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Land degradation neutrality

Land degradation is an obstacle to sustainable development due to its impact on the environment, food security, agroecosystem service provision and people's livelihoods. It is a combined local, regional and global problem that—in addition to drylands—affects areas worldwide. A global concerted effort is thus needed to halt and reverse this phenomenon. The land degradation neutrality concept has emerged to mobilize the international community to cope with the issue.

CONCEPT

Land degradation neutrality (LDN) is one of the concepts that has emerged from international bodies.

In 2015, the United Nations Convention to Combat Desertification (UNCCD) defined LDN—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 ecosystem**". LDN encompasses both sustainable development and combating land degradation and is hinged on two key points:

- global food security, through the reduction of cultivated land degradation and restoration of degraded lands
- preservation and restoration of ecosystems to maintain the flow of ecosystem services that enhance human wellbeing.

EVOLUTION OF THE CONCEPTS

2012

- The zero net land degradation concept developed for dryland regions (UNCCD) in preparation for Rio+20.
- Five paragraphs in the Rio+20 text devoted to combating desertification, including § 206 which highlights the need for urgent action to reverse land degradation and strive to achieve a land-degradation neutral world[13].

2013

- Creation of a UNCCD working group to define LDN and support its implementation.
- Launch of a UNCCD pilot project designed to implement and monitor the LDN concept in 14 volunteer countries[7].

2015

- UN adoption of the Sustainable Development Goals (SDGs), including SDG 15 "protect, restore and promote sustainable use of terrestrial ecosystems…", and target 15.3 "…strive to achieve a land-degradation neutral world."
- Adoption of the LDN definition by UNCCD, and inclusion of SDG 15 and target 15.3 in the implementation strategy.
- Inclusion of LDN targets and projects in national action programmes.
- Selection of indicators for monitoring and assessing LDN implementation.
- Development of options to increase incentives and financial support by the Global Mechanism and project to create an independent LDN fund.

DEFINITIONS

Land degradation is the "reduction or loss of the biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes, including processes arising from human activities and habitation patterns, such as soil erosion caused by wind and/or water, deterioration of the physical, chemical and biological or economic properties of soil, and long-term loss of natural vegetation."

Desertification is "land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities."

Source : UNCCD

WHAT STRATEGIES ARE NEEDED TO REALLY ACHIEVE LDN?

According to the UNCCD, three types of action could reverse land degradation:

1. **Avoid** degradation and reduce the risk factors on non-degraded lands (including the adoption and intensification of sustainable land management [SLM] practices)
2. **Reduce** land degradation (when degradation is under way)
3. **Restore** degraded land.

The priority is to avoid and reduce degradation and its associated drivers, and, as a last resort, to offset inevitable or already produced degradation via restoration.

Each of these strategies could be implemented in five steps[2].

Step 1. Scoping
Development and implementation of an LDN strategy in an area (application scales, diagnostic methods, etc.)

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Step 2. Mapping degradation
Classification of land use and the state of degradation and productivity—according to experts (local scale), remote sensing (NDVI) and/or biophysical modelling—to define degraded areas, their spatial distribution and quantitative extent.

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Step 3. Prescribing
Prescribing—social, organizational and human techniques—relevant management approaches and practices for each land class.

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Step 4. Implementation of the selected practices
SLM, reduction in degradation, restoration or rehabilitation of degraded lands.

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Step 5. Montoring-assessment

STAKEHOLDERS AND GOVERNANCE

The inclusion of LDN in SDGs gives this concept broader scope than in the UNCCD framework—the aim is to achieve a land degradation neutral world resulting from the sum of neutralities achieved worldwide.

LDN implementation entails addressing the governance, roles and positions of a diverse range of stakeholders involved at different scales and whose power relations and modes of cooperation will determine the medium- and long-term results. Regardless of the LDN arrangements, its social acceptability and impacts of its implementation will determine the success of the actions.

Nationally, the five implementation steps are as follows[2]:

1. **Scoping** involves developing an LDN application strategy in the country, and the necessary dialogue; it must include multi-stakeholders and can be grouped within a national steering committee.
2. **Zoning/assessment** should take the ecological, socioeconomic and vulnerability aspects into account. UNCCD could propose a minimal dataset to guide the implementation. This work is coordinated by the steering committee with the support of experts and international organizations. Local committees, including local authorities, NGOs and community organizations, are associated with the diagnostic work.
3. **Prescription** involves selecting LDN projects/activities applicable to each area. Guidelines, which are drawn up under the responsibility of the steering committee, specify the requirements and support the implementation. The national steering committee has a coordination and monitoring-assessment role in this implementation. Local committees enable sustainable involvement of stakeholders, local authorities and community representatives. Local stakeholders are supported by project team members and/or technical experts. Local NGOs serve as facilitators.
4. **Implementation of the selected practices** requires guidelines that are locally adapted in the framework of public or privately funded projects. Irrespective of the funding source, operators can be private, e.g. NGOs, companies, farmers' organizations, etc., or public, e.g. governments and their technical services, decentralized, etc. Dialogue between these different stakeholders is essential for territorial coherence regarding the incorporation of environmental and food security issues. Operators can act individually or in consortiums in projects that meet the guidelines. Local authorities—local guarantors of the guidelines—have a facilitator and mediator role between project operators and local populations. Scientists and civil society representatives have an advisory role to facilitate project implementation at the local level, while ensuring that people's needs are taken into account.
5. **Monitoring-assessment** is geared towards local (projects) and national scales. Indicators regarding local projects fuel the national database, which centralizes the results in a streamlined manner and should enable their aggregation in terms of achieving neutrality. Local projects are assessed by project coordinators and local stakeholders in an apprenticeship phase.

OPERATIONALIZATION – THE UNCCD PILOT PROJECT

Since 2015, this project has been aiming to develop a framework for LDN implementation and monitoring in 14 affected volunteer countries. Note:

- The national action programme is the institutional framework adopted. Synergy/complementarity will be sought with other conventions.
- The LDN implementation and monitoring scale is national, and applicable locally via selected intervention sites.
- The stakeholders are national—implementation team—and international—interdisciplinary advisory group (country, private stakeholders, international NGOs, research organizations, international organizations).
- Technical aspects: UNCCD progress indicators[12]—land cover, land-use change, land productivity change, soil organic carbon content[3]—enable the assessment and mapping of land degradation at the national level. The choice of pilot sites and type of intervention is based on the land degradation maps and classification[8].

National reports are available on the Convention site*. Land degradation reference mapping and priority site determination are carried out for all countries, while also characterizing the degradation factors[7]. National targets, itineraries, action plans and budgets have yet to be defined. Recommendations will be drawn up from these reports, such as using finer resolution satellite data, defining the limits of validity and establishing national monitoring systems. The 2nd phase of the project will be extended to 60 countries.

* www.unccd.int/en/programmes/RioConventions/RioPlus20/Pages/LDN-Project-Country-Reports.aspx

DIAGNOSIS AND ASSESSMENT

Assessing the extent of land degradation and the effects of restoration and rehabilitation initiatives helps estimate the situation relative to the LDN concept.

At the global level, after the first global assessments of land status based on expert opinions and field data (e.g. Global Assessment of Soil Degradation, GLASOD) —which were deemed useful for sounding the alarm but unreliable—recent assessments were conducted using satellite data.

These approaches use long series of measurements (obtained via the NOAA satellite AVHRR probe) of the normalized difference vegetation index (NDVI), which is essential for monitoring seasonal changes in vegetation and detecting trends over several decades. The Global Assessment of Land Degradation (GLADA) project[6] measured fluctuations in primary productivity, which is nevertheless still quite low in dryland areas. The 1 km maximum resolution of these data enables detection of regions with 'abnormal' features. It is possible, by zooming in on more detailed images (e.g. Landsat and SPOT satellite images), to diagnose the corresponding degradation/improvement, with validation by field observations (see World Atlas of Desertification).

The reduction in the rain use efficiency coefficient is also a quite reliable degradation indicator in dryland regions, but rainfall data are often of poor quality.

In summary, although satellite images can reveal changes, currently available land degradation/improvement assessment methods are still too general and imperfect. Effective LDN monitoring requires harmonization of assessments and continuous data collection Moreover, soil organic carbon content seems to be one of the most promising land status indicators, but this parameter is still hard to measure, even by remote sensing.

At the project level, monitoring requires that there is access to qualitative and quantitative information on the initial situation, and that:

- the same information is collected during the project, at the end of the project and 10 years thereafter; ideally, a baseline 'without project' situation, in a similar setting, should also be available and monitored to be able to determine the 'natural' evolution of the initial situation
- there is a rigorous protocol for data collection that is applied during each monitoring session
- there is a sufficient number of simple indicators that are representative of the concerned areas.

Indicators—biophysical, quantitative of production, economic and financial, institutional and societal—of project impact have been selected by CSFD[1]. They are listed in various publications and widely used, but not as yet presented systematically in a given framework.

LAND RESTORATION

Land degradation—if it cannot be stopped or avoided—must be offset by the restoration of degraded land. This is recognized as a way to enhance native biodiversity and ecosystem services that are provided by well-functioning ecosystems.

