3rd UNCCD Scientific Conference

9-12 March 2015, Cancún, Mexico

Climate change and land degradation: Bridging knowledge and stakeholders

Outcomes from the UNCCD 3rd Scientific Conference

The Scientific and Traditional Knowledge for Sustainable Development (STK4SD) Consortium

UNCCD United Nations Convention to Combat Desertification · AGROPOLIS INTERNATIONAL · DesertNet International · CGIAR Science for a food secure future · OSS · IADIZA · CONICET · U.N.CUYO · GOBIERNO DE MENDOZA

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Foreword

Human activities are the principal drivers of the processes of land degradation, desertification and climate change. Though highly complex and difficult to predict, interactions between climate change and land degradation are likely to affect a range of different ecosystem functions and the services they deliver, with consequent impacts on food production, livelihoods and human well-being.

Society must therefore mitigate or reverse these stresses through innovative approaches. Cutting-edge modern science and technology will be needed, allied with traditional and local knowledge that has developed over time, within a favourable institutional and political setting. Ultimately, we must change human behaviour and attitudes regarding the use of land and other natural resources. Doing nothing or maintaining the status quo is not an option. To have a fighting chance of securing communities and ecosystems, and of moving towards land degradation neutrality, we must enable land-based adaptation through effective, multi-stakeholder partnerships and collaboration.

The UNCCD 3rd Scientific Conference, held from 9 to 12 March 2015 in Cancún, Mexico, used a novel, participatory approach to explore the various forms of knowledge that link biophysical and social systems, the vulnerabilities of these systems and potential pathways to reach sustainable land management. The conference gathered nearly 300 participants from 90 countries, half of them from the scientific community, and the other half from ministries, government agencies, international organizations and civil society organizations. This document highlights the key issues raised by the conference Impulse Report[1] and discussed by the participants, to come up with specific scientific and operational proposals to achieve impact[2].

The UNCCD 3rd Scientific Conference Scientific Advisory Committee

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The UNCCD Science-Policy Interface

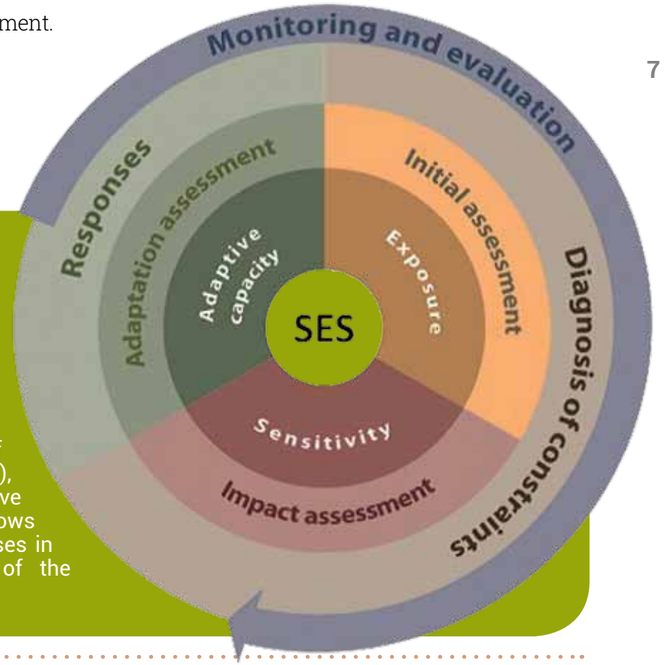
The effects of demographic pressure and unsustainable land management practices on land degradation and desertification are being exacerbated worldwide due to the effects of climate change, which include changing rainfall patterns, increased frequency and intensity of drought and floods, rising temperatures, and profound ecological shifts.

