Introduction to Sustainable Land Management and Land restoration

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E-nugget – 9th June 2020

Thematic area: Land Resources Planning

Building Forward Better Initiative
Project "Strengthening natural resources management capacities to revitalize agriculture in fragile contexts"

ITALIAN AGENCY FOR DEVELOPMENT COOPERATION

Lesson 1: Introduction to Sustainable Land Management (SLM) and land restoration: basic principles

Introduction
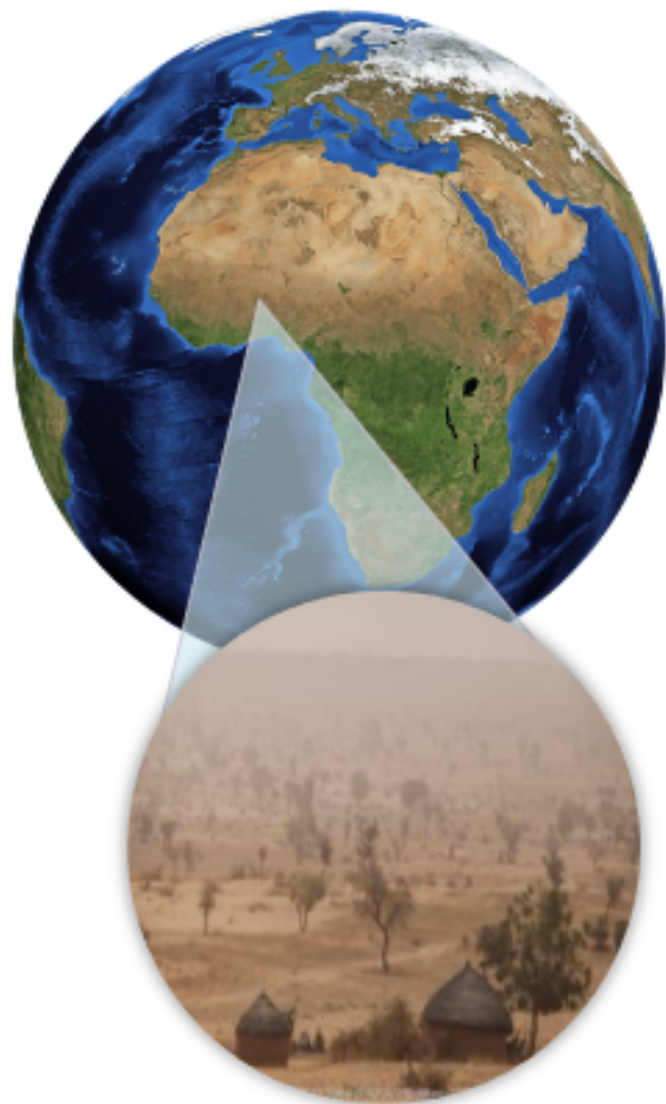
Seventy-five per cent of the Earth is covered by water and only fifteen per cent of the remaining solid part is suitable for biomass production. But...

10.5 billion hectares of land, more than three-quarters of the global land surface excluding Antarctica, suffer from **severe soil constraints** for low input crop production (Fischer et al., 2006).

Almost 40% of the global soils suffer from incipient **severe soil nutrient deficiency.**

Another 6% of the global soils are affected by **limitations** resulting from salinity, sodicity, or gypsum constraints.

Climate change impacts are expected to further aggravate the situation.

Introduction

Land resources are increasingly under pressure and there are many competing interests. However, unsustainable agricultural expansion and urbanization remain the **main driving forces in land resource depletion**.

