United Nations ICCD/CST(S-4)/2

Convention to Combat Desertification

Distr.: General
23 December 2014

Original: English

**Committee on Science and Technology**
**Fourth special session**
Cancun, Mexico, 9–12 March 2015
Items 2 and 3 of the provisional agenda
**Combating desertification/land degradation and drought for poverty reduction and sustainable development: the contribution of science, technology, traditional knowledge and practices**
**Provision of scientific advice on the topic: "Explore the options to achieve land degradation neutrality in the context of sustainable development"**

# Report on the preparation of the UNCCD 3rd Scientific Conference on "Combating desertification/land degradation and drought for poverty reduction and sustainable development: the contribution of science, technology, traditional knowledge and practices" and progress made on the topic: "Explore the options to achieve land degradation neutrality in the context of sustainable development"

## Note by the secretariat

*Summary*

By its decision 18/COP.10, the Conference of the Parties (COP) to the United Nations Convention to Combat Desertification (UNCCD) decided that the 3rd UNCCD Scientific Conference would address the topic: "Combating desertification/land degradation and drought for poverty reduction and sustainable development: the contribution of science, technology, traditional knowledge and practices".

This document contains a summary of activities undertaken to prepare the scientific conference and the executive summary of a pre-conference report prepared under the guidance of the Scientific Advisory Committee for the 3rd Scientific Conference. The main conclusions of the pre-conference report will be presented at the scientific conference for discussion.

By its decision 21/COP.11, paragraph 26, the COP also decided that the topic to be considered by the UNCCD 4th Scientific Conference shall be "Explore the options to achieve land degradation neutrality in the context of sustainable development".

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This document contains a brief summary of progress made on this topic at the level of the Open Working Group of the General Assembly on Sustainable Development Goals and the Committee for the Coordination of Statistical Activities, as well as by the Intergovernmental Working Group and the Science-Policy Interface established by the COP at its eleventh session. The Committee may wish to consider how to bring forward the provision of scientific advice on this topic.

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# I. Background

1. At the eighth session of the Conference of the Parties (COP 8), Parties decided to strengthen the scientific basis underpinning the Convention. Pursuant to the provisions contained in decision 13/COP.8, paragraph 1 (a), and decision 21/COP.11, paragraphs 19 and 20, the COP decided that each future intersessional session of the Committee on Science and Technology (CST) would be organized in a predominantly scientific and technical conference-style format by the Bureau of the CST in consultation with a lead institution/consortium that is qualified in and has expertise in the relevant thematic topic selected by the COP.

2. Since then, two scientific conferences have been held. The UNCCD 1st Scientific Conference took place from 22 to 24 September 2009 in Buenos Aires, Argentina on the theme "Biophysical and socioeconomic monitoring and assessment of desertification and land degradation, to support decision-making in land and water management". The UNCCD 2nd Scientific Conference took place from 9 to 12 April 2013 in Bonn, Germany on the theme "Economic assessment of desertification, sustainable land management and resilience of arid, semi-arid and dry sub-humid areas".

3. By its decision 18/COP.10, the COP decided that the UNCCD 3rd Scientific Conference will address the theme: "Combating desertification/land degradation and drought (DLDD) for poverty reduction and sustainable development: the contribution of science, technology, traditional knowledge and practices".

4. Progress reports on the preparation of the UNCCD 3rd Scientific Conference were presented at the third special session of the CST (CST S-3) and at the eleventh session of the CST (CST 11) as contained in documents ICCD/CST(S-3)/4 and ICCD/COP(11)/CST/5, respectively. The present document contains a summary of activities undertaken to prepare the UNCCD 3rd Scientific Conference and the executive summary of a pre-conference report prepared under the guidance of the Scientific Advisory Committee for the UNCCD 3rd Scientific Conference. The main conclusions of the pre-conference report will be presented during the scientific conference for discussion.

5. By its decision 21/COP.11, the COP also decided that the topic to be considered by the UNCCD 4th Scientific Conference shall be "Explore the options to achieve land degradation neutrality in the context of sustainable development".

6. This document therefore also contains a brief summary of progress made on the topic selected for the 4th Scientific Conference to help the CST consider how to bring forward the provision of scientific advice on this topic.

# II. UNCCD 3rd Scientific Conference on "Combating desertification/land degradation and drought for poverty reduction and sustainable development: the contribution of science, technology, traditional knowledge and practices"

7. The UNCCD 3rd Scientific Conference has been organized by the consortium Scientific and Traditional Knowledge for Sustainable Development (STK4SD), which was appointed by the Bureau of the CST at its meeting on 29–30 October 2012. The STK4SD consortium is composed of five major scientific organizations (Agropolis International, DesertNet International, the CGIAR Consortium, the Sahara and Sahel Observatory (OSS) and the Argentine Institute for Arid Zone Research (IADIZA)), plus two associate partners (the Institute for Environment and Sustainability (IES) of the European Commission's Joint

Research Centre and the Desertification Research Centre (NRD) of the University of Sassari). The memorandum of understanding between the secretariat and the STK4SD consortium (represented by Agropolis International) was signed on 27 September 2013 in Windhoek, Namibia.

