



**Conference of the Parties
Committee on Science and Technology
Eleventh session**

Windhoek, Namibia, 17–20 September 2013

Item 5 (a) of the provisional agenda

**Reshaping the operation of the Committee on Science and Technology in line with The Strategy:
Review of the outcomes of the UNCCD 2nd Scientific Conference**

Final outcome of the UNCCD 2nd Scientific Conference

Note by the secretariat

Summary

By its decision 18/COP.10, paragraph 9, the Conference of the Parties invited Parties to review the outcomes of the UNCCD 2nd Scientific Conference before the eleventh session of the Committee on Science and Technology (CST) in order to make recommendations, as they deem appropriate, to the COP at its eleventh session (COP 11).

The CST at its third special session (CST S-3), held from 9 to 12 April 2013 in Bonn, Germany, agreed that the final outcome document of the UNCCD 2nd Scientific Conference, would be prepared by the Global Risk Forum GRF Davos and the Scientific Advisory Committee, and issued by the secretariat as an information document for the eleventh session of the CST. Also at CST, Parties requested the secretariat to send out letters containing the preliminary outcomes of the Conference and a set of key questions inviting Parties to provide their views and feedback (contained in ICCD/COP(11)/CST/4, chapter III).

Accordingly, this document presents the final outcome of the 2nd Scientific Conference as prepared by the Global Risk Forum GRF Davos with the feedback of the Parties and the suggestions, considerations and reviews from the Scientific Advisory Committee of the UNCCD 2nd Scientific Conference.

Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Mandate and scope of the note	1–10	3
II. Background and rationale for enhanced science-policy-practice interaction regarding the economics of desertification, land degradation and drought	11–17	4
III. Action and implementation related requirements to guide science-policy efforts ..	18–23	6
IV. Findings and recommendations for enhanced strategy and policy development	24–30	8
V. Findings and recommendations relating to scientific tools and methodologies as well as to communication and outreach	31–40	10
Annex		
Summary of session reports		14

I. Mandate and scope of the note

1. The 10-year strategic plan and framework to enhance the implementation of the Convention (2008–2018) (The Strategy), contained in decision 3/COP.8, highlights the importance given to the development and implementation of scientifically-based and sound methods for monitoring and assessing desertification, and underlines the need for a holistic view. In an effort to upgrade the scientific base for the implementation of the United Nations Convention to Combat Desertification (UNCCD), Parties to the Convention decided in 2007 to reshape the Committee on Science and Technology (CST) in line with The Strategy. One of the initiatives to strengthen the CST is the organization of scientific conferences to enhance the knowledge¹ base about desertification and drought processes. The UNCCD 1st Scientific Conference was organized in 2009 under the theme “Understanding desertification and land degradation trends.”

2. By its decision 16/COP.9, the Conference of the Parties (COP) decided that the thematic topic to be considered by the UNCCD 2nd Scientific Conference would be “Economic assessment of desertification, sustainable land management and resilience of arid, semi-arid and dry sub-humid areas”.

3. In order to prepare for the 2nd Scientific Conference, a Steering Committee comprised of the members of the Bureau of the CST and a Scientific Advisory Committee (SAC) were established. Under the guidance of these bodies, two trans-disciplinary working groups of scientists and dryland development practitioners were convened to analyse and summarize the leading scientific knowledge on the priority themes in order to provide a scientific base for policy recommendations. Out of this, two white papers were produced: White Paper I, entitled “Economic and social impacts of desertification, land degradation and drought”² and White Paper II, entitled “Costs and benefits of policies and practices addressing land degradation and drought in the drylands”.³ Both papers aim to present state-of-the-art research findings, good practices and lessons learned in the field of the economic valuation of sustainable dryland and drought risk management, including assessments of current practices and valuation techniques. White Paper I presents the different types of impact and costs – economic and social as well as environmental – relating to desertification, land degradation and drought (DLDD) and evaluates various methods for measuring and addressing them. White Paper II specifically addresses the costs and benefits of policies and practices for sustainable land and drought risk management, including resilience management based on an integrated system approach to social-ecological systems and valuation of ecosystem services. As a summary of White Paper I and White Paper II, a background document⁴ was produced and issued in all six official languages of the United Nations.

