land degradation neutrality and observe the principles summarised in document ICCD/COP(13)/CST/2, taking into account national circumstances;



LDN is central to SDG Target 15.3

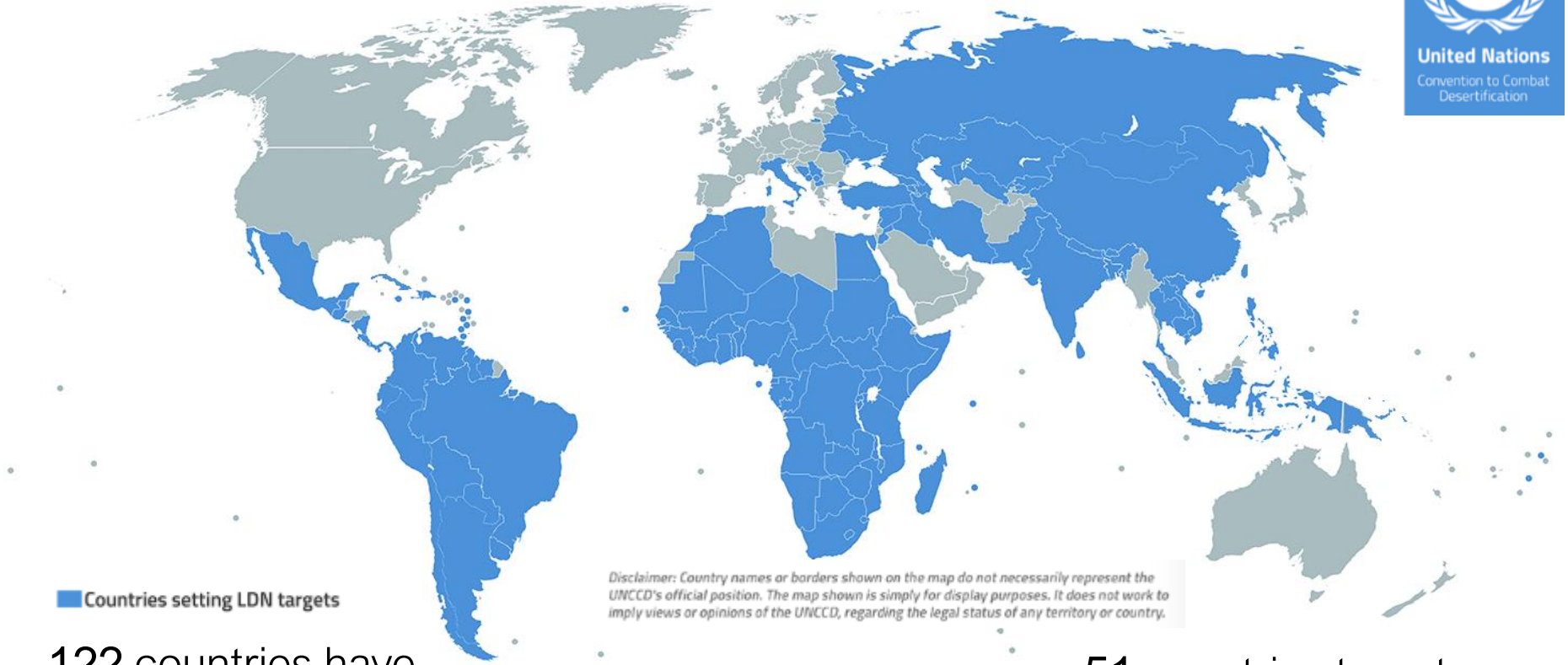
PROTECT, RESTORE AND PROMOTE SUSTAINABLE USE OF TERRESTRIAL ECOSYSTEMS, SUSTAINABLY MANAGE FORESTS, COMBAT DESERTIFICATION, AND HALT AND REVERSE LAND DEGRADATION AND HALT BIODIVERSITY LOSS

United Nations
Convention to Combat Desertification

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.

Countries are embracing the LDN target

United Nations
Convention to Combat Desertification



122 countries have committed to set LDN targets so far

83 countries have officially validated their targets

51 countries targets adopted by their governments

An Example of how and why this can work... Also from Brazil:

URAD

Unidades de Recuperação de Áreas Degradadas e Redução da Vulnerabilidade Climática


1. Site of a degraded spring


2. Evidence spring could be restored


3. Preliminary intervention


4. Revitalized (and protected) spring

Prof. Dr. Valdemar Rodrigues E-mail: desert.piaui@gmail.com


All together combating
land degradation to
adapt to climate change

Thank you!

25 YEARS

United Nations
Convention to Combat Desertification

Web: www.unccd.int

Twitter: @UNCCD

Facebook: www.facebook.com/UNCCD

Further information

- ***Global Land Outlook***
  https://knowledge.unccd.int/glo
- ***Scientific Conceptual Framework for Land Degradation Neutrality.*** **A Report of the Science-Policy Interface.**
  http://www2.unccd.int/publications/scientific-conceptual-framework-land-degradation-neutrality
- ***Land in balance: The scientific conceptual framework for Land Degradation Neutrality. Environmental Science & Policy***
  https://doi.org/10.1016/j.envsci.2017.10.011
- ***Brazil sets up a novel model to reverse desertification***
  https://knowledge.unccd.int/knowledge-products-and-pillars/unccd-science-policy-weblog/brazil-sets-novel-model-reverse