As a consequence, populations' capacities to generate livelihoods are limited, particularly in the drylands. Where land users are exposed and sensitive to changes but able to adapt, through flexibility and mobility in the use of the natural capital, they can cope with such stresses. When they cannot adapt, land users become more vulnerable, which can lead to increased poverty, malnutrition, outmigration, political insecurity and conflict. Taking action to reduce vulnerability and enhance resilience of ecosystems and human populations to the combined effects of climate change and land degradation needs to consider:

- The degree, duration and extent to which the social-ecological system is exposed to land degradation and climate change (*initial assessment* measuring *exposure*);
- The extent to which the function and structure of the social-ecological system is likely to be modified by the changes it is exposed to (*impact assessment* measuring *sensitivity*);
- The extent to which it is possible to change the way the social-ecological system functions, so that livelihoods can still be maintained (*adaptation assessment* measuring *adaptive capacities*).

The initial and impact assessments correspond to the *diagnosis of constraints* on social-ecological systems with regard to land degradation and climate change. The adaptation assessment relates to the responses to these constraints that can contribute – through knowledge and technology, success stories and lessons learnt – to build resilience. Continuous *monitoring and assessment* are needed to evaluate the effectiveness of these responses in reducing the exposure and sensitivity of social-ecological systems to the effects of climate change and land degradation. The conference focused on those three areas, whilst highlighting issues related to *knowledge brokering*, to targeting *land degradation neutrality* and to fostering *synergies between the three Rio Conventions*.

Those six major items form the backbone of this document.



Methodological framework

for assessing the vulnerability of social-ecological systems (SES) to the combined effects of land degradation and climate change[1]: the initial assessment evaluates exposure of the social-ecological system to land degradation and climate change, while the impact assessment considers sensitivity of the system to the drivers of change that it is exposed to (diagnosis of constraints), then the adaptation assessment identifies adaptive options (responses). Monitoring and evaluation allows continuously assessing the effectiveness of responses in reducing vulnerability and enhancing resilience of the social-ecological system.

Diagnosis of constraints

Climate change and land degradation: A double burden for drylands

Along with land mismanagement, climatic variability is a major driving force of land degradation. Given the high temperatures and limited rainfall already experienced in most drylands, these regions are particularly sensitive to the damaging interactions between land degradation and climate change.

Indeed, climate-induced changes in air temperature and moisture – combined with degradation-induced reductions in soil organic matter, above- and below-ground biomass and soil fertility – may enhance desertification. In addition, the increased occurrence of extreme weather events – such as severe droughts or heavy rainfalls – is likely to exacerbate wind or water erosion and contribute towards further reductions in biomass and physical and chemical degradation of the land.

Feedbacks between climate change and land degradation are highly complex. These processes may be self-reinforcing, for instance when land degradation, via the loss of terrestrial carbon stores from soils and vegetation, contributes to climate warming. Additionally, degradation-induced reductions in vegetation cover influence the local microclimate by decreasing air humidity and increasing soil temperature. At the same time, the reduction of vegetation cover usually increases the amount of solar radiation reflected by the earth surface (the so-called albedo effect), which has a cooling effect on the global earth temperature.

In any case, land degradation combined with climate change have the potential to disrupt established ecological and land use systems, which in turn may lead to the failure of food and water supplies, with consequent negative impacts upon livelihoods and households adaptive capacity.

Facts and figures about climate change and land degradation [3, 4]

- It is estimated that, during the last 40 years, nearly one-third of the world's arable land has been lost to erosion and continues to be lost at a rate of more than 10 million hectares per year.
- 25% of the Earth's land area is either highly degraded or undergoing high rates of degradation.
- Land use change and degradation is responsible for about 20% of carbon emissions globally.
- From 1950-1980, 10-14% of the land mass was classified as dry, which rose to 25-30% between 2000 and 2010.
- The average river run-off and water availability is projected to decrease by 10-30% over some dry regions, including the dry tropics.
- Each of the last three decades has been successively warmer than any preceding decade since 1850.