4. The present report synthesizes in a total of 40 items the most important conclusions and recommendations of the UNCCD 2nd Scientific Conference, held from 9 to 12 April

¹ In this report the term knowledge always refers to not only Western type science but also to indigenous, local and traditional knowledge.

² P.S Low, (ed.) “Economic and social impacts of desertification, land degradation and drought”, White Paper I. UNCCD 2nd Scientific Conference, prepared with the contributions of an international group of scientists, (2013). Available from: <<http://2sc.unccd.int>> (accessed 26 March 2013).

³ Lene Poulsen, “Costs and benefits of policies and practices addressing land degradation and drought in the drylands”. White Paper II. UNCCD 2nd Scientific Conference. UNCCD secretariat, Bonn, (2013) Available from <<http://2sc.unccd.int>> (accessed 26 March 2013).

⁴ United Nations Convention to Combat Desertification, “The economics of desertification, land degradation and drought: methodologies and analysis for decision-making”. Background document. UNCCD 2nd Scientific Conference. Available from <<http://2sc.unccd.int>> (accessed 8 March 2013).

2013 in Bonn, Germany. The specific thematic focus of the Conference (see paragraph 2 above) required the analysis and evaluation of current state-of-the-art knowledge on economic assessment of desertification, sustainable land management (SLM) and resilience of arid, semi-arid and dry sub-humid areas and translated available scientific findings into recommendations for use by policy and decision makers. Most of the 40 subsequent items are followed by a brief recommendation (in italics).

5. This note is based on session reports, summarized by the Global Risk Forum GRF Davos, which condensed all plenary, parallel and special sessions of the Conference. The reports of each session are given in the annex below.⁵

6. The Chairs of the plenary and parallel sessions, as well as the organizers of the special sessions, have also been asked to submit a brief report. The essentials of these reports are included in the session reports (see paragraph 5 above).

7. The present note also takes account of the major findings of the two white papers and the background document referred to in paragraph 3 above⁶ as well as including suggestions, considerations and reviews from the Scientific Advisory Committee (SAC).

8. The draft report of the Conference was presented by the Global Risk Forum GRF Davos at the closing meeting of the CST held in the afternoon of 12 April 2013 and was subsequently circulated for review and comments to all conference participants and Parties from 16 to 28 April 2013.

9. The final report considered all comments, recommendations and inputs received from conference participants and Parties.

10. The reviewed version of the Conference report has been submitted to the Scientific Advisory Committee (SAC) for their final comments.

II. Background and rationale for enhanced science-policy-practice interaction regarding the economics of desertification, land degradation and drought

11. There is a widespread consensus that the pressing issues of DLDD are inadequately addressed in today's political agenda at the global, regional and national levels. It is therefore of vital importance to raise awareness on the issues, not only on the negative impacts of DLDD in terms of socioeconomic development, but also on the opportunities that drylands offer to guide current and future land management practices to be more sustainable and resilient. Understanding and evaluating the economic and social costs and benefits associated with DLDD is essential for effective policymaking and strategies for sustainable dryland and drought risk management and in raising awareness of this globally.

Recommendation: *The economics of DLDD should be used for awareness-raising and effective policymaking.*

⁵ For a more detailed overview of the programme, see the interactive conference agenda with presentations online at <www.conftool.pro/2sc-unced/sessions.php>.

⁶ These documents are available online at <<http://2sc.unced.int/conference-documents/>>.

12. The evidence base for the economics of DLDD has expanded rapidly in recent years. Several global initiatives have been launched to further knowledge, particularly on land degradation, such as the Economics of Land Degradation (ELD) initiative⁷ created by the Centre for Development Research at the University of Bonn in 2011 and the OSLO⁸ partnership of leading research and academic institutions, international organizations and United Nations agencies working on the promotion of sustainable land management by demonstrating the total economic value of terrestrial ecosystems. Nonetheless, the evidence base needs to be expanded further in a systematic way. For example, so far only a somewhat limited body of key research has been published in peer-reviewed academic journals on the economics of DLDD. The Conference concluded that efforts by the scientific community in this regard must be intensified.

