Land degradation neutrality

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Land degradation, desertification and land degradation neutrality: definitions

Land degradation is a threat to sustainable development. The term refers to both:

- The decline in biological and/or economic resilience of land when exposed to stress and/or perturbations and
- The loss of the land's adaptive capacity to support basic ecosystem functions (primary productivity, nutrient recycling) after a stress or a perturbation.

The effects of land degradation extend far beyond local or regional scales, because of: a) the connections within the ecosystem – e.g. loss of biomass through vegetation clearance and soil erosion, produces greenhouse gases that contribute to global warming and climate change; and b) the connection between the ecosystem and the sociosystem, e.g. loss of soil and land (in quality, quantity, accessibility), through soil erosion and/or lack of soil restoration, rehabilitation or reallocation, results in land abandonment that contributes to urban migration and/or international migration.

Land degradation is caused by multiple drivers. The various processes involved (alone or in combination) include those generated by human activities (i.e. water and wind erosion, overcultivation, overgrazing, inappropriate uses of natural resources (uprooting of woody areas and excessive clearing). During the 20th century, land degradation has accelerated as a result of the increasing and combined pressures of agricultural and livestock production, urbanization, deforestation, land grabbing, and extreme weather events such as droughts. Land degradation results in each place from an original combination of biophysical, social, economic and political factors.

Although land degradation can occur in any climatic zone, land degradation in arid, semi-arid and dry sub-humid areas[1] is referred to as "desertification". These drylands represent about 41% of the total surface of worldwide terrestrial ecosystems. It is estimated that 10% to 20% of drylands are affected by land degradation (MA, 2005), with severe and extensive desertification in Africa and in Asia. The 2 million or so people who inhabit the drylands suffer from the lowest human well-being and the highest poverty (Thomas, 2008). Nevertheless, drylands provide a wide range of commodities. For example, cotton provides about 30% of annual incomes from export for Burkina Faso, and for Mali (Reed and Stringer, 2016). However, land productivity relies on natural resources there more than in any other region in the world. In these zones, productivity, largely dependent on precipitation, is strongly affected by climate change. It is thought that up to 50% of the Earth's surface will face frequent droughts by the end of 21st century under a "business as usual" scenario. Drylands in northern Africa and southern Europe are likely to become dryer. A potential increase of 1-3°C in drylands (if CO_2 concentrations reach 700 ppm) would result in an increase in the evapotranspiration by 75-225 mm per year (Burke et al. 2006; D'Odorico et al. 2013)

The following statement: "[there is a] need for urgent action to reverse land degradation. In view of this we will strive to achieve a land degradation neutral world…." (paragraph 206 of "The future We want", Rio+20, 2012) sets the goal for maintaining a world where the total amount of degraded land remains constant. In 2015, UNCCD defines "Land Degradation Neutrality" (in areas affected by desertification) as 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". This could be achieved by a) sustainable management of land to reduce the rate of degradation; or b) increasing the rate of restoration of degraded land, so that these two trends converge to a zero net rate of land degradation. Very recent publications (see Chasek et al. 2015; Grainger, 2015) have examined the bottlenecks and assessed the feasibility of the operationalization of LDN.

1. Ratio of annual precipitation to potential evapotranspiration within the range of 0.05 – 0.65.

Box 1
Policy context

The Agenda 21 at the Earth Summit in 1992 at Rio de Janeiro was an opportunity to address the various domains for sustainable development:

• The Convention on Biological Diversity (CBD) targets "the conservation of biological diversity the sustainable use of its components and the fair and equitable sharing of the benefit arising out of the utilization of genetic resources" (for more detail, see https://www.cbd.int/doc/legal/cbd-en.pdf)

• The Convention on Climate Change (UNFCCC) targets the "stabilization of greenhouse concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system…" (for more detail, see http://unfccc.int/files/essential_background/convention/background/application/pdf/convention_text_with_annexes_english_for_posting.pdf)

• The Convention to Combat Desertification (UNCCD) aims "to combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach which is consistent with Agenda 21" (for more detail, see http://www.unccd.int/en/about-the-convention)

There are obvious links between these 3 Rio Conventions. For example a special report on "Climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems will be drafted for the 6th IPCC assessment report, and in 2015 IPBES launched an assessment of land degradation and restoration (global status and trends in land degradation and state of current knowledge). At the crossroads of these 3 Conventions, soils and organic carbon stocks play a key role in strengthening a triple gain in mitigation, adaptation and food security solutions. The recent adoption of the 17 Sustainable Development Goals (September 2015, https://sustainabledevelopment.un.org) by the United Nations reinforces the "nexus" Food security (SDG 2), Land Degradation (SDG 15) and Climate Change (SDG13).