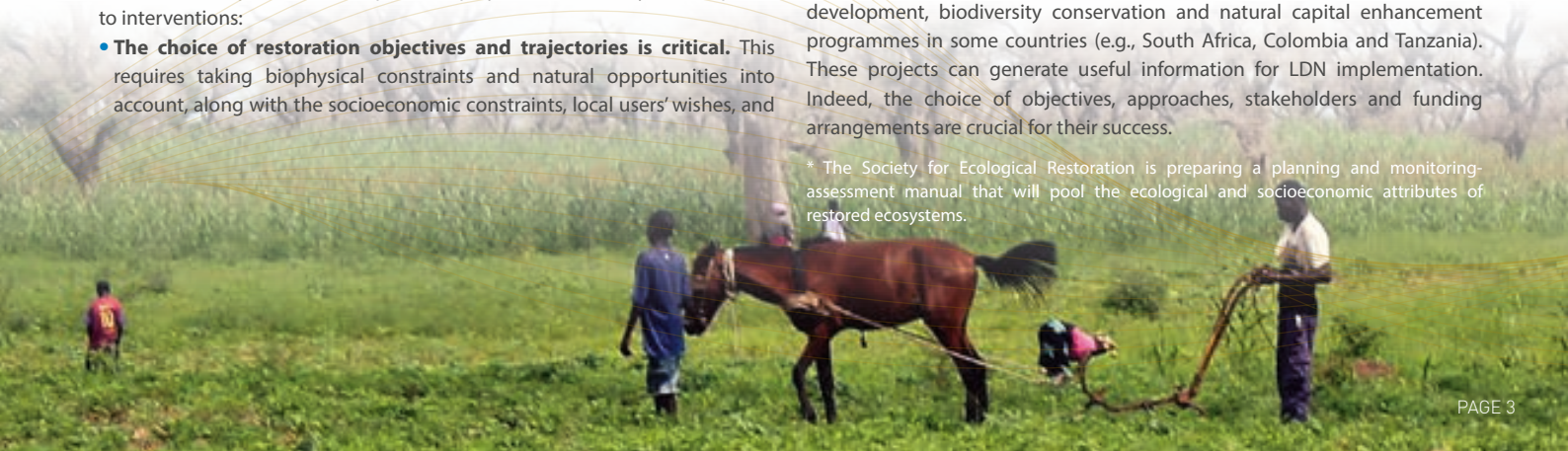
However, this response to degradation is expensive and time consuming, and should not be seen as a license to degrade or as a large-scale compensation system. We are still very far from having complete success with existing science and technology to fully restore any ecosystem type.

Many terms—ecological restoration, rehabilitation, restoration of natural capital—are used to define different forms of restoration. Most of these operations are not intended to restore in the fullest sense of the word some presumed pre-disturbance or "original" nature, as indeed in most cases that is impossible. Instead, the goal is to change directions—away from degradation and towards repair. What needs repair will differ in each case, but in simple terms, it's a matter of recovering ecosystem components, i.e., native biodiversity, and ecosystem functions and processes. There are a variety of approaches, with variable costs and objectives depending on the ecosystem functions chosen for special attention. The flow of ecosystem services of various kinds, as defined by the Millennium Ecosystem Assessment, can help orient programmes and set priorities[4,10]. For LDN, the selection of objectives regarding ecosystem functions and services will determine the different methods that could be implemented, and which may have variable results and different impacts on development of projects and on ecosystem response to interventions:

- **The choice of restoration objectives and trajectories is critical.** This requires taking biophysical constraints and natural opportunities into account, along with the socioeconomic constraints, local users' wishes, and operational potential. Some authors[4] have discussed the need to develop a holistic vision and protocol that encompasses conservation and services. Approaches aimed at restoring a maximum of ecological functions, enabling the provision of several ecosystem services, and enhancing biodiversity are needed to achieve successful results.
- **Assessing the effectiveness of ecological restoration is difficult.** This is often done on the basis of the attributes of restored ecosystems*. New methodological assessment tools have been recently developed. Studies[5,9] have shown the high effectiveness of some restoration initiatives, with an increase in ecosystem services relative to the degraded reference situation, but without as yet achieving the quality and quantity of services as are provided by an undegraded, or intact, ecosystem of the same type. Clearly, efforts aimed at the restoration of a single ecosystem service may induce possible losses or less than satisfactory recovery of other essential services.
- **Costs differ markedly depending on the objectives:** restoration costs have been reported ranging from US$20 to 4 000/ha, and maintenance costs from US$22 to 287/ha/year[14]. It is therefore essential: (i) that there are efficient financial incentives to carry out restoration initiatives and (ii) that farmers receive funds to cover restoration costs. Studies have shown that restoration leads to a substantial gain for society as a whole, but funding through payments for ecosystem services is limited, and restoration based on market or commercial mechanisms is a risky business. Commercial land restoration is sometimes discussed, but without defining the associated contents, expectations and rules.