The way forward [2]

- Foster integrated and multidisciplinary studies on the links between climate change and land degradation processes
- Create greater compatibility among methods for diagnosing constraints in order to better share knowledge and to enhance responses
- Reinforce regional cooperation in the analysis of the links between land degradation and natural disasters
- Develop qualitative indices for ecosystem services that cannot be easily monetized, such as cultural and spiritual indices, for these are highly relevant to such key issues as food security and sustainable land use
- Adopt systemic and integrated landscape approaches to assess vulnerability
- Use models, participatory tools and scenarios to provide evidence to policy-makers and other stakeholders in useable and accessible ways to guide land-based adaptation options and investments
- Set up appropriate governance structures, institutions and processes, from the local to the international level, to enable effective use of this knowledge and take into account the impacts of climate change on land degradation and desertification

There are a number of ways to enhance the adaptive capacities and retain the integrity of ecosystems whilst maintaining sustainable livelihoods in the face of the interactive effects of climate change and land degradation. Adaptation includes coping, adjustment and transformation. It can be autonomous/reactive but also planned/anticipatory. In the latter case, it requires to address environmental, social, institutional and knowledge exchange needs and to take into account barriers to adaptation of socioeconomic and cognitive nature.

Adaptation options can be win-win, no-regret or low-regret. Potential trade-offs between adaptation options have to be considered, so that complementary bundles of adaptations can be implemented together, avoiding maladaptation and reducing vulnerability to both climate change and land degradation.

Among adaptation options, Climate Smart Agriculture invites researchers, practitioners and policymakers to explore solutions combining food security, climate adaptation and mitigation, underpinning sustainable landscapes and food systems [5].

Such solutions already exist and can be made reality provided favorable policies and conditions. Agroecology is particularly relevant to drylands to increase soil fertility and water efficiency in cropping systems. Pastoral stock farming is a traditional way of valorizing dryland ecosystems while coping with the scarcity of resources. Sustainable land management can rebuild soil organic matter stocks, thus increasing soil fertility and biodiversity, while sequestering significant amounts of carbon, thereby helping to mitigate climate change. Ecosystem-based adaptations also include the restoration of degraded ecosystems or the development of "green infrastructures".

Altogether, land-based actions are the climate change adaptation agenda for most people and communities. Land-based adaptation is a pathway to resilience and to food, water, energy, economic and human securities[6].

The way forward [2, 6]

- Adopt systemic analyses to identify incentives and barriers to sustainable responses
- Undertake robust and comprehensive economic valuations including the economics of land degradation and climate change, considering the costs of action and inaction and taking into account non-monetary values
- Set up appropriate governance, combining incentives to foster sustainable land management and disincentives to avoid maladaptation, on different scales
- Adapt land access, use and property rights so as to increase the effectiveness of adaptation incentives, especially for small-scale land users that are already under acute pressure from food price volatility and climate variability
- Ensure that public-private tools and market-based incentives stimulate behavioural changes and reach their target in reducing vulnerability with reduced transaction, social and environmental costs
- Develop participatory approaches with stakeholders having sometimes conflicting priorities, needs and perspectives, in order to build trust, reduce conflict and facilitate co-learning
- Co-develop and co-implement effective adaptations over the medium and long term by engaging all stakeholders involved

On the UNCCD agenda [7]

The integrated economic valuation of land and ecosystem services was identified at the UNCCD 2nd Scientific Conference as one of the primary vehicles for unlocking the investment potential of Sustainable Land Management (SLM).

The UNCCD secretariat and the Global Mechanism actively participate and promote the Economics of Land Degradation (ELD) Initiative with a view to producing a global assessment of the costs and benefits of SLM and global tools and policy recommendations.

Through a consortium called OSLO (Offering Sustainable Land use Options), responsible land use at a country level is promoted through valuation projects that demonstrate the financial, socio-economic and environmental benefits of responsible SLM investments.

Monitoring and evaluation

Following up on the effects of adaptation options

Decision-makers need to be able to effectively monitor and evaluate the success of response options so as to inform the refinement of adaptations and enhance the capacity of ecosystems and populations to adapt to climate change and land degradation.