Recommendation: *To use the total economic value of terrestrial ecosystems as a tool to promote SLM, the evidence base for the economics of DLDD needs to be expanded further in a systematic way.*

13. Direct economic costs are incurred through reductions in benefits obtained by land users as a result of the lower productivity of land that results from land degradation. Overall, estimates of the costs of land degradation and droughts vary widely and are generally recognized to be very inaccurate. Estimate variation and inaccuracy can be linked to the lack of reliable biophysical measurements of the extent and rate of change of desertification and land degradation; the use of different economic estimation methods; isolation from estimates of the benefits of actions that cause degradation and which are central to decision-making and its appraisal; and the inherent level of uncertainty of complex social-ecological systems characterized by non-linearity of causation, emergence, and complex feedback loops.

Recommendation: *To use the direct economic costs of DLDD as a tool to promote SLM, the evidence base for direct economic costs of DLDD needs to be expanded further in a systematic way.*

14. Indirect economic costs of unsustainable land use are incurred through off-site impacts, and so are generally externalized and suffered by people other than those using the land. Off-site impacts of DLDD include dust storms, dryland salinity, changes in stream flow, reliability of irrigation water flow, decline in the quality of drinking water, and the silting of rivers, lakes, reefs systems and dams, and so forth. Estimates of indirect costs are less common than those of direct costs. Most indirect costs are still not estimated because of a lack of data and a lack of assessment of boundary agreements in space and time as well as which values (losses and benefits) should be included. The range and inaccuracy of estimates of indirect costs is explained in a similar way to those for direct costs, with the additional complication that valuation of non-market ecosystems services of soil and land are lacking for many of these impacts and impact profiles vary from country to country.

⁷ Scientific partners of ELD include the International Food Policy Research Institute (IFPRI), the Stockholm Environment Institute (SEI), the Global Mechanism (GM), the United Nations University Institute for Water, Environment and Health (UNU-INWEH, Hamilton, Ontario) and the Centre for Development Research (ZEF, University of Bonn). Further details at <<http://eld-initiative.org>>.

⁸ Offering Sustainable Land-use Options (OSLO). Further details available at <www.theoslo.net/>.

Recommendation: *To use the indirect economic costs of DLDD as a tool to promote SLM, the evidence base for indirect economic costs of DLDD needs to be expanded further in a systematic way.*

15. Estimations of social impacts, such as an increase in poverty, are also important but their estimation is hindered by lack of social and biophysical data and by synergies between these impacts and the underlying social causes of DLDD. Sustainable land use and drought risk management is about planning, organization, and monitoring of activities linked to the use of all natural resources in social-ecological systems that ensure positive trends in the value of dryland ecosystems, including the monetary net present value of longer-term future benefits.

16. The final impact of desertification is typically the result of numerous drivers interacting in complex ways. For example, economic modelling shows how decisions by land users that lead to land degradation can be affected by government policies in unexpected ways. Likewise, while SLM is an important measure for tackling desertification, research into entitlements, environmental justice and vulnerability suggests that tackling desertification is not just about adopting physical remedies, social remedies are equally important.

17. Economic and social impacts need to be tackled in an integrated manner, rather than separately, if policies for addressing desertification are to be effective. Improving estimates of the magnitudes of economic and social impacts will require better measurements of the extent and rate of change of land degradation; for instance, by integrating desertification and land degradation into national statistics and planning methods.

Recommendation: *If policies for addressing desertification are to be effective, economic impacts and social impacts of DLDD need to be tackled in an integrated manner. An inter-disciplinary scientific platform dealing with DLDD is one possible solution to facilitate inter-disciplinary collaboration.*

III. Action and implementation related requirements to guide science-policy efforts

18. The main topics of the conference, economic assessment of DLDD, resilience, and SLM, derive their rationale and relevance from an urgent need for improvement. This said, the goal established at the United Nations Conference on Sustainable Development (Rio+20) regarding the improvement of scientific and technical knowledge on the economic aspects of sustainable development, and therefore on SLM, means that the involvement of scientists is crucial.

Recommendation: *Science needs to be involved in the implementation process of the Rio+20 goals.*

19. DLDD impacts food insecurity, health, poverty, unemployment and migration. The direct and indirect values of land, however, are vital for resilient societies and economic

growth. Tools for stakeholders and decision makers are now available but they need to be deployed more widely: that is, tested, refined and prioritized.