Box 2
The French Scientific Committee on Desertification (CSFD)
http://www.csf-desertification.eu/

Launched in 1997 by the French Ministry of Foreign Affairs, the Ministry of Ecology and Sustainable Development, and the Ministry for Higher Education and Research, CSFD is an independent multidisciplinary committee (20 members from the main French scientific research institutions) providing policymakers and civil society stakeholders in France and affected countries with updated science-based evidence of causes and impacts of desertification (http://www.csf-desertification.eu/dossier contains examples on "Carbon in dryland soils", and "Ecological engineering for sustainable agriculture in arid and semi-arid West African regions"). CSFD is actively involved in several networks, e.g. "DesertNet International"

Box 3
Operationalization of land degradation neutrality (LDN)

An estimated US$40 billion annually is attributed to land degradation worldwide. Additional costs resulting from, for example, increased fertilizer use and loss of biodiversity must be taken into account. Degraded land is costly to reclaim and, if severely affected, may no longer provide a range of ecosystem functions and services, with a loss of goods and many other potential environmental, social, economic and non-material benefits that are critical for society and development.

Strategies to implement the LDN scheme are organized in five steps (Chasek et al. 2015):

• Step 1: **Scoping scale and domain**: although the ambition of LDN is to address global issues, since local land degradation directly affects land inhabitants, any plan for LDN actions needs to determine the spatial scale and the thematic domain targeted,

• Step 2: **Mapping degradation**: Monitoring the implementation of LDN (Step 5) necessitates the definition of baselines. This means classifying and mapping the lands in the areas where LDN is to be achieved, i.e. the identification of lands already degraded and lands under degradation, but also lands not degrading – the difficulty being to differentiate these states along a continuum.

• Step 3: **Prescribing relevant practices**: Good practices in sustainable land management (SLM), when implemented in a given context, lead to improved land management performance. Several criteria determine whether a practice is a good or relevant one. Several regional or international initiatives focus on guidelines and best practices, but more should be done particularly in terms of:

- Stakeholder knowledge brokering systems to share best practices.
- Economic valuations of the best practices.

Practices which do not degrade the land, or which reduce or fight against degradation are relevant if they are targeted and appropriate to the context and to the state of the land degradation, accepted and fair according to the points of view of all stakeholders. That means:

– They should take into account the specificities of the place and its connexion with its immediate (local) and global environment.

– They should be appropriate to the type and severity of the damage, taking into account the the intrinsic characteristics of the place, the climate and human activities, the temporal dynamics and the spatial diversity of the degradation, the multifunctionality of landscapes and the diversity of stakeholders.

– They should be built with several stakeholders and based on experienced practices (e.g. zaï, cordon pierreux).

– They should promote a judicious combination of practices (e. agroforestry, agroecology, integration of agriculture and livestock practices), and their integration in existing exploitation and territorial systems.

– They should be applied without taking the risk of affecting other areas or systems near or far , and within a legal framework.

• Step 4: **Monitoring**: Earth Observation, Official Statistics, with supported by survey sampling/grounds measurements and citizen sourcing will be used to monitor, detect and validate the changes in the sub indicators. Several international and regional organisations

(FAO, OSS, JRC, NASA, ESA) have developed a methodology (land cover classification system) and databases that could be used. One of the key ways to ensure effective LDN monitoring is to set up baselines on land cover information, land productivity and for carbon stocks to determine the initial status of the sub-indicators. The challenge is therefore to use appropriate indicators. In line with SDG target 15.3 and to monitor progress, the indicator: "the percentage of land that is degraded over total land area", is being considered by international organizations (UNCCD, FAO, CBD) and would be based on the use of three metrics:

- Land cover and land cover change
- Land productivity
- Carbon above (plant biomass) and below (soils) stocks

The resulting indicators will allow countries to focus on the relevance and effectiveness of current land and planning policies and agricultural practices.

This monitoring approach should be accompanied by local and participatory initiatives including a broad range of stakeholders. Countries will also need adequate capacity building in data interpretation and validation and their use to inform national authorities and international reporting.

Box 4
LDN Fund

In order to achieve Land Degradation Neutrality (LDN) by 2030, an independent fund – the LDN Fund project – was announced during UNFCCC COP 21 in Paris. The LDN Fund intends to raise capital from public and private institutions and to directly or indirectly finance initiatives that promote land rehabilitation and sustainable land management in all countries. The Fund will adopt a collaborative approach, complementing and leveraging existing initiatives. It is expected to partner with other fund managers and financial institutions, including local banks and microcredit agencies to increase scale and impact. Some concerns regarding the Fund's orientation (restoration vs degradation, land status) and structuration (funding platform model, civil society involvement) have been expressed by various partners. Discussions are still on-going during the first semester of 2016 and it is expected that the fund will become operational by the end of 2016

Box 5
LDN Action Plan

Following its initiative "Towards achieving Land Degradation Neutrality: turning the concept into practice" with 15 countries, UNCCD secretariat has launched a LDN Target Setting Programme (LDN TSP), designed to help countries familiarize themselves with the methodological and operational LDN approaches and to support countries (technical guidance and expertise, capacity building) in defining baselines related to the LDN indicator and set LDN targets. More than 80 countries are already involved in this programme. Analysis of LCD National Action Plan of should be also undertaken to identify the key points (legal, scientific, governance) where synergies with LDN could be implemented.

Box 6
Soil carbon stocks:
the Food Security (SGD 2) – Climate Change (SDG 13) – Land degradation and desertification (SDG 13) nexus

At the COP 21 in December 2015 in Paris, Stéphane Le Foll, the French Minister of Agriculture, launched an international initiative called "4 per 1,000, soils for food security and climate change" (see https://youtu.be/JMWpPfhJVzc). This expresses at the global scale the ratio of annual CO_2 increase in the atmosphere (4.3 billion tonnes of C on average over the period 2004-2013) and soil carbon stock up to 30 cm deep (about 800-1,000 billion tons of C). It illustrates the fact that land management practices are key to global GES mitigation (SDG 13). Above and beyond the benefit that storage can represent in the fight against the accumulation of greenhouse gases, soil organic carbon is one of the main indicators of the quality and fertility and hence productivity, which is essential for food security (SDG 2). In family agriculture in LDCs, the management of organic materials (crop residues, crop-livestock integration, recycling organic urban waste, etc.) is at the center of farmer practices to maintain or improve yields and fight against land degradation (SDG 15), particularly soil erosion. Their management also helps overcome the scarcity of mineral fertilizers, which are only partially available and certainly less accessible to farmers.

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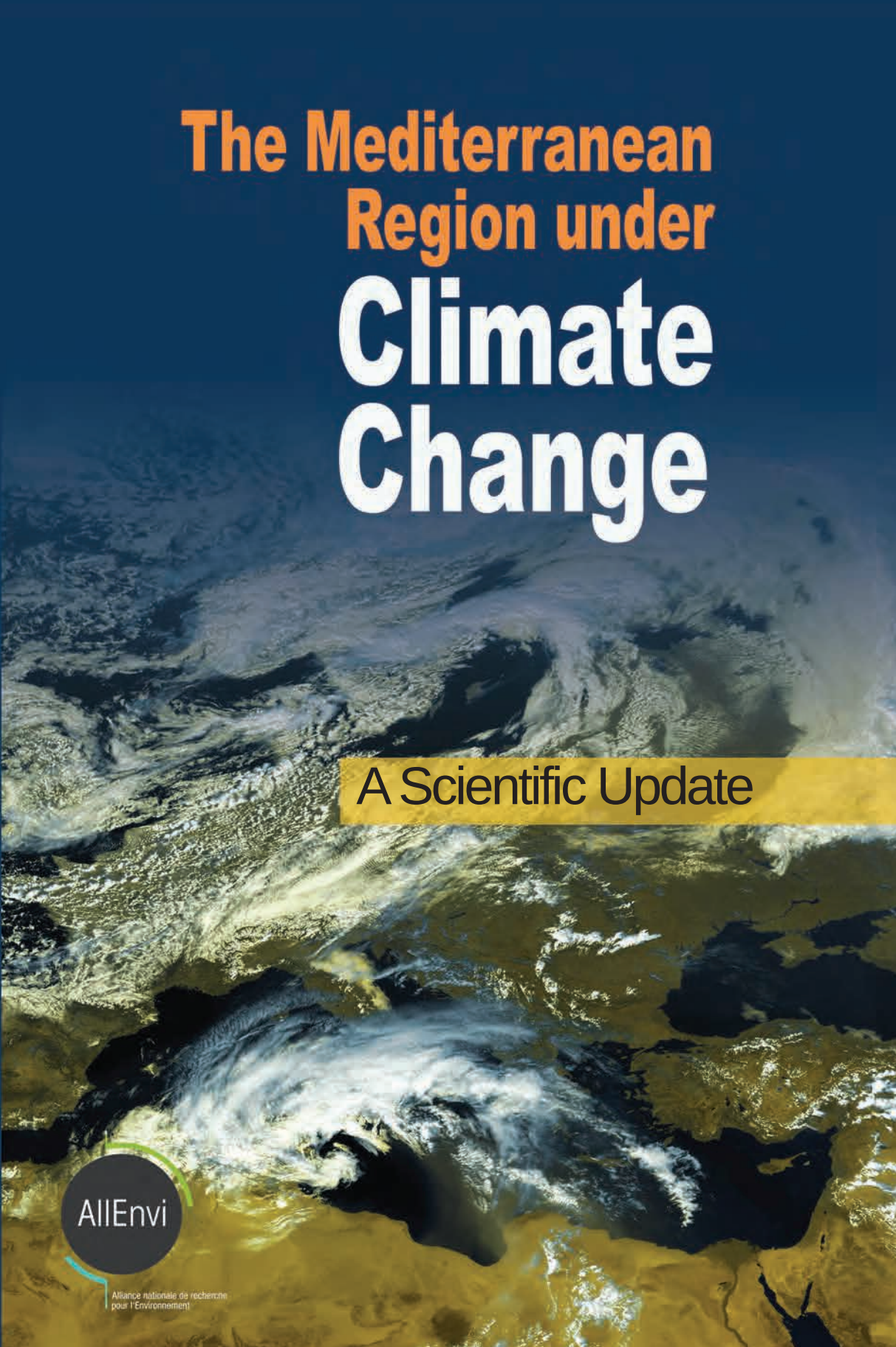
The Mediterranean Region under Climate Change

A Scientific Update



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