8. The conference has been organized under the guidance and coordination of the Steering Committee which includes representatives of the Bureau of the CST, the STK4SD, the UNCCD secretariat and the host country. The Scientific Advisory Committee, whose members had been selected by the Steering Committee at its meeting on 14 September 2013 in Windhoek, Namibia, has guided all scientific activities in preparation for the conference.

9. The call for submission of abstracts was open from 13 June 2014 to 28 September 2014. A total of 206 abstracts were submitted: 52 (25%) came from Asia, 39 (19%) from Latin America and the Caribbean, 37 (18%) from Africa, 21 (10%) from the Northern Mediterranean and 18 (9%) from Central and Eastern Europe. A total of 39 abstracts (19%) were submitted by countries not belonging to a Regional Implementation Annex or observers. All submitted abstracts were reviewed by the Scientific Advisory Committee; nine abstracts were not accepted because they were evaluated to be outside the scope of the conference.

10. All accepted abstracts will be discussed at the conference during poster sessions. The conference will be organized in three main sessions: (a) diagnosis of constraints; (b) responses; and (c) monitoring and assessment. Each session will start with plenary presentations followed by parallel workshops and then a wrap-up session. Additional plenary sessions will address issues related to indigenous and traditional knowledge, synergies with the other Rio conventions and regional perspectives from Latin America and the Caribbean.

11. During the session on the diagnosis of constraints, it is expected that participants will discuss how to best characterize and understand the vulnerability and adaptive capacities of ecosystems (in particular agro-ecosystems) and populations in affected regions, including regions newly vulnerable to the consequences of climate change.

12. During the session on responses, it is expected that participants will discuss how to efficiently build on available knowledge, success stories and lessons learned to promote the implementation of better adapted, knowledge-based practices and technologies.

13. During the session on monitoring and assessment, it is expected that participants will discuss the new monitoring and assessment methods available to evaluate the effectiveness of those practices and technologies. These methods should provide improved insight on whether and how their implementation could be scaled up.

14. A pre-conference report, designed to inform the conference deliberations, was prepared under the guidance of the Scientific Advisory Committee and with inputs from a multidisciplinary panel of experts. The executive summary of the pre-conference report is contained below. The main conclusions of the pre-conference report will be presented at the scientific conference for discussion.

## Executive summary of the pre-conference report

15. Climate change and land degradation 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 the dual challenges of climate change and land degradation if we are to meet targets such as the proposed

Sustainable Development Goals, tackle poverty and address many of the most pressing environmental challenges of the 21st century.

16. Although much is known about the processes and effects of land degradation and climate change, less is understood about the links between these two processes. Little is known about how climate change and land degradation processes are currently interacting in different social-ecological systems around the world, or how they might interact under different scenarios in future. The numerous and often contradictory feedbacks inherent in both processes, operating in different habitats and under different forms of land management, means that links between climate change and land degradation are highly complex and difficult to predict. This may give rise to a number of important impacts on ecosystems and their human populations in regions affected by land degradation and drought, and so limit the potential for anticipatory adaptation. There is thus an increasingly urgent need for research to elucidate these links so that land users and policy-makers can respond in a timely and effective way.

17. The pre-conference report was designed to inform debate at the UNCCD 3rd Scientific Conference. It synthesizes current knowledge and raises questions in relation to each of the three major challenges that the conference will address: (a) diagnosis of constraints; (b) responses; and (c) monitoring and assessment. The report considers how land users, the policy and research communities, and other stakeholders can work together to better anticipate, assess and adapt to the combined effects of climate change and land degradation. It also considers the behavioural, governance and policy changes that may be needed to facilitate effective adaptation at national and international scales. It takes an interdisciplinary and integrated approach to climate change and land degradation, treating them as interlinked concepts that have biophysical and human drivers, impacts and responses.

## 1. Conceptual and methodological frameworks

18. There are many ways of conceptualizing the links between climate change and land degradation as well as the vulnerability of ecosystems and human populations around the world to these interactions. Broadly speaking, the following three factors are likely to influence vulnerability, and these form the basis for the conceptual framework presented in figure 1:

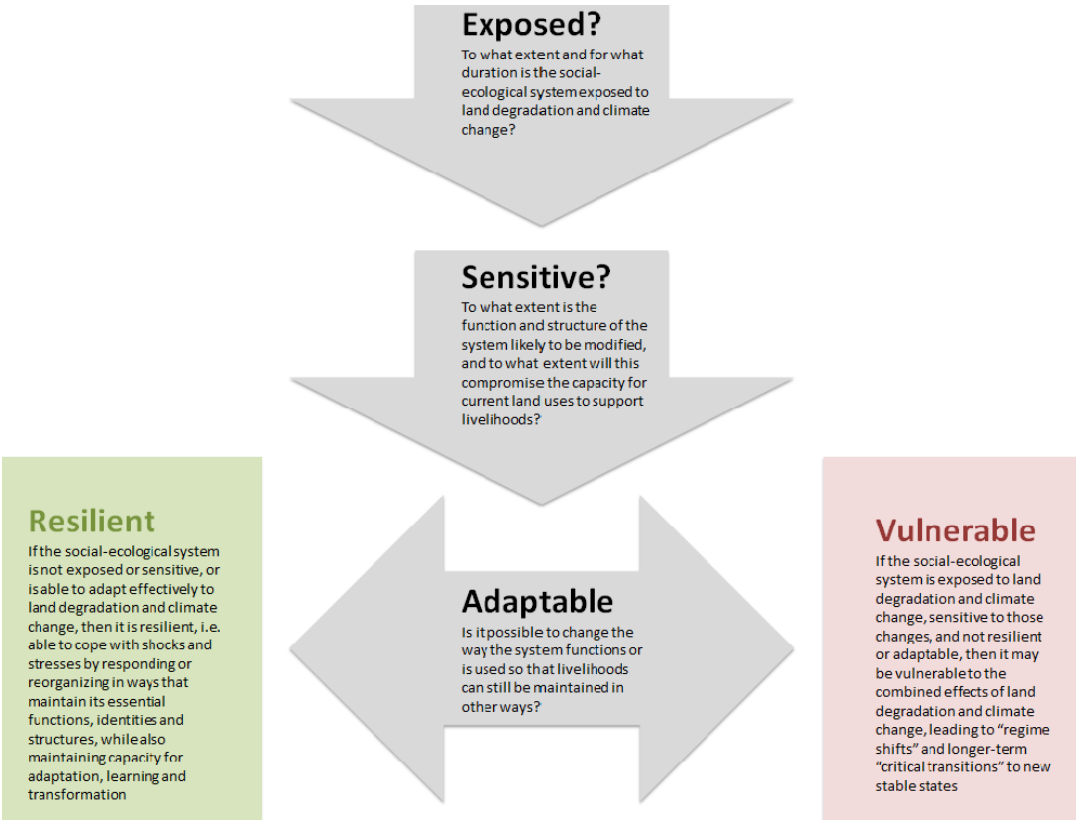
(a) **Exposure:** this considers the degree, duration and extent to which the ecosystems and populations are exposed to land degradation and climate change;

(b) **Sensitivity**: if the system is exposed to land degradation and climate change, then its sensitivity can be defined as the extent to which the function and structure of ecosystems are likely to be modified by the changes they are exposed to, and the extent to which this will compromise the capacity for current land uses to support livelihoods and deliver essential ecosystem services;

(c) **Adaptability**: if the system is exposed and sensitive to the effects of land degradation and climate change, then it is necessary to assess the adaptive capacity of the system, that is the extent to which it is possible to change the way the system functions or is used so that livelihoods can still be maintained in other ways. Adaptation may take the form of: (i) coping (short-term, immediate responses to reduce the risk posed by climate variability and drought to livelihoods); (ii) adjustment (more deliberate planned change, representing adaptation to longer-term climate change and land degradation); and/or (iii) transformation (fundamental changes to either system function or political economic structures, often involving behavioural change, leading to the establishment of new long-term social-ecological states). Many apparent adaptations to climate change and land degradation may in fact be maladaptive if they are not sustainable or increase vulnerability.

Figure 1

**Conceptual framework for assessing the vulnerability of ecosystems and populations in regions affected by desertification/land degradation and drought to land degradation and climate change**




19. If the social-ecosystem is exposed, sensitive and unable to adapt effectively to the effects of land degradation and climate change, then it will not be able to maintain its essential functions, identities and structures, or its ability to adapt to future changes, and it will become **vulnerable** to land degradation and climate change. This may lead to significant changes in the social-ecological system (sometimes referred to as "regime shifts" and "critical transitions") when these shifts lead to new long-term stable states. On the other hand, if the system is not exposed/sensitive or is able to adapt effectively to the effects of land degradation and climate change, then it would be considered **resilient**.

20. To take action to reduce vulnerability and enhance resilience to climate change and land degradation, the methodological framework in figure 2 proposes:

(a) **Initial assessment**: This is an evaluation of the degree to which the stocks of natural capital, ecosystem processes and flows of ecosystem services are *exposed* to climate change and land degradation. For example, exposure to climate change may be assessed from climate records and predictive models. Exposure to land degradation (whether actual or the risk of degradation) can be assessed via: (i) direct measurement (e.g. of soil fertility and productivity); (ii) indirect measurement via indicators (e.g. soil erosion features and vegetation cover); and (iii) indirect measurement and projections via process-based computational models, which would typically combine a range of indicators and be calibrated and validated via direct measurements. At local scales, such assessments may combine qualitative social science methods (e.g. semi-structured interviews, oral histories

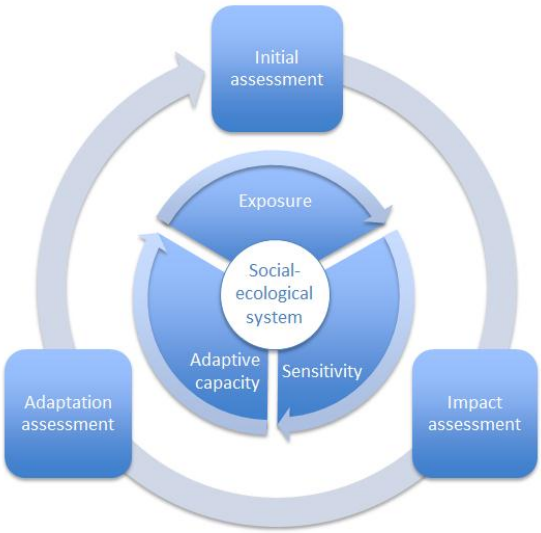
and ethnographic methods) with quantitative methods based on indicators (e.g. GIS mapping or process-based modelling of the effects of land degradation and climate change on land cover, populations of animals and plants, and livestock populations). At regional and international scales, assessments may be based on expert opinion (e.g. the Global Assessment of Soil Degradation (GLASOD) or process-based models (e.g. of future agricultural yields or forest cover);

(b) **Impact assessment**: To understand the *sensitivity* of ecosystems and human populations to the combined effects of climate change and land degradation, it would be necessary to know the extent to which changes in air and soil temperature, precipitation (total amount, intensity/erosivity and patterns), humidity, atmospheric $CO_2$ concentrations and evapotranspiration rates are likely to affect land degradation processes such as soil erosion and so compromise the supply of ecosystem services and the livelihoods and human well-being that depend on them. Many of the same models used to assess degradation severity, extent and/or risk may be used or adapted to assess these links. However, given the approximate nature of model outputs in such complex social-ecological systems, there are also strong arguments for including evidence based on locally-held knowledge of how these systems work;

(c) **Adaptation assessment**: This considers the potential and feasibility of *adaptive capacity* to reduce the sensitivity of the system to the changes it is likely to be exposed to and provides specific recommendations to planners and policymakers. Using social science methods, it may be possible to identify future adaptations based on how local communities have adapted to previous changes in the productive potential of the land or climate variability. Process-based models may provide insight into the future pressures likely to arise from land degradation and climate change, and help evaluate and refine adaptive options.

Figure 2

**A methodological framework (outer circle) for assessing the vulnerability (segmented middle circle, which is based on conceptual framework in figure 1) of ecosystems and human populations to the combined effects of climate change and land degradation**




*Note: An initial assessment is done to assess the exposure of the social-ecological system to climate change and land degradation, followed by an impact assessment to consider the sensitivity of the system to the drivers of change that it is exposed to, and finally an adaptation assessment to identify adaptive options.*

## 2. Diagnosis of constraints

21. Interactions between climate change and land degradation are likely to affect a range of different ecosystem functions and the consequent ecosystem services those systems can deliver. Provisioning services are particularly affected by climate change and land degradation, with impacts on food production, livelihoods and human wellbeing. It is difficult to anticipate how specific ecosystems and human populations are likely to be affected by climate change and land degradation, given the many uncertainties and feedbacks. However, it is possible to identify the following key vulnerabilities to the combined effects of climate change and land degradation at a more general, global level:

(a) Exposure to climate change varies globally, with different regional projections of changes in temperature, rainfall and sea-level rise. Likewise, different regions are exposed to different types and levels of land degradation, and it is impossible to assess the vulnerability of populations and ecosystems to either climate change or land degradation solely on the basis of these differing levels of exposure. However assessments of current and likely future exposure to climate change and land degradation can provide an important basis for assessing the sensitivity of social-ecological (including economic) systems to those changes, as well as possible environmental, social, economic, political and cultural impacts;

(b) Many areas already experiencing land degradation and drought are likely to be exposed to interactions with climate change if extreme weather events such as severe droughts or heavy rainfall events exacerbate wind or water erosion and contribute to further reductions in or changes to biomass or the physical and chemical degradation of the land;

(c) The full extent to which exposure to risks from climate change and land degradation lead to negative impacts on ecosystems and human populations can only be understood by considering their relative sensitivity to these risks;

(d) Further research is needed to understand how soil degradation processes such as water and wind erosion and physical (e.g. compaction and sealing) and chemical (e.g. soil organic matter loss and salinization) degradation might interact with changes in soil temperature, precipitation (amount, intensity and patterns), humidity, atmospheric $CO_2$ concentrations and evapotranspiration rates. Interactions between these soil variables and other components of land such as above-ground biomass, water and biodiversity also need further research;

(e) Given the high temperatures and limited rainfall already experienced in drylands, where land degradation is known as desertification, these regions are likely to be particularly sensitive to the effects of climate-induced changes in temperature and moisture, combined with degradation-induced reductions in soil organic matter, biomass (both above and below ground) and soil fertility;

(f) These processes may in some cases be self-reinforcing, leading to feedbacks between climate change and land degradation. For example, feedbacks can occur when land degradation, via the loss of terrestrial carbon stores from soils and vegetation, leads to climate warming, or when the albedo effect of degradation-induced reductions in vegetation cover leads to climate cooling or other local climatic effects. Similarly, the dual effects of climate change and land degradation may have impacts on biodiversity that may further exacerbate land degradation and compromise ecosystem functioning and the provision of ecosystem services, consequently limiting capacities to adapt to climate change;

(g) Assessing the sensitivity of ecosystems and human populations to climate change and land degradation requires scientific and locally-held knowledge as well as other forms of knowledge. By definition, land degradation must be assessed in relation to the

objectives of those using the land, and locally-held knowledge (including indigenous and traditional knowledge) is usually necessary to appreciate the full effects of climate change on livelihoods and human well-being. However, collecting and analysing qualitative data from local communities and other stakeholders can be time-consuming and expensive;

(h) In addition to considering the sensitivity of ecosystems to these processes, it is necessary to understand the sensitivity of livelihoods to the combined effects of climate change and land degradation. Climate change and land degradation have the potential to disrupt established ecological and land-use systems including land cover, which in turn may lead to the failure of food and water supplies, with consequent negative impacts upon livelihoods. This may in turn limit the adaptive capacity of households when they are faced with other perturbations or stresses.

## 3. Responses

22. There are a number of ways to enhance adaptive capacity and retain the integrity of ecosystems whilst maintaining sustainable livelihoods in the face of the interactive effects of climate change and land degradation. For example:

(a) There are number of different approaches to adaptation. Adaptation can be autonomous, reactive and planned/anticipatory, and can include coping, adjustment and transformation. There are also win-win, no-regret and low-regret adaptation options;

(b) Adaptation needs include biophysical and natural environmental needs, social needs (which vary with location, gender, age and socioeconomic status), institutional needs (to facilitate cross-scale adaptations, establish incentives and shape behaviours), and knowledge exchange needs, including access to information, technology and private sector engagement;

(c) There are a range of barriers to adaptation, including: a lack of available options to substitute one form of capital for another (e.g. due to a limited asset base, limited agro-ecosystem capacity or limited market access); limited political capacity to enact strategies to support adaptation; a lack of institutions or high levels of institutional inertia and rigidity; a lack of access to information about adaptation options (including poor agricultural extension services); and/or financial constraints (including lack of access to credit);

(d) Other barriers can be cognitive in nature, linked to a lack of perceived risk, absence of perceived agency and a sense of powerlessness, low aspirations, a lack of social norms that influence behaviour within particular socio-cultural settings, and/or a lack of incentives or resources to change behaviour;

(e) Maladaptation to the combined effects of climate change and land degradation may, for example: increase greenhouse gas emissions (e.g. via fossil fuel use by desalinization plants); increase polarization between rich and poor or disproportionately burden the poor (e.g. by raising the costs of water and energy or privatizing communal rangeland); lead to high opportunity costs (whether economic, environmental or social); and create path dependencies where communities are locked in to particular technologies or livelihood strategies that may compromise their capacity or willingness to adapt in future;

(f) Once these barriers have been overcome, it is necessary to evaluate potential trade-offs between adaptations so that complementary bundles of adaptations can be implemented together, avoiding maladaptation and reducing vulnerability to both climate change and land degradation.

23. Options for simultaneously adapting to climate change and land degradation include:

(a) Cropping systems can be adapted, for example through a careful use of agroforestry techniques such as intercropping with leguminous woody species to access nutrients deeper in the soil profile, whilst simultaneously reducing the effects of erosion and increasing levels of soil fertility;

(b) Livestock systems can be adapted, for example through enabling migratory pastoralist activities or new/modern mobile animal husbandry systems, altering stocking rates to match changes in forage/ fodder production in response to climate change and/or land degradation, and increased provision of tree shade via silvopastoral systems to reduce heat stress in livestock whilst reducing erosion rates and providing fodder during drought;

(c) Ecosystem-based adaptation can be developed such as restoration (e.g. wetland restoration to provide water resources for livestock and cropping systems, whilst buffering against climate-induced flood risks) and green infrastructure (e.g. green roofs, porous pavements and urban wildlife corridors to reduce soil-sealing whilst improving storm water management, reducing urban flood risk and moderating the heat-island effect);

(d) Sustainable land management (SLM) may be able to harness positive synergy between climate change and land degradation via changes in vegetation and soil carbon stocks. Rather than losing carbon due to land degradation, SLM can build soil organic matter and sequester significant amounts of carbon, thereby helping mitigate climate change. SLM practices also directly link to the feedback between climate change and land degradation that is mediated through losses of vegetation cover. Certain SLM technologies and practices also have the potential to mitigate biodiversity-mediated feedbacks between climate change and land degradation;

(e) Adaptations based on scientific knowledge alone may not be suitable for the socio-cultural context in which they are needed, and this may significantly limit uptake and effectiveness. By combining scientific understanding of adaptation options with locally-held, contextual knowledge, it may be possible to develop more appropriate adaptations. It is therefore necessary to consider the benefits and drawbacks of locally-held, scientific and other kinds of knowledge for the development of adaptations to climate change and land degradation;

(f) Ecosystem-based approaches and SLM have the potential to simultaneously enable adaptation to climate change and land degradation, whilst in many cases protecting or enhancing biodiversity, which may be considered ‘triple-win’ adaptation options. SLM can also enhance food production.

## 4. Monitoring and evaluation

24. Decision-makers need to be able to effectively monitor and evaluate the success of response options, inform the refinement of adaptations and enhance the capacity of ecosystems and populations to adapt to climate change and land degradation. The following considerations can be made:

(a) In addition to monitoring and evaluating effects of response options on ecosystem processes and services, it is essential to assess the socio-cultural and economic context in which adaptations might be implemented and to evaluate and monitor the effects of those adaptations on livelihoods and human well-being;

(b) There are a range of benefits and drawbacks associated with direct measurements, proxy measures (or indicators) and model-based approaches for monitoring adaptation. A combination of these approaches is most appropriate for understanding the complex interactions between climate change and land degradation and monitoring their effects. A number of hybrid frameworks and approaches now exist that can enable this combined approach;

(c) Given the complex and uncertain interplay between land degradation and climate change, it is difficult to predict how different social and ecological systems around the world are likely to be affected by the combined effects of climate change and land degradation. A range of predictive, visioning and scenario-based approaches (including computational, process-based modelling) may therefore be needed to enable policymakers to better anticipate future interactions between land degradation and climate change;

(d) Given the types of interactions likely to occur between climate change and land degradation in the future, monitoring and evaluation needs to consider biophysical, socioeconomic and cultural changes arising from adaptations. There are a number of biophysical indicators that may be monitored cost-effectively via remote sensing at broad spatial scales. However, field-based measurements are likely to be necessary to interpret this data, and to establish cause and effect;

(e) Even with more detailed field-based data, it may be difficult to directly attribute changes to adaptation interventions. Socioeconomic (often qualitative) data is therefore essential to triangulate and supplement biophysical data in order to understand whether observed changes in biophysical variables may be considered to be sustainable or whether they trigger or further worsen land degradation. Such data are also necessary to understand changes in natural capital in the context of changes in other capital assets (social, physical, financial and/or human capital) to interpret the overall impact of interventions on livelihoods and well-being;

(f) Understanding, adapting to and monitoring the interactions between climate change and land degradation requires the integration of many types of knowledge, ranging from: (1) specific to generalized; (2) informal to formal; (3) novice to expert; (4) tacit and implicit to explicit; and (5) locally-held to scientific knowledge. Given the number of gaps in our understanding about the links between climate change and land degradation, it is essential to pool knowledge from different sources to better understand the processes involved and the likely response options, and to be able to effectively monitor our actions, identifying also where new research could fill knowledge gaps and effectively complement locally-held knowledge;

(g) Knowledge exchange needs to be facilitated through the development of cross-institutional initiatives and mechanisms for evidence-based policy, including science-policy interfaces like the Intergovernmental Panel on Climate Change, Intergovernmental Platform on Biodiversity and Ecosystem Services, Intergovernmental Technical Panel on Soils and the newly established Science-Policy Interface (SPI) of the UNCCD, as well as multi-scale assessments like the Millennium Ecosystem Assessment and the Land Degradation and Restoration Assessment. Knowledge exchange also needs to be facilitated between local communities, civil society, the private sector and policymakers at national and international scales, and between researchers and stakeholders affected by climate change and land degradation;

(h) Adaptation to climate change and land degradation will require engagement with diverse and often conflicting stakeholder priorities, needs and perspectives that link to core aspects of human survival such as food and livelihood security. Participatory approaches may be able to reduce conflict, build trust and facilitate learning amongst stakeholders, who are then more likely to co-develop and implement effective adaptations in the medium and long-term;

(i) There are certain contexts where it may not be appropriate to seek engagement with stakeholders. However, where participation is appropriate, it is important to design participatory processes to effectively represent stakeholder interests, manage power dynamics, and be relevant to stakeholder needs and priorities.

## 5. Knowledge gaps

25. Building on the findings of the pre-conference report, the UNCCD 3rd Scientific Conference aims to provide new scientific insights and recommendations to policymakers on assessing the vulnerability of land to climate change and current capacities to adapt. The conference is expected to help combat desertification/land degradation and reduce the impacts of drought by: (i) better anticipating the impacts of climate change on land degradation and desertification; (ii) identifying sustainable and adaptive methods of using ecosystems to reduce poverty and achieve sustainable development; and (iii) identifying pathways towards a land degradation neutral world. To reach these outcomes, the conference is organized around the three major challenges that the pre-conference report addresses. The report has identified a number of important knowledge gaps and questions under each of these challenges, listed below:

**(a) Diagnosis of constraints:**

(i) What is the best way in which to characterize and understand the vulnerability and adaptive capacities of ecosystems (in particular agro-ecosystems) and human populations in affected regions, including regions newly susceptible to the consequences of climate change?

(ii) Which disciplines need to be brought together to enable a holistic assessment of vulnerability and adaptive capacity?

(iii) What methodologies can capture the temporal and spatial dynamics of vulnerability and adaptive capacity? To what extent can temporal and spatial analogues be used to identify possible trajectories of vulnerability?

(iv) How might the effects of climate change be moderated by interactions with other future social-ecological trends and drivers of change to make ecosystems and populations more vulnerable to land degradation?

(v) What trade-offs might exist between climate adaptation options in terms of their effects on ecosystem service provision and land degradation? Are there complementary bundles of adaptation options that can reduce trade-offs and create win-wins for both climate change and land degradation?

(vi) How are cultural factors likely to shape adaptation options and influence their uptake, and how might the implantation of these adaptation options influence the provision of cultural ecosystem services?

(vii) Are there currently unused ecosystem services that may be combined with existing assets to provide new livelihood options that can increase resilience to climate change and land degradation?

(viii) At what spatial scale do vulnerability maps provide the most useful information to decision-makers whilst at the same time retaining richness of information?

(ix) What steps can be taken to deliver a more equitable distribution of adaptive capacity across different social-ecological systems? What measures can be undertaken to prevent the erosion of adaptive capacity?

**(b) Responses:**

(i) What are the best ways in which to build efficiently on available knowledge, success stories and lessons learned, and promote the implementation of better adapted, knowledge-based practices and technologies?

(ii) How do knowledge exchange activities, social relations and power shape the way knowledge is shared and created?

(iii) What are the challenges associated with managing knowledge exchange at different organizational and spatial scales?

(iv) How do contextual conditions (e.g. political, structural and funding) and the way knowledge is understood and framed influence the way knowledge exchange strategies are developed within international policy programmes such as UNCCD?

(v) What are the processes and mechanisms through which knowledge exchange activities (at these different scales) generate beneficial outcomes for the ecosystems and human populations that are affected by climate change and land degradation?

(vi) How do different research (disciplinary) and decision-making contexts influence the likelihood that knowledge exchange delivers beneficial outcomes for ecosystems and human populations?

(vii) What formats should knowledge and information take to enable widespread sharing of success stories across areas with comparable conditions?

(viii) How can scientists and other stakeholders co-evaluate and jointly communicate success stories and adaptations?

(ix) What drives the discontinuation of sustainable practices and technologies (and what incentives and disincentives need to be in place to promote continued adoption)?

(x) What actions need to be taken to assess the applicability of success stories in other locations? What analyses of cultural dimensions of practices and technologies are required?

**(c) Monitoring and assessment:**

(i) What are the new monitoring and assessment methods available to evaluate the effectiveness of sustainable practices and technologies that provide improved insights on whether or how their implementation should be scaled up?

(ii) How can we reconcile results from the monitoring of slow and fast variables?

(iii) What are the most important variables for monitoring interactions and feedbacks between climate change and land degradation?

(iv) What resolution and frequency of monitoring provides optimal information to decision-makers on important variables linked to climate change and land degradation?

(v) How can we identify the thresholds (temporal and spatial) at which adaptive practices and technologies may become maladaptive, such that their spread should be discouraged?

(vi) How can we use modelling and mapping approaches to prioritize spatial areas for in-depth monitoring and assessment?

(vii) Against what criteria should the success of practices and technologies be evaluated and who should decide?

(viii) What resources are needed and how do the costs of monitoring (action) fare against the costs of not monitoring (inaction) over the short, medium and long term?

### 6. Conclusions

26. Despite a number of known uncertainties and gaps in our knowledge about links between climate change and land degradation, it is possible to draw the following broad conclusions about the vulnerability of ecosystems and human populations, adaptation needs, and methods needed to monitor and evaluate interactions between these processes:

(a) Areas already exposed to land degradation are likely to be particularly sensitive to interactions between climate change and land degradation. Drylands, where land degradation is known as desertification, are particularly sensitive. A number of potential feedbacks between climate change and land degradation can be identified, which have the potential to disrupt established ecological and land-use systems, and may in turn threaten livelihoods and human well-being;

(b) Ecosystem-based approaches and response options based on SLM have the potential to simultaneously enable adaptation to climate change and land degradation whilst protecting livelihoods and biodiversity. These may be considered 'triple-win' adaptation options in the context of the three Rio conventions. Importantly, many of these adaptations have the potential to help avoid significant negative feedbacks between climate change and land degradation;

(c) The monitoring and evaluation of interactions between/responses to climate change and land degradation needs to consider effects on livelihoods and well-being as well as ecosystem processes and services. Biophysical assessments need to be triangulated and interpreted in relation to socioeconomic data within specific cultural settings to establish cause and effect; and

(d) Cooperation and knowledge exchange between land management, research and policy communities and participatory approaches to research and development are needed to negotiate diverse stakeholder priorities and perspectives on the effects and/or responses to climate change and land degradation. However, it is important to design participatory processes to effectively represent stakeholder interests, manage power dynamics and be relevant to stakeholder needs and priorities.

## III. Progress made on the topic: "Explore the options to achieve land degradation neutrality in the context of sustainable development"

27. The concept of land degradation neutrality was born out of the United Nations Conference on Sustainable Development (Rio+20), where Member States "recognized the need for urgent action to reverse land degradation. In view of this, [Member States] will strive to achieve a land-degradation-neutral world in the context of sustainable development." The Rio+20 outcome document, "The future we want" set out, inter alia, a mandate to establish an open working group to develop a set of sustainable development goals for consideration and appropriate action by the General Assembly at its sixty-eighth session.

28. The Open Working Group on Sustainable Development Goals (OWG) presented its proposal at the General Assembly as contained in document A/68/L.61. In its resolution 68/309, the General Assembly decided that the proposal of the OWG shall be the main basis for integrating sustainable development goals into the post-2015 development agenda, while recognizing that other inputs will also be considered, in the intergovernmental negotiation process at the sixty-ninth session of the General Assembly.

29. The proposal of the OWG includes, inter alia, the following provisions related to desertification/land degradation and SLM:

(a) Goal 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

(b) Target 15.3: By 2020, combat desertification, and restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land-degradation neutral world.

30. At its forty-sixth session (3–6 March 2015), the United Nations Statistical Commission (UNSC) is expected to discuss and agree on the process and modalities for the development of an indicator framework for the post-2015 development agenda. At its subsequent forty-seventh session (February/March 2016), the UNSC is expected to discuss and agree in some form on the indicator framework (and the set of indicators) for the measurement and monitoring of the Sustainable Development Goals/post-2015 development goals and targets, and its implementation. The Committee for the Coordination of Statistical Activities (CCSA) has invited its member agencies to express their views and considerations as input to the indicator discussion.

31. Under the UNCCD, the Intergovernmental Working Group (IWG) established by the COP in decision 8/COP.11 has been working on (1) establishing a science-based definition for land degradation neutrality in arid, semi-arid and dry sub-humid areas; (2) developing options relating to arid, semi-arid and dry sub-humid areas that Parties might consider should they strive to achieve land degradation neutrality; and (3) advising the Convention on the implications for its current and future strategy, programmes and resource requirements. The IWG met twice in 2014 and is expected to meet again in March 2015. An electronic consultation with Parties, observers and civil society organizations on the interim results of the IWG was conducted from August to the end of October 2014. The final report of the IWG will be available by July 2015 and submitted for consideration at COP 12.

32. The SPI, which was established by decision 23/COP.11, has participated in the consultation process organized by the IWG by advising on the science-based definition of land degradation neutrality and on options for implementation. Furthermore, the SPI plans to submit to the CCSA for its consideration as appropriate a brief input paper on indicator(s) to be used for tracking the progress towards land degradation neutrality.

33. Finally, with the support of the Republic of Korea, the UNCCD secretariat has launched the Land Degradation Neutrality Project, which aims to provide technical assistance to a voluntary group of countries with diverse socio-ecological conditions for mainstreaming land degradation neutrality in the implementation of their national action programmes. It is expected that the report of the project will be reviewed by Parties at a meeting organized in the margins of COP 12.

34. An update on progress made on this issue will be presented at the CST S-4.

# IV. Conclusions and recommendations

**35. Participants at CST S-4 and the UNCCD 3rd Scientific Conference are expected to actively contribute to the discussion on the conference topic and sub-topics with the aim of producing sound scientific outputs that could inform policy formulation and dialogue at the COP. Pursuant to the provisions of decision 21/COP.11, paragraphs 15 and 16, the Bureau of the CST, in conjunction with the SPI and in consultation with Parties and regional groups, will review the outcomes of the**

**UNCCD 3rd Scientific Conference prior to CST 12. A report on the organization and outcomes, including policy-oriented recommendations, of the UNCCD 3rd Scientific Conference will be prepared for consideration at CST 12 by the Bureau of the CST with the support of the STK4SD consortium and the secretariat, and in consultation with the Scientific Advisory Committee for the UNCCD 3rd Scientific Conference.**

**36. The Committee might also wish to consider how to bring forward the provision of scientific advice on the topic: "Explore the options to achieve land degradation neutrality in the context of sustainable development".**