Monitoring and evaluation needs to consider the biophysical, socio-economic and cultural changes arising from adaptations. The effects of response options on ecosystem processes and services and on livelihoods and human well-being have to be considered, taking into account the socio-cultural and economic context in which such adaptations are implemented.

A number of biophysical indicators can be monitored cost-effectively via remote sensing on broad spatial scales. They have to be coupled with field-based measurements for data interpretation and establishment of cause and effect links. Qualitative socioeconomic data are also essential to assessing the overall impact of interventions on livelihoods and well-being. In addition, such data inform on whether observed changes in biophysical variables may be considered sustainable by land users. Finally, they enable interpretation of changes in natural capital in the context of changes in other assets such as social, physical, financial and human capitals.

A combination of direct measurements, indicators and model-based approaches is most appropriate for understanding the complex interactions between climate change and land degradation, their impacts on populations and livelihoods and the effect of adaptation options. A range of predictive, visioning and scenario-based approaches are needed to enable policymakers to better anticipate future impacts and design adequate responses.

The way forward [2]

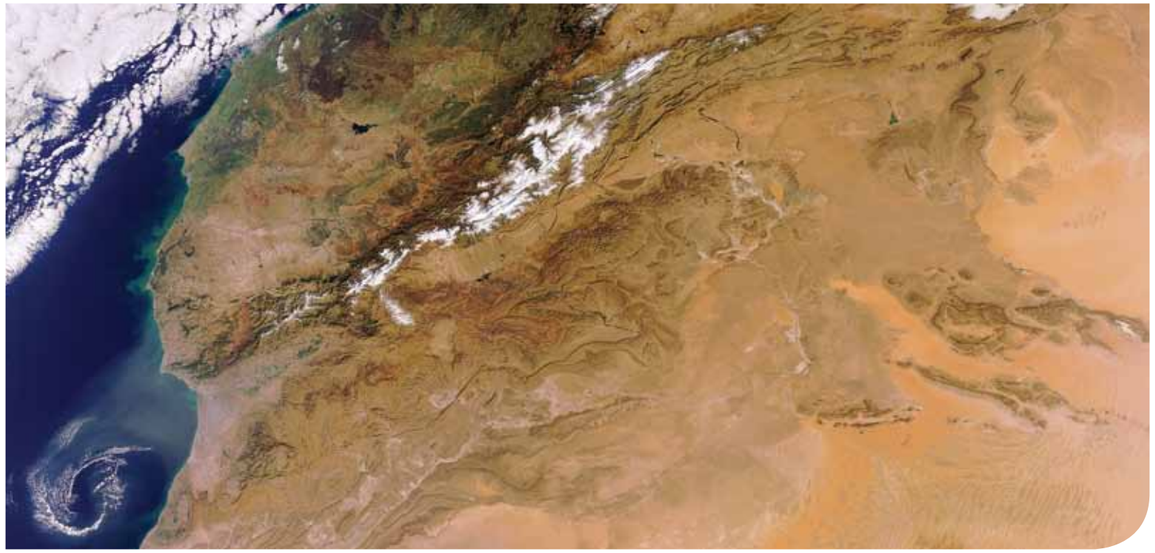
- Design a more coherent integrated framework for monitoring and assessment able to produce policy-relevant information
- Better distinguish indicators of the state of land degradation and climate change from indicators of the drivers of such processes
- Consolidate developments in the field of remote-sensing, validated by ground observations, such that monitoring and evaluation can be done on different scales and by different stakeholders
- Increase the use of satellite data for the identification of key areas for urgent, targeted interventions and for providing a basis for assessing adaptation options
- Engage citizens and users, including women and youth, in participatory monitoring, using technologies such as mobile phones
- Build capacities to facilitate multi-stakeholder engagement in monitoring sustainable land management
- Develop new and innovative approaches to managing and combining large sets of heterogeneous data

On the UNCCD agenda [7]

The UNCCD secretariat and Global Mechanism are currently analyzing key performance and progress indicators as well as financial flows, in order to enable Parties to take informed decisions on measures to advance UNCCD implementation at all levels.