Agricultural expansion

Urbanization
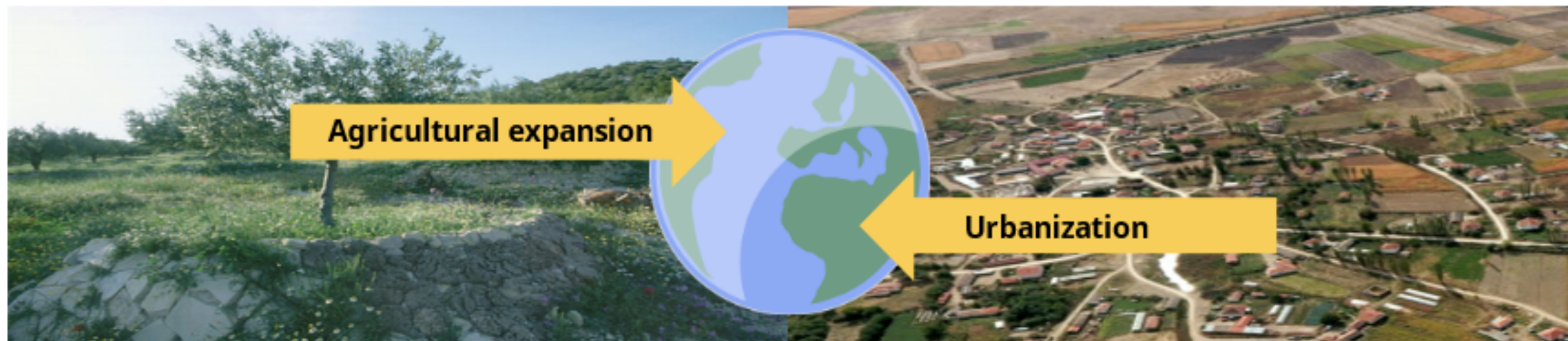
Land resources are scarce

Their distribution is uneven

If the rest of the world would aspire to the same lifestyle as the richest one-fifth of the mankind, resources of four planets the size of Earth would be needed.

Globally agriculture is practiced on 1.6 billion hectares, but the distribution of cropland is very uneven.

View an example

Introduction

Sustainable land management practices are urgently required because of widespread resource degradation from poor land use practices.