Large-scale ecological restoration is financed in the framework of economic development, biodiversity conservation and natural capital enhancement programmes in some countries (e.g., South Africa, Colombia and Tanzania). These projects can generate useful information for LDN implementation. Indeed, the choice of objectives, approaches, stakeholders and funding arrangements are crucial for their success.

* The Society for Ecological Restoration is preparing a planning and monitoring-assessment manual that will pool the ecological and socioeconomic attributes of restored ecosystems.



SOCIOECONOMIC ASPECTS OF LDN

The tangible impacts of LDN will depend on the upstream implementation choices of countries. Compensation tools and ecosystem service payments enhance the opportunities in terms of innovative financing.

LDN leads to a 'stabilized' situation in terms of land productivity losses and gains. Gains concern the difference between an 'inaction' situation and a situation 'with limited degradation, prevention or restoration'. Collective and global gains from LDN are referred to as 'costs avoided by neutrality', which immediately raises the question as to the allocation and beneficiaries of avoided costs and resulting gains (monetary and quality of life).

The spatial impact of LDN raises questions: Who can legitimately make land-use choices? How can the loss-gain balance be measured *ex ante*? Negotiation and a contract approach could serve as a model for determining reference areas that could, over time, be used to achieve neutrality. In this respect, an external organization would be appropriate for commercial restorations of large areas with an ecological/environmental objective. Its legitimacy would be questionable when targeting smallholders, land users and rural societies, their collective and territorial resources and improving their livelihoods.

A major impact concerns land property rights: LDN could *de facto* lead to gradual land dispossession for many land rights holders if, for instance, countries opt for commercial restoration projects to offset land degradation without accounting for local rights on these restored lands.

The results of compensation studies could serve as a benchmark for designing neutrality implementation tools focused *de facto* on market mechanisms.

Compensation can be used to mitigate the impacts of large-scale development projects. This compensation can be:

- **'Anticipatory' (*ex ante*)** by focusing on programmed/expected land productivity losses, and should then be included in environmental laws and regulations. This compensation is programmed in environmental impact studies and participatory discussions are essential so that it can be collectively defined.
- **'Restorative' (*ex post*)** (in case of unforeseen damage or natural disasters) while determining the compensatory measures to implement and allowing off-site repairs.

It is essential to take the specific features of neutrality into account and explain the extent to which the compensation tools are relevant for LDN, in what setting, and the boundaries. There are speculative risks associated with the international funding arrangements when private investors are competing on the rights market. There is also a risk that financial operators will rush towards this new manna consisting mainly of national public funds, leading to the emergence, in the medium term, of new financial bubbles.

In legislative terms, the **compensation obligation concept** is based on European Directive 2004/35 on environmental liability, which was transposed into the French eponymous law of 1 August 2008. According to the Directive, "compensation consists of additional improvements to protected natural habitats and species or water at either the damaged site or at an alternative site. It does not consist of financial compensation to members of the public."

DRYLAND REGIONS – PASTORALISM

In dryland areas, the LDN initiative should—in addition to the protection and restoration of agricultural land—focus on pastoral lands spanning large areas. Their degradation involves a significant and sustainable, quantitative and/or qualitative loss of forage resources accessible to pastoral livestock. This degradation leads to a loss in herd productivity, in turn impacting the income and food security of livestock farmers and their families.

Pastoral land degradation can have several causes, including crop and livestock farmers' practices, but may also be due to the implementation of unsuitable public development and pastoral resource management policies.

Crop farmland extension in these areas, which are subject to severe climate hazards, is often done at the expense of grazing resources for pastoral systems, which are more ecologically and economically adapted to these climatic constraints.

In agropastoral areas, it is thus essential to support all land-use policies that enable integration of these two complementary activities, especially on the regional scale. Investment in land restoration and physical development should be incorporated in a broader and more demanding support of public stakeholders, i.e. governments and local authorities, local communities and groups of herders in the governance of these areas.

In pastoral areas, LDN initiatives could apply to vast areas utilized by mobile and diversified livestock herding systems, which are the only systems able to take advantage of these resources typical of imbalanced environments. The many lessons learned from the implementation of pastoral development policies over the last 40 years should be taken into account in order to support innovative strategies regarding this area. The restoration of these broad ranging pastoral lands requires strengthening of the security of mobile herding, which is essential for sustainable management of these ecosystems and for the socioeconomic viability of people living in these areas[11].