The improved monitoring and reporting system will be dramatically simplified with cleaner, leaner templates that will allow Parties to draw on existing global data sets to baseline and measure progress.

Reporting will be done via a more user-friendly online portal — PRAIS 2.0. A roadmap that is clear, accessible, relevant and practical for all Parties is being implemented.



Knowledge brokering: Engaging all stakeholders

Understanding, adapting to and monitoring the interactions between climate change and land degradation requires the integration of many types of knowledge, from specific to generalized, informal to formal, novice to expert, implicit to explicit, empirical to scientific. Pooling knowledge from different sources can help understand the processes involved, to explore the likely response options and to effectively monitor the effects of land degradation and climate change and adaptation options. It can also be useful in identifying where new research is needed to fill knowledge gaps and complement locally-held knowledge.

Land degradation can only be assessed in relation to the objectives of the land users, while local knowledge is necessary to fully appreciate the effects of climate change on livelihoods and human well-being. Only by combining scientific understanding of adaptation options with locally-held, contextual knowledge, can appropriate adaptations be developed and effectively adopted.

Knowledge exchange needs to be facilitated at all levels: between local communities, civil society, the private sector and policymakers on national and international scales; and between researchers and stakeholders affected by climate change and land degradation. This can help build trust and understanding while reconciling the needs of local communities, consumer demands, research and political agendas, enabling concerted action and reducing the time-lag between knowledge generation and application.

Knowledge can also be shared through multi-scale assessments and the development of cross-institutional initiatives and inter-governmental mechanisms for evidence-based policy. The UNCCD Science-Policy Interface (SPI) has been created to facilitate dialogue between scientists and policymakers, through the analysis, synthesis and translation of scientific information, knowledge and findings to ensure timely delivery of policy-relevant advice. The SPI collaborates with other international mechanisms such as the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) and the Intergovernmental Technical Panel on Soils (ITPS).

The way forward [2, 8]

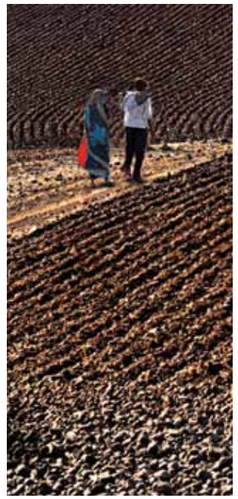
- Foster an environment of co-learning in research that places value on "hybrid knowledge", integrates social, economic and biophysical information, and recognize the perceptions and experiences of local populations
- Involve local stakeholders in both the identification of scientific questions and the search for solutions
- Develop operational indicators that integrate both scientific and local knowledge in order to better understand the complex interactions between biophysical and social systems in specific settings, and that are useful to diverse stakeholders
- Improve existing models of knowledge transfer for increased efficiency, using new opportunities offered by modern technologies, in particular through the development of stakeholder knowledge brokering systems to share experiences and best practices

On the UNCCD agenda [7]

The UNCCD secretariat is working towards the creation of a Scientific Knowledge Brokering Portal (SKBP) functioning as a "portal of portals" to deliver major impact for a large number of beneficiaries.

SKBP will simplify and consolidate the information retrieval process for DLDD knowledge (such as case studies, best practices, analytical papers, comparative experiences, studies on lessons learned, how-to guides, policy briefs, etc.) and help DLDD-knowledge producing experts to collaborate more easily.

It will help UNCCD stakeholders to search for and find better content; improve the visibility of participating DLDD initiatives by providing a UNCCD umbrella; allow partners to focus on developing high-quality knowledge rather than using limited resources for dissemination and web presence; and enable UNCCD to track and eventually fill DLDD knowledge gaps.



Land degradation neutrality: A global objective for sustainable development

Land degradation neutrality means that the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remains stable or increases within specified temporal and spatial scales and ecosystems[9]. This can only be achieved by reducing land degradation through sustainable land management and ecosystem and land restoration. This is the only way to save enough productive land to meet future demand for food, energy and water in the face of climate change.