Recommendation: *Stakeholders should use available tools to measure the cost of DLDD and share experience in a systematic way.*

20. Education of the populations living in drylands and degraded land is an essential element in combating DLDD. If people do not understand what they should preserve and protect, and what they have to improve, there will be no sustainability. Society and stakeholders from governments should promote education on causes of and measures against DLDD. Drylands and other environments vulnerable to desertification should be presented as economically and socially valuable in order to foster sustainable development within these regions. Endogenous, participatory, and informal learning can contribute to identifying locally adapted methods of SLM and making these available for wider use.

Recommendation: *Promote education on causes of and measures against DLDD*

21. Statistically, land susceptible to land degradation is dominated by the rural poor. These people have very few productive assets except land and unskilled labour. Asset-less poor have low ownership over resources, which can often be attributed to small landholdings and permanent migration. New fragile land policy strategies should include the poor in market oriented schemes for payment for ecosystem services (PES) to improve access of the poor to resources, insurance and loan programmes and to reduce high transaction costs.. Land degradation is a “poverty-environment trap” that can only lead to higher vulnerability, declining land productivity and a decrease in wealth, all of which accelerates further degradation.

Recommendation: *PES schemes are a fruitful approach for cost-effective and equitable SLM practices. Improvement in access to insurance and loan programmes for the poor can help to avoid the “poverty-environment trap”.*

22. Economic productivity without land degradation is essential for sustainable development. Lessons on SLM in low income countries, where degradation took place in the past, show some improvement over time. Deliberate efforts to invest in empowering traditional and local institutions as well as government effectiveness ought to be paired with efforts for improved economic incentives. Recent initiatives like Land Degradation Neutral World (LDNW)⁹ or the targets for zero net land degradation (ZNLD)¹⁰ are innovative approaches. Thus SLM needs to be embedded in sustainable, productive and comprehensive strategies so that food security matters can be addressed in a sustainable way. Action strategies need to be developed without imposing pressure on natural resources. Actions must consider the rights of the people directly involved in the management of land.

Recommendation: *Deliberate efforts to invest in empowering local institutions and government effectiveness should be paired with efforts to achieve the goals of ZNLD and improved economic incentives.*

23. The assessment of current vulnerability and the risk of future land degradation show that local populations are in urgent need of sustainable and resilient strategies to mitigate DLDD and promote SLM. In order for a rehabilitation effort to be successful, the rehabilitation strategy must be long term. SLM requires strategic approaches using adaptive collaborative management principles. At the same time there is also a need to focus on short-term benefits to land users and/or adequate compensation if the protection of natural resources carries an opportunity cost.

Recommendation: *Combine long term rehabilitation plans with short-term benefits to land users and/or adequate compensation if protection of natural resources has an opportunity cost.*

IV. Findings and recommendations for enhanced strategy and policy development

24. There is a wide consensus that research plays an essential role in combating DLDD. In order to implement the UNCCD effectively, policies to promote the sustainable management of land, forest, water, and other natural resources at national, regional and global level needs to be included in an overall strategy and policy framework. It is essential

⁹ Achieving a land-degradation neutral world is an aspirational goal, which was agreed at the United Nations Conference on Sustainable Development (Rio+20) in June 2012. To achieve this goal, land degradation should be avoided and for every hectare of degraded land a hectare of land should be restored preferably in the same ecosystem and landscape. A land-degradation neutral world is a prerequisite for assuring water, food and energy security, alleviating poverty and mitigating climate change. See: <www.unccd.int/>.

¹⁰ Zero net land degradation (ZNLD) means the achievement of a state of land degradation neutrality. Achieving this involves a combination of reducing the rate of further degradation of land, and offsetting newly occurring degradation by restoring the productivity and the provision of other ecosystem services of currently degraded lands. See: <www.unccd.int/Lists/SiteDocumentLibrary/secretariat/2012/Zero%20Net%20Land%20Degradation%20Report%20UNCCD%20May%202012%20background.pdf>.

that such policies are based on the best scientific findings and are adapted to the local ecological, social and economic conditions. This leads to the call that research should be extended to all parts and regions of the world. Investment in capacity-building of scientists and research infrastructure in low income countries is essential. This requires innovative thinking and mutual inter- and trans-disciplinary learning. In addition, more attention must be paid to the interface of science and policy, especially to the structures and processes through which scientific findings reach policymakers.