LDN initiatives should thus stimulate the economy and efficient governance of these lands to the benefit of the concerned pastoral and agropastoral societies. When investment comes from private funds, it is essential to be particularly cautious regarding the community and public drivers of the planned initiatives. Initiatives shoud: (i) support concerted development approaches at a spatial scale corresponding closely to the extent of pastoral mobility, (ii) invest in water resource development, consistent with the principles for the development of public pastoral livestock watering sites and controlled and fair access, which requires effective negotiations between governments and communities. Beyond the substantial physical investments required in this area, a 'land security' component and strengthening of local and regional stakeholders' capacities in the prevention and fair management of pastoral resources are essential.

RISKS

LDN action plans and their implementation are based on political, technical and financial choices that lead to different approaches, which in turn determine their social, environmental and economic impacts, with associated risks and limitations.

- **Political and governance challenges.** Technical solutions or sustainable land management (SLM) practices alone are not enough, LDN implementation should be accompanied by land policies, land-use planning and management[7]. There is a risk of political lobbying due to the presence of certain stakeholders with greater political or financial clout. Governments should enforce the implementation of laws and regulations through good governance.
- **Choice of objectives and techniques.** There is a high risk of favoring degraded land restoration—which has greater visibility—rather than avoiding or reducing degradation, leading to degradation displacement and loss of natural capital. The LDN objective should not represent a license or encouragement to restore degraded land at one place to compensate degradation elsewhere. LDN should be implemented in coherent territorial entities, integrated in local and national development plans, with devolution to users and their organizations. The fate of the restored lands should be foreseen. At each site, land degradation is the result of a combination of biophysical, social, economic and political factors that should be determined through accurate assessments. It is also important to identify suitable measures to eliminate or reduce these factors. Otherwise there is a risk of promoting run-of-the-mill formulas that may be inappropriate, ineffective or even harmful. Enhanced management or restoration options are hard to identify because they must meet with specific local conditions and correspond to development pathways that local communities want or accept. There is a risk that adopted solutions will be incompatible with sustainable family farming development, or unfeasible for local populations. Stakeholders have a key role by participating in decision-making structures and in restoration initiatives and in the adoption of SLM practices. Systematic use of external experts would quash the benefits of apprenticeship and self-designing of the practices, thus reducing the chance of successful LDN implementation.
- **Land, usage rights and social conditions.** The land rights and usage issue is especially important. A lack of clarification and inadequate (and/or unfair) consideration of social rules and users'-managers' rights could lead to marginalization of vulnerable populations and social conflicts. The integrity and cohesion of local and indigenous communities should not be jeopardized, nor should their land rights be weakened by LDN interventions. This would lead to the risk that LDN projects/activities would not benefit local populations, while limiting their role or even prompting their displacement in some cases in exchange for compensatory allowances. The inclusion of local societies in LDN implementation would help to: (i) reduce the negative impacts of projects/activities, (ii) ensure social acceptance at all implementation scales, and (iii) ensure local appropriation and long-term support of local populations.
- **Economic and financial challenges.** Reducing land degradation and restoring degraded lands are expensive, especially when large areas are concerned. The nature and forms of financing dictate the LDN implementation choices and conditions. The origin of the funding, remuneration and type of governance are crucial questions. There is a risk that the grounding of the planned actions is not included in the issues covered in discussions between governments and communities. LDN investments could be misguided and ultimately not (or only partially) benefit local societies. The effects of land restoration on its value and land market changes should be investigated to avoid adverse effects. Land grabbing, commodification and commercialization, or even land speculation via LDN funding should be avoided at all costs, and local land rights (formal and informal) should always be respected.

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Coordination: A. Cornet & R. Escadafal
Authors: J. Aronson, I. Amsallem, M. Bernoux, M. Bied-Charreton, B. Bonnet, L. Bourziq, P. Burger, J.-P. Chassany, A. Cornet, A. Derkimba, R. Escadafal, P. Hiernaux, B. Ivars, M. Loireau, M. Requier-Desjardins.
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Contact:
CSFD
Comité Scientifique Français de la Désertification
Agropolis International
1000 Avenue Agropolis
F-34394 Montpellier CEDEX 5
France
Tel. + 33 (0)4 67 04 75 75
Fax + 33 (0)4 67 04 75 99
csfd@agropolis.fr
www.csf-desertification.eu

CSFD
AGROPOLIS INTERNATIONAL