Promising options are available to reverse this trend.

In this lesson we will provide an overview of how it is possible to apply SLM practices, but let's first clarify some basic definitions, beginning with land and soil resources and describing the differences between them.

Land degradation

(?) | What is **land degradation**?

There are <u>several definitions</u>* for land degradation and desertification.
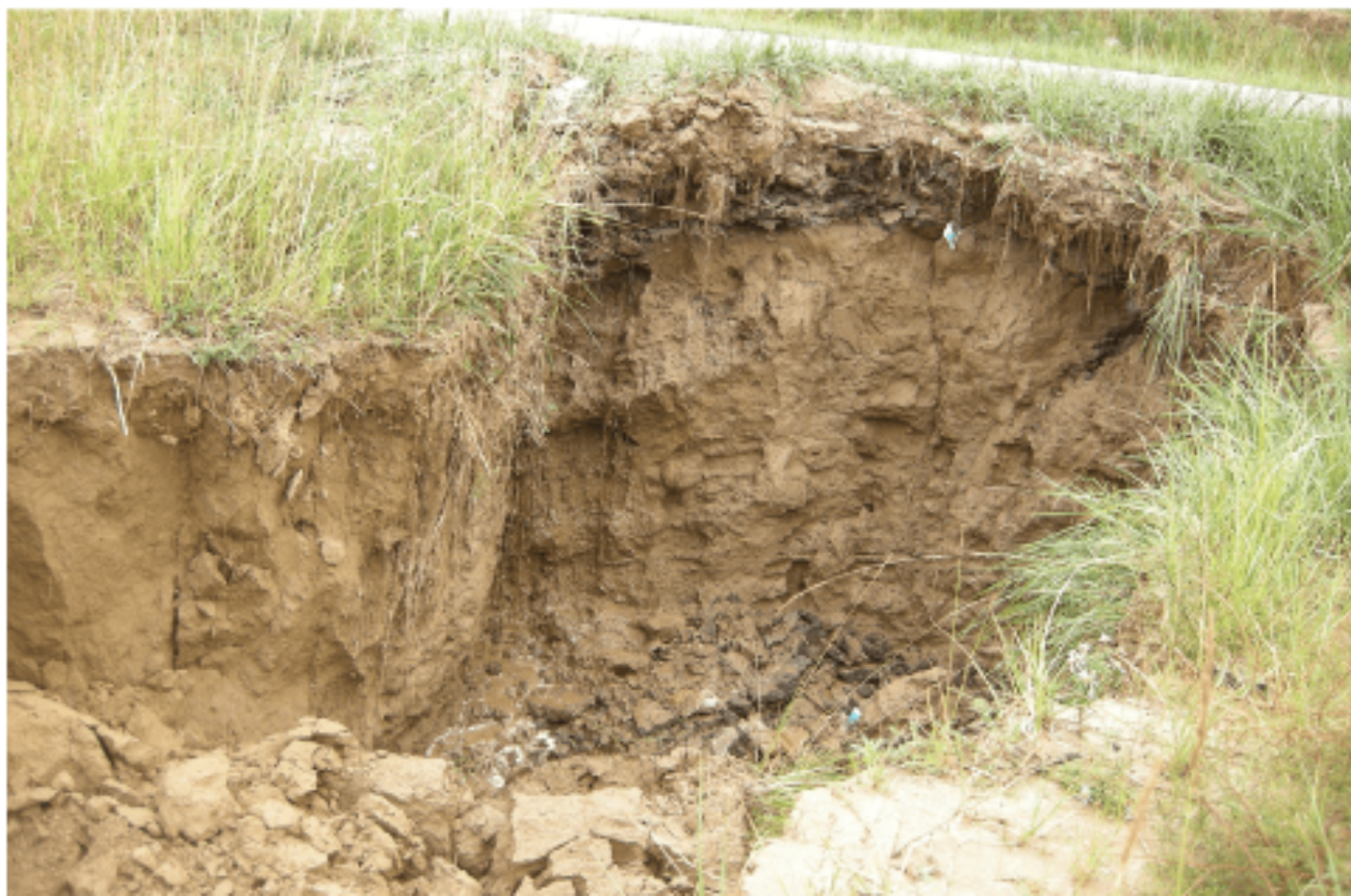
This is the definition provided by the United Nations Convention to Combat Desertification (UNCCD) in 1994:

(*) | **Land degradation**
Is the reduction or loss of the biological or economic productivity and complexity of the land resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns.

(i) | <u>Forms and types of land degradation</u>

Land degradation

Land degradation (LD) is an impediment for achieving food security and reducing hunger. Globally, there are little opportunities for expanding the agricultural area because much of the additional land available is not suitable for agriculture, therefore, sustainable management of land resources is key to acheive food security and combating land degradation.

Source: Chapter 3 of [Land degradation and the Sustainable Development Goals: Threats and potential remedies](#).

## For example, in the area of Badopal village of Fatehabad (India)

Salinity has hit my agricultural field, leaving me and my family in debt.

Hundreds of other hectares are affected by salinity and waterlogging in the area.

Land degradation affects negatively the state and the management of the natural resources - water, soil, plants and animals - and hence reduces agricultural production.

Land degradation

The risk of land degradation is to assess and realize the process at an early stages to adjust the land management and avoid irreversible degradation. The United Nations Convention to Combat Desertification (UNCCD) deals with land degradation not just in the drylands, but also in other areas that could be at risk of degradation or are already degraded.
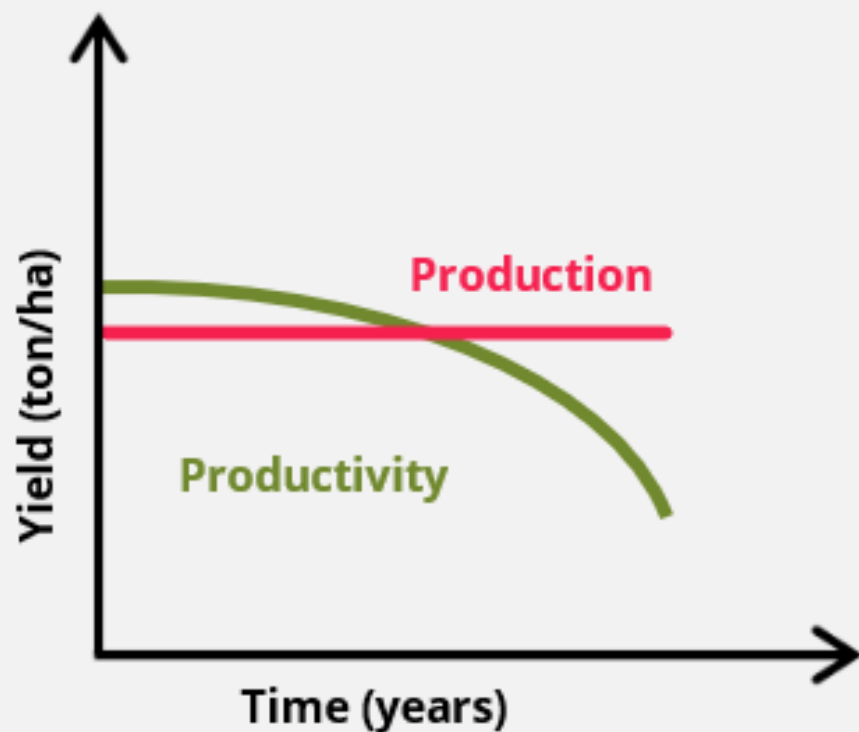
In these cases, land degradation causes reduced productivity while production could be maintained by different practices (over fertilizers use, irrigation, etc.).
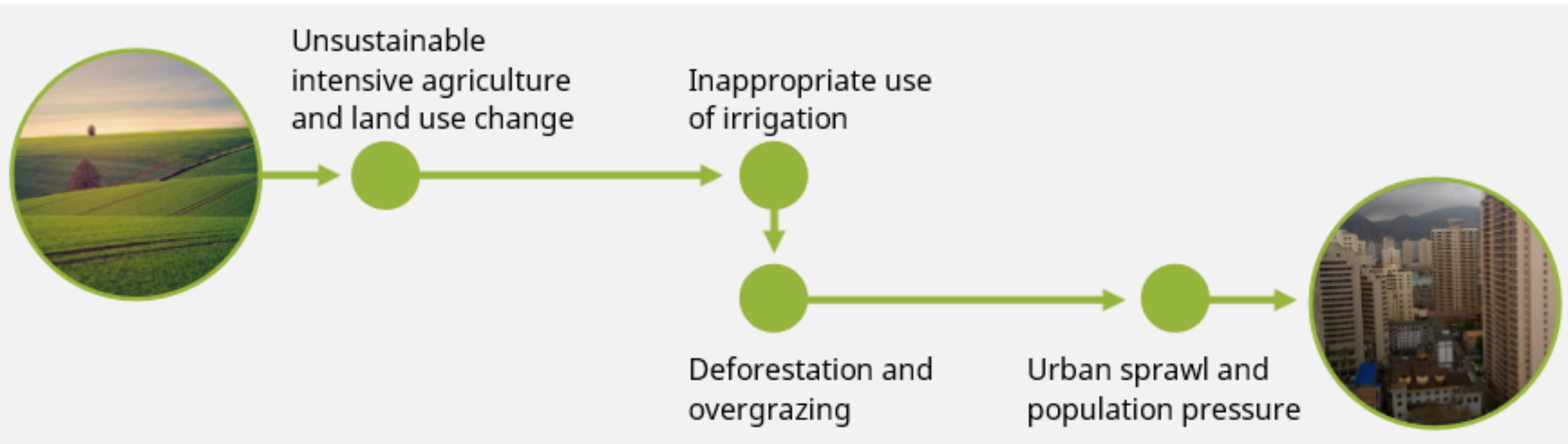
As shown in the graph:

The declined productivity due to land degradation will continue hidden until irreversible loss of production is clear, but it could be too late to restore the land.

Therefore preventing/reducing land degradation is much more useful than restoring an already degraded land. In these regards, the monitoring and assessment of land degradation types, causes and symptoms is necessary to avoid loss in food production and impact on ecosystem services.

Production

Productivity

Yield (ton/ha)

Time (years)

Causes of land degradation

Globally, 25% of land is severely degraded. Land degradation and desertification are mainly caused by mismanagement practices and driving forces such as:

Unsustainable intensive agriculture and land use change

Inappropriate use of irrigation

Deforestation and overgrazing

Urban sprawl and population pressure

Land degradation could be further accelerated by:

- Weak implementation of policies
- Poor governance

- National and international food market demands
- Land tenure and land take

- Land acquisitions or land grabbing
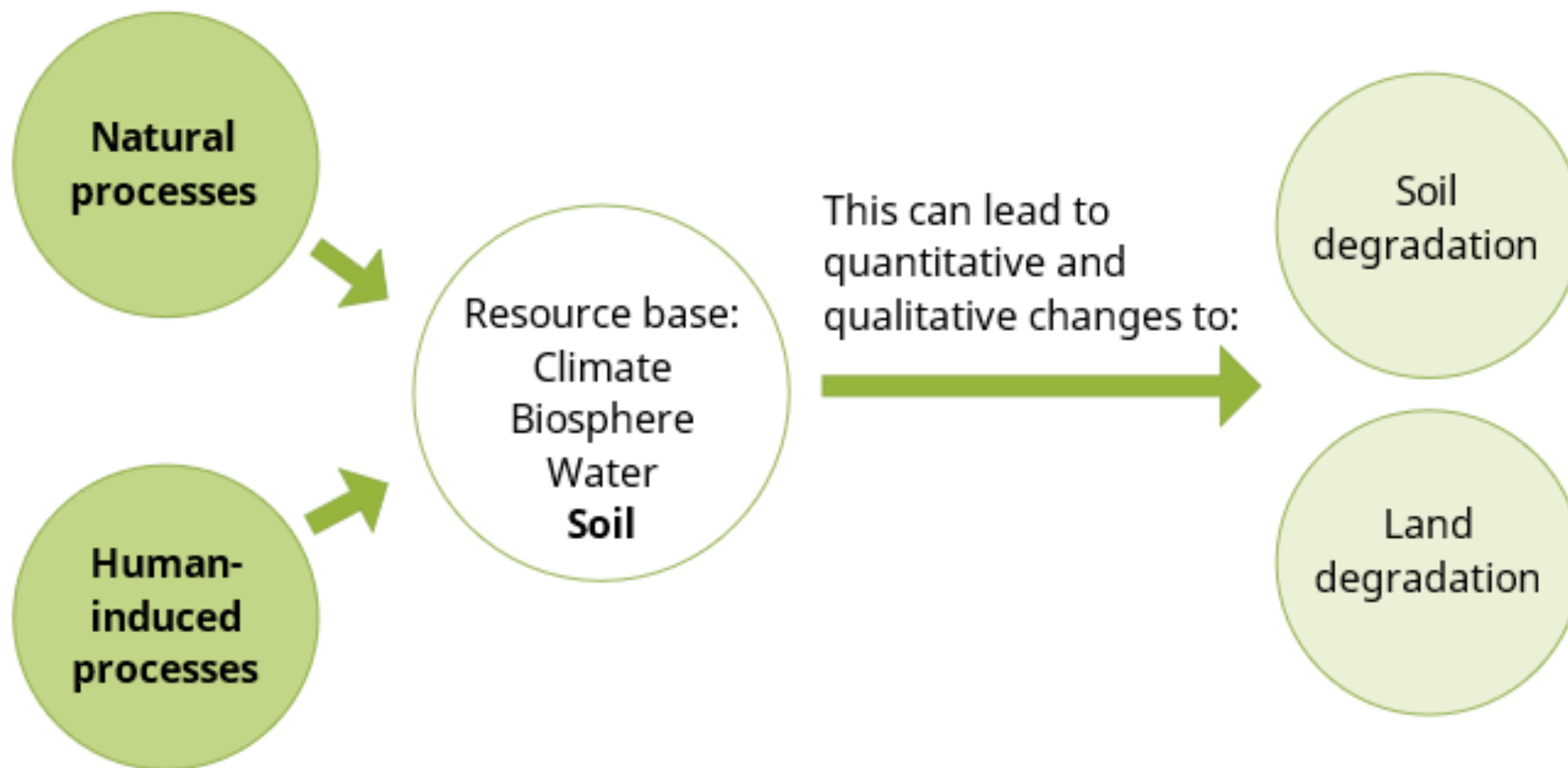- Lack of education
- Poverty

Causes of land degradation

To summarize how land use and management determine the effect of human activities on land degradation or conservation:

Natural processes (such as soil erosion by wind and water, hurricanes, landslides, floods) may lead to land degradation.

Natural processes

Human-induced processes could mitigate, but could also accelerate effects on natural processes.

Human-induced processes

Resource base:
Climate
Biosphere
Water
Soil

This can lead to quantitative and qualitative changes to:

Soil degradation

Land degradation

Sustainable Land Management (SLM)

? | <u>What to do to reverse land and soil degradation?</u>

Sustainable Land Management (SLM) is the answer.

The United Nations define SLM as follows:

* **Sustainable land management**
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 (UN Earth Summit, 1992).

* <u>Definition of SLM provided by TerrAfrica</u>

SLM and land restoration

Sustainable land management is different from land restoration.

> ✱ **Land restoration**
> Is the process of ecological restoration of a site to a natural landscape and habitat, safe for humans, wildlife, and plant communities.

This is an example of land restoration from poorly managed cropland to natural habitats.

Cropland

Natural habitats

Land restoration can enhance the supply of valuable ecosystem services that benefit people through conservation and/or conversion of damaged land systems into their natural conditions.

SLM challenges

Globally, it is estimated that over two billion hectares of land can be subject to restoration and rehabilitation through the application of SLM tools. Promising sustainable land management options are available to reverse land degradation. However, the adoption of SLM by land users/farmers is far beyond satisfactory.

There can be a weak connection between science and practice.

Poor recognition of bio-physical and socio-economic interaction may impede land managers to address simultaneously environmental, productivity and socio-economic benefits of land management.

There can be limited financial resources, lack of coordination and support from governmental structures at all levels.

There can be absence of decision support tools and/or evidences or not awareness of already existing tools.

Stakeholders may be reluctant on the costs and benefits of SLM.

The most frequent weaknesses observed for SLM adoption are usually the low awareness of stakeholders and the strong dependence on external subsidies and technical support.

SLM as a response to land degradation

? | How can communities and governments involved in SLM tackle these issues?

I will be convinced only when I see real benefits for me and my community.

SLM needs long-term commitment from the government institutions.

Adoption of sustainable management practices is usually lead by imitation. In order to facilitate upscaling of SLM, policies have to facilitate the spread of information, support capacity building, and encourage **local communities'** participation.
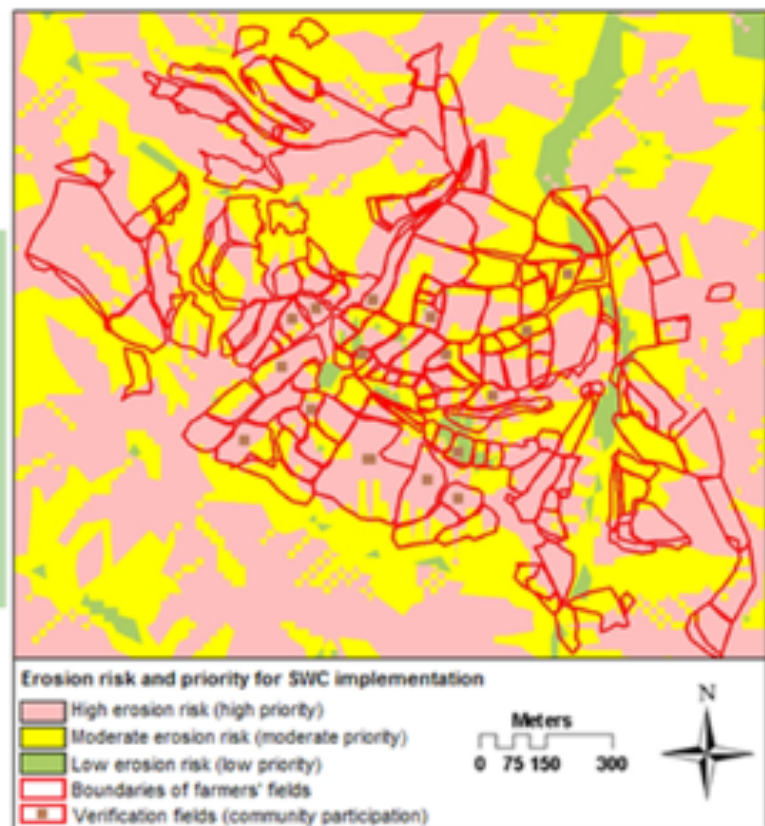
Government commitment needs to be supported by extension service, increased investment and business opportunities that demonstrate its impacts and benefits, financial compensation schemes for ecosystem services provided by SLM, training and dissemination of existing best practices.

SLM as a response to land degradation

Traditional knowledge merged with advanced research results must be adapted to climate, soil condition, topography, level of mechanization, population density, and local conditions (Schwilch et al., 2014).

Erosion risk and priority for SWC implementation

- High erosion risk (high priority)
- Moderate erosion risk (moderate priority)
- Low erosion risk (low priority)
- Boundaries of farmers' fields
- Verification fields (community participation)

Meters
0 75 150   300

N

For example:
This erosion priority map was produced with an active participation of communities and field verification, and areas at high risk of erosion were identified and targeted with optimum soil and water conservation (SWC) measures.

Source: Al-Wadaey and Ziadat, 2014, *A Participatory GIS Approach to Identify Critical Land Degradation Areas and Prioritize Soil Conservation for Mountainous Olive Groves*.

SLM as a response to land degradation

Promising sustainable land management (SLM) options are available to reverse land degradation.Yet, land degradation and desertification are threatening people's livelihoods and food security, particularly in the dry areas with un-favorable climate variability and change. We propose a guiding opportunistic approach to reverse this trend.


This photo shows the implementation of SLM in farmers' fields by the whole community.

The approach helps in identifying target areas where adaptable SLM options have high potential of success (**similarity analysis**) and to be coupled with an implementation and scaling-out program that is supported by proper policies and financial mechanisms.
This also requires continuous assessment of the impact and fine-tuning based on future fluctuations.

Source: Ziadat et al. 2014, [Living land](.).

The LADA-WOCAT tools

The main purpose of **LADA-Local level assessment** is to provide a standard methodological approach for the assessment of land degradation processes, their causes and impacts at local level in collaboration with local stakeholders and communities. The approach also assesses the extent to which land resources (soil, vegetation, and water) and landscapes/ecosystems are being conserved and/or improved by SLM practices.

The LADA-Local assessment method is documented in two interlinked manuals:
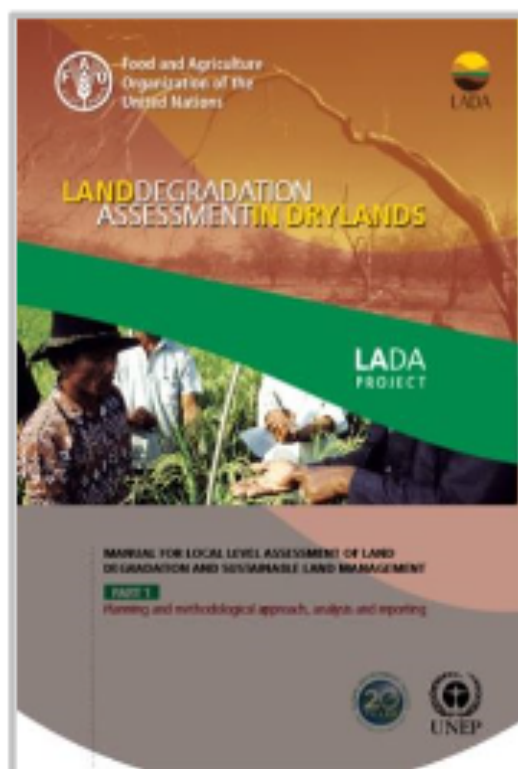
Part 1

Planning and Methodological Approach, Analysis and Reporting
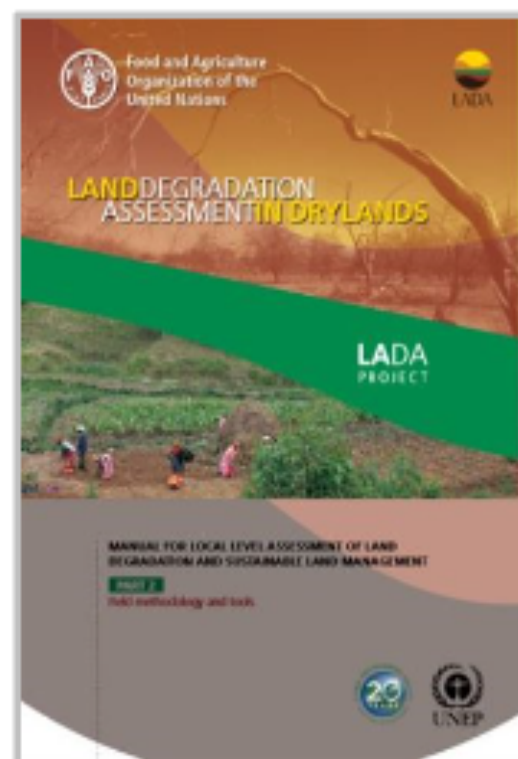
Part 2

Field Methodology and Tools

Thank you