Land degradation neutrality has the power to secure vital ecosystem services and support the livelihoods of billions of people, and the processes of recovering lost land productivity can also absorb significant amounts of carbon dioxide from the atmosphere, thus playing a fundamental role in climate change mitigation.

The concept of land degradation neutrality is included in the Sustainable Development Goals (SDGs), within objective 15: "Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss" and is specifically referred to in its target 15.3: "combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land-degradation-neutral world"[11].

Implementing land degradation neutrality at the national and international levels remains a challenge from the political, organizational and technological viewpoints.

The way forward [2, 8, 9]

- Put further efforts in scientifically underpinning the emerging concept of land degradation neutrality
- Set up adequate and efficient information and monitoring systems based on indicators and evaluation frameworks that are meaningful not only to scientists but also to engaged communities and policymakers working to achieve land degradation neutrality
- Clarify how funding can be channeled into land-based adaptation and identify what resources are available on which scales and for which stakeholders
- Set up appropriate and effective governance structures and institutions to help ensure that investments in sustainable land management and land restoration are carried out in the respect of human well-being and justice, taking into account local populations' aspirations and future adaptation capacities

On the UNCCD agenda [9]

After Rio+20, the UNCCD Conference of the Parties at its eleventh session established an Intergovernmental Working Group (IWG) to develop concrete options for defining, implementing and monitoring land degradation neutrality.

To make the target precise and measurable, and to enable the international community to take action, the IWG is preparing a science-based definition of land degradation neutrality as well as related options and their implications for national programmes and resource mobilization.

The IWG report and recommendations are intended to contribute to the further deliberations of the UNCCD Parties on the follow up to Rio+20. In addition, with the support of the Republic of Korea, the UNCCD secretariat has launched a new initiative – the Land Degradation Neutrality project.

The project aims to provide technical assistance to a voluntary group of 16 countries with diverse socio-ecological conditions for mainstreaming land degradation neutrality in the process of aligning their National Action Programmes to the UNCCD's Strategic Plan.

Finally, the Global Mechanism is designing a layered Land Degradation Neutrality Fund to attract investments in sustainable land use and land rehabilitation offering adequate risk and capital protection.

Land-based approaches: At the crossroads of the three Rio Conventions

Land degradation not only directly affects provisioning ecosystem services, but also regulating ones – first and foremost carbon sequestration. Indeed, the loss of organic carbon from soils and vegetation subsequent to land degradation, in addition to decreasing soil fertility and productivity, leads to increased carbon emission to the atmosphere, thus accentuating climate change itself. The loss of vegetation on degraded lands also changes the local microclimate by decreasing humidity.

Moreover, carbon and vegetation loss decreases soil water holding capacity and its potential to buffer periods of drought and floods, thus locally aggravating the negative impacts of climate change and limiting adaptation capacities.

Thus, sustainable land management at the local level – and more particularly, the management of soil organic matter – not only plays a crucial role in enhancing local adaptation capacities, but also contributes to global mitigation efforts. Furthermore, the dual effects of climate change and land degradation on biodiversity loss may further exacerbate land degradation, compromise ecosystem functioning and the provision of ecosystem services, consequently limiting capacities to adapt to climate change.

Land-based approaches thus have the potential to simultaneously increase food security and livelihoods, protect or enhance biodiversity, enable adaptation to climate change and contribute to climate change mitigation: restoring the soils of degraded ecosystems has the potential to store between 1.5 and 4 billion tons of CO_2 annually[10]. Land-based approaches shall therefore be considered as a multiple-win adaptation and mitigation option. This has to be recognized across the three Rio Conventions.

The way forward [2, 6, 8]

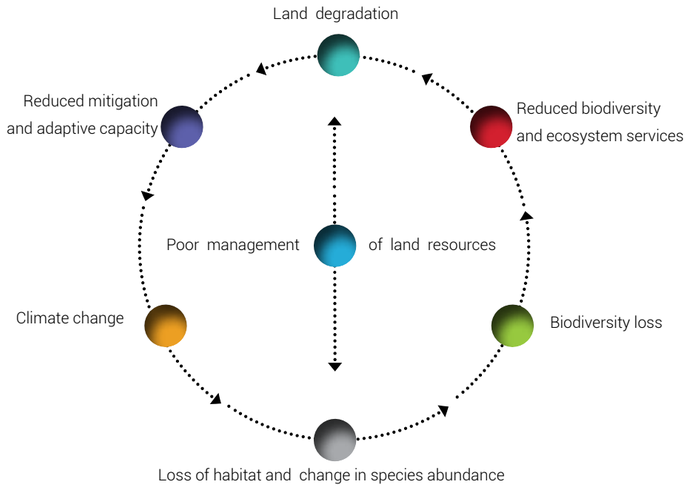
- Foster exchanges and coordination within stakeholders involved in the implementation of the three Conventions, at all levels: National Focal Points, government agencies, local authorities, Civil Society Organizations
- Develop a common framework assessment across the three Rio Conventions, based on existing indicators, in order to facilitate a more balanced monitoring of multiple ecosystem services and to provide insight into the multiple benefits of sustainable land management
- Create links and synergies within National Action Plans implemented at country level in the framework of each of the Conventions
- Implement projects on the ground that simultaneously address issues raised by the three Conventions

On the UNCCD agenda [7]

The UNCCD secretariat and the Science-Policy Interface are exploring the potential of land-based indicators for monitoring the contribution of sustainable land management to climate change adaptation and mitigation, and to safeguarding biodiversity and ecosystem services.

The UNCCD wants to offer leadership in building synergy and efficiency within the global environmental system by framing common indicators to measure progress on the implementation of the land-related Aichi Targets under the Convention on Biological Diversity and the adaptation goals under the Nairobi Action Plan of the United Nations Framework Convention on Climate Change.

The Global Mechanism will help identify financially viable and practical investment opportunities that bring together implementation of the Rio Conventions at country level.



Feedback loops and the objectives of the Rio Conventions (Figure: UNCCD)

Conclusion

Joining forces to achieve impact

Climate change, land degradation and biodiversity loss are closely interlinked and most acutely experienced by ecosystems and resource-dependent populations in regions affected by desertification and drought. It is essential to understand and address these multiple challenges if we are to meet targets such as the Sustainable Development Goals, tackle poverty and address the most pressing environmental issues of the 21st Century.

Land-based approaches have the potential to simultaneously enable adaptation to climate change and avoid land degradation whilst protecting livelihoods and biodiversity and mitigating climate change through carbon sequestration. Land-based adaptation, with the aim of reaching land degradation neutrality, is thus a 'multiple-win' option simultaneously addressing challenges raised by the three Rio Conventions.

Monitoring and evaluation of interactions between – and responses to – climate change, land degradation and biodiversity loss, needs to consider effects on ecosystem processes and services as well as on livelihoods and human well-being. A more coherent and integrated monitoring framework should be designed across the three Rio Conventions that engages stakeholders at all levels through participatory monitoring, integrates scientific and local knowledge and is able to produce policy-relevant information.

Cooperation and knowledge exchange between land management, research and policy communities is needed at different levels for a more efficient integration and transfer of the various forms of knowledge.

Participatory approaches should be implemented for the formulation of research and development priorities and for the implementation of response options in order to effectively represent stakeholders' interests, manage power dynamics and be relevant to stakeholders' needs and perspectives.

Appropriate governance structures, institutions and processes have to be set up at all levels, from the local to the international, in order to sustain such participatory approaches, ensure the proper use of existing knowledge and the effectiveness of adaptation incentives in reducing vulnerability of populations and ecosystems and improve the coordinated implementation of the three Rio Conventions on the ground.

Sources and credits

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