Recommendation: *For the better development and formulation of effective policies, greater investment in mutual inter- and trans-disciplinary research on DLDD is essential.*

25. There is significant potential for governments and the international scientific and technical bodies of the Rio conventions to benefit from joining efforts in knowledge management. Cost-efficient, easily manageable and exchangeable monitoring and assessment systems are vital at various levels of interaction, for land users and local decision makers as well as national and regional planning purposes.

26. Until now, the lack of effective monitoring and assessment of the state of the land and the performance of interventions has hampered progress in implementing national action programmes (NAPs).¹¹ This has made it difficult to link remedial measures to diagnoses. Fortunately, some of these issues are currently being addressed in the development of the UNCCD knowledge management system, the secretariat's multi-year work programme, and the establishment of impact indicators. However, the latter initiatives should establish harmonized approaches to collecting and storing biophysical and socio-economic data.

27. An enhanced understanding of how land-use interventions affect livelihoods, biodiversity, carbon sequestration and soil fertility will enable improved targeting of financial resources for the three Rio conventions.¹²

Recommendation: *Governments and the international scientific and technical bodies of the Rio conventions should benefit from joining efforts in knowledge management.*

28. At the global level more resources are required to enable affected Parties, especially low income countries, to implement their obligations under the UNCCD. Regional cooperation is an important component for successful implementation. Coordination mechanisms must respond to existing and emerging needs, capacities and the specific issues of each region. At the national and local levels, decision makers should also have responsibility for ensuring participation and providing full ownership to local and primary affected communities, while mobilizing access to resources from relevant institutions and organizations.¹³

¹¹ National action programmes (NAPs) are key instruments in implementing the Convention. They are often supported by action programmes at subregional (SRAP) and regional (RAP) levels.

¹² See footnote 4 above.

¹³ See footnote 2 above.

Recommendation: *The UNCCD NAP process should help affected Parties to present their strategies for DLDD prevention and mitigation and outline future action.*

29. Soil is the most significant resource for ensuring water, energy and food security. Competing claims on finite land resources are increasing sharply which makes land degradation a key issue in disaster risk reduction, poverty reduction and sustainable development. It is less costly to prevent land degradation than to deal with its consequences. Efforts to enhance food security need to reach out well beyond the confines of individual sectors and should instead be combined into a more complex system. The One Health Initiative¹⁴ – an integrated approach in managing health risks through an interdisciplinary interface for human, animal and environmental health care – can be a powerful tool to successfully cope with the drivers and consequences of desertification. Better knowledge is needed for informed debate, informed policymaking, and informed planning.

Recommendation: *Rural development should not only increase resilience in economic risk but should also reduce social and environmental risks. Developmental and environmental policies need to minimize risks, reduce exposure to hazards and reduce vulnerability by improving coping and adaptive capacities, building resilience and fostering growth.*

30. Several participants at the Conference welcomed further scientific investigation into other initiatives, including the feasibility and potential of the ZNLD approach, which appeared to be a promising strategy to a number of participants.

Recommendation: *Further scientific investigation into the feasibility and the potential of the ZNLD approach is recommended.*

V. Findings and recommendations relating to scientific tools and methodologies as well as to communication and outreach

31. Based on a comprehensive study of recent peer-reviewed scientific journals complemented with grey literature, the white papers and the background document provide an introduction to current thinking about economic valuation and techniques relating to different aspects of dryland policymaking and management. These papers highlight the challenges that exist, the different opinions about the best way to address environmental economic valuations, and the many assumptions that need to be clearly identified for each exercise in order to communicate the results efficiently to decision-makers at all levels.

Recommendation: *Use the white papers and the background document as a basis for further research.*

32. Science must contribute to the integrated management of land. Economics should play a stronger role regarding DLDD and SLM. The Conference led to a coming together of

¹⁴ <http://www.onehealthinitiative.com>.

two communities – the bio-physical, natural scientists and the economists – and there is a need to further develop this community of practice around the economics of DLDD. The inaccessibility of data and the lack of recognized forums or peer-reviewed publications on the subject are likely to lead to scattered research and difficulty in establishing a community of practice.

Recommendation: *A better system for making data available, both between scientists and economists and between them and policymakers, is needed.*

33. To decide whether it is optimal from a societal perspective to control the level of land degradation (mitigation of causes), adjust to its effects (adaptation) or do nothing (inaction), the decision maker needs to know the value of the ecosystem services affected by possible policy interventions. Cost-benefit analysis can demonstrate the full value of land to help both decision makers and land managers assess current and future land-use practices and enable the analysis of trade-offs associated with different land-use patterns.

Recommendation: *Economic analysis should be used for a better balanced negotiating power between stakeholder groups.*

34. The Conference took note of the new *World Atlas of Desertification (third edition)*¹⁵ that aims to contribute to the economic valuation of land degradation. The need for a new baseline assessment of land degradation and desertification and its causal issues was clear and a more holistic and global approach was chosen to create the new *World Atlas of Desertification*, which illustrates local dynamics at a given time. It aims at documenting environmental and anthropogenic issues and changes (that is, drought, population or land productivity dynamics) and at bringing them into relationship with their impact on land degradation and desertification. A platform for including the most recent findings and interactivity (indicator definitions) is provided through the website of the European Commission Joint Research Centre.

Recommendation: *Make use of the new World Atlas of Desertification for economic valuation.*

35. In most cases, action to combat DLDD is less costly than inaction. Land degradation is a consequence of market failures and also partly a consequence of poverty. Land users must receive direct benefits from adopting SLM practices. The Conference took note with appreciation of the efforts under way within the scientific framework of the Economics of Land Degradation (ELD) initiative. The strategy of ELD assessment is to build and inform policy debate, improve open collaboration and communication and to increase awareness and commitment.

Recommendation: *Make use of the ELD initiative to assess the benefits of action versus inaction in SLM.*

36. Understanding and evaluating economic and social costs and benefits associated with DLDD is essential for developing cost-effective mitigation strategies. The significant

¹⁵ World Atlas of Desertification, third edition currently being compiled by the Joint Research Centre of the European Commission.

indirect economic costs resulting from DLDD either fails to deter the driving forces of degradation or lead to an undesirable change in behaviour. Social impacts of DLDD include increased poverty, migration, environmental injustice, increased vulnerability, area conflicts, and/or government instability. Economic and social consequences of DLDD need to be targeted in an integrated manner. A sense of caution was to be noted regarding the acquisition of large-scale foreign private sector investments in the drylands.

Recommendation: *Acquisitions of large-scale foreign private sector investments in the drylands must be ecologically and socially just and sound.*

37. Transformative land regeneration first requires an understanding of the drivers of land crisis, and second, requires identifying grassroots solutions to build resilience. Moving to more sustainable agriculture production systems, including the various approaches of ecological and climate resilient agriculture and building more productive and growth resilient farming systems at various scales, empowering women, improving food security and nutrition are important contributions.

Recommendation: *Sustainable agriculture production systems including the various approaches of ecological and climate resilient agriculture are important contributions for transformative land regeneration.*

38. Bringing science to bear on DLDD issues through the mechanism of conferences and workshops is an important step towards informed decision-making. The scientific community represented at the Conference encouraged the UNCCD secretariat to promote and facilitate forums that would ensure and enhance the scientific discourse and thereby strengthen the evidence base of UNCCD policy deliberations. It would integrate strong socioeconomic and ecological expertise, and would adhere to scientific principles, including peer review. In addition, some participants proposed that it may be useful to explore the potential of including DLDD related research, and thereby research relating to the Conference theme, within appropriate panels such as the Intergovernmental Platform on Biodiversity and Ecosystem Services.

Recommendation: *UNCCD should further use scientific conferences to strengthen the evidence base of UNCCD policy deliberations.*

39. There is credible evidence that prevention of DLDD is more cost-effective than cure: it is better to act to prevent land degradation than to react and restore degraded land. Data is being made accessible to the scientific community to advance this topic further. We need a nexus perspective across sectors to address food security, energy security, water security while land quality is underpinning all of these aspects. The conference has stimulated trans-disciplinary thinking involving all scientific disciplines.

Recommendation: *Researchers, their networks and professional communities and organizations, as well as the relevant public authorities in charge of research, are to be called upon to promote the inclusion of the Conference theme in appropriate funding instruments for research and decision support.*

40. The Conference has made a strong case for the role of economic valuation in informing decisions that impact on land degradation and SLM. The doubling and tripling of

land value in recent years – linked with population growth and land scarcity – is going to make this at the same time a much more attractive but also more threatening issue and thus a much more urgent topic in the coming years. There are great opportunities but huge risks, especially where property rights are weak, which is a particular feature of many drylands.

Recommendation: *There is a need for greater awareness of DLDD. A stronger case for global action towards land degradation neutrality needs to be made.*

Annex

Summary of session reports*

I. Tuesday, 9 April 2013

A. Opening ceremony

1. Speakers underlined the main topics of the conference (economic assessment of desertification, land degradation and drought (DLDD), resilience and sustainable land management (SLM)). They pointed out the goal established at Rio+20 i.e. to improve scientific and technical knowledge on economic aspects of SLM. Consequently the involvement of scientists is crucial.

2. The impacts of DLDD include food insecurity, poverty, biodiversity loss, unemployment and migration. There are gaps in our understanding of the socioeconomic impacts. Moreover the indirect values of land, which are vital for resilient society and economic growth, matter. Land degradation is caused by inappropriate policies; therefore in future smarter decisions need to be taken. In order to restore degraded land worldwide, we need a clearer picture of available options and create a ‘toolbox’ for stakeholders and decision makers. We need to make smart investments yielding socio-environmental resilience.

3. DLDD is a slow and silent process, leading to economic and social disasters if appropriate action is not taken now. Nevertheless it has little media coverage. To tackle DLDD we need a more holistic approach, which requires building bridges between disciplines. Science has to contribute to an integrated management of land. The conference should be a platform for personal and professional networks as well as providing guidance for governments and non-governmental organizations to increase good practices for sustainability.

4. Poverty eradication is the first and most important millennium development goal. DLDD causes food, water and energy scarcity, which are among the main drivers of poverty. Therefore land is the key and scientific knowledge is the tool to eradicate poverty. SLM can be one of these tools. It has to be considered that poor, youth and women are parts of society most affected by DLDD. Providing women access to SLM can greatly contribute to reverse land degradation by promoting sustainable development. DLDD has an impact on gross domestic product (GDP), meaning that prevention of DLDD is less expensive than rehabilitation from DLDD. Rio+20 recommended investing in people, which also means in education systems.

1. Conclusion and recommendation from the scientific perspective

- More trans-disciplinary and holistic approaches have to be established in the scientific community in order to provide an integrated management of land. In fact case studies show that the cost of SLM is lower than inaction.

* The text of these summaries is reproduced as submitted by the Global Risk Forum GRF Davos to the UNCCD secretariat. Minor editorial adjustments have been made for the sake of clarity. The videos of all plenary session, opening ceremony and closing ceremony as well as the presentation slides of all presentations are available under: <http://2sc.unccd.int/conference-programme/presentations-and-interactive-conference-agenda/>.

- Scientific approaches have to consider more the indirect values of land because they contribute to a resilient society and to economic growth. Therefore a toolkit of available options for restoring degraded land should be provided to stakeholders and decision makers.

2. Conclusion and recommendation from the policy perspective

- SLM has to become a strategic investment; therefore it is fundamental to involve scientists in the development of appropriate policies.
- The more holistic approaches developed by scientists should translate into appropriate policies. We need to improve local livelihoods, natural capital and rural development.

3. Conclusion and recommendation from the action perspective

- Media awareness of DLDD should be raised. In fact, despite it appearing to be of low impact, DLDD acts at all levels (social, environmental, economic). For this reason we need to achieve an integrated management of land.
- We need a stronger focus on DLDD prevention (by SLM) rather than land rehabilitation where appropriate. Involving women in this process is one of the key actions to be taken.

B. Plenary I: Economic and social impacts of desertification, land degradation and drought

5. We cannot look at land degradation just as an environmental problem. We have to understand and assess better policies for land degradation. Poverty leads to land degradation and vice versa. It will be less costly to prevent land degradation than to deal with its consequences. We need better evidence for better policies.

6. Efforts to enhance food security need to reach out well beyond the confines of individual sectors, instead the efforts need to be combined into a more complex system. Rural development should not only increase resilience in economic, but also social and environmental risks. Better evidence is needed for better knowledge. Better knowledge is needed for informed debate, informed policymaking, and informed planning. Developmental and environmental policies need to minimize risks, reduce exposure to hazards and reduce vulnerability by improving coping and adaptive capacities, building resilience, and fostering growth. A precautionary approach should be utilized in these policies. Economics should have a stronger role in desertification and land preservation. Scientific integration is needed as is a realistic picture of combined socioeconomic-ecological risks.

7. Land degradation is a global issue that is mostly prevalent in developing nations. The rural poor are statistically dominating “fragile lands” that are prone to land degradation. Countries with the largest shares of population on fragile lands have the highest poverty rates. The rural poor have very few productive assets except land and unskilled labour. Asset-less poor have low ownership over resources, this can be attributed to small landholdings and permanent migration. New fragile land policy strategies should include the poor for payment for ecosystem services, improve access of the poor to resources, reduce high transaction costs, provide effective instructions, reduce high transportation costs, improve the poor’s access to insurance and loan programs. Land degradation is a “poverty-environmental trap” that will lead to higher vulnerability, declining land productivity, decrease in wealth and further degradation.

8. We need a nexus perspective across sectors to address food security, energy security, water security, and land quality is underpinning all of these aspects. Arable land globally available has been stagnant for some 20 years. Land prices are “shooting up”, the value of the resource land is rapidly increasing. What is feeding the earth today is science. Productivity growth in the last years depends more on knowledge than on irrigation, area expansion, and input intensity. Inaction to combat DLDD is more costly than action. Land degradation is a consequence of market failures and partly a consequence of poverty. Land users must receive direct benefits for adopting sustainable land management practices. The strategy of the ELD assessment is to build and inform policy debate, improve open collaboration and communication, and to increase awareness and commitment.

9. We need to develop methods and indicators for desertification, specifically at the local level. Environmental poverty, specifically induced by desertification, can be targeted through the implementation of the pentagon method. The pentagon method does not require any highly technical equipment and is low cost. It evaluates five aspects: social capital, human capital, natural capital, physical capital and financial capital. Evaluation of a community is then based on a theorized ideal scenario in contrast to the actual scenario. The information gathered through this method can be utilized in policymaking and the identification of high priority areas to formulate new projects.

10. Understanding and evaluating economic and social costs and benefits associated with DLDD is essential to developing cost-effective mitigations. The significant indirect economic costs resulting from DLDD fail to deter the driving forces of degradation or lead to a change in behaviour. Social impacts of DLDD include increased poverty, migration, and environmental injustice, vulnerability, area conflicts, and government instability. Economic and social consequences of DLDD need to be targeted in an integrated method.

11. Even with the understanding of what makes people vulnerable to DLDD, there is a discontinuity between policy and practice. Farmers are not passive victims, they adapt to DLDD when they notice a change in their land productivity. Adaptations include migration of both labour and livestock, diversification of livelihood activities, crops, and livestock breeds, and land based adaptations. Local people are helping themselves and are not solely dependent on policy. Policy needs to address educational and social aspects of land degradation. Work across scales.

1. Conclusion and recommendation from the scientific perspective

- Productivity growth in the last years depends more on knowledge than on irrigation, area expansion, and input intensity.
- The trend in land degradation risk is negative: in 2025, 3.2 billion will live in rural areas in developing countries.
- Understanding and evaluating economic and social costs and benefits associated with DLDD is essential to developing cost-effective mitigations.

2. Conclusion and recommendation from the policy perspective

- Developmental and environmental policies need to reduce exposure to hazard and reduce vulnerability by improving coping and adaptive capacities, building resilience and fostering growth. A precautionary approach should be utilized in these policies.
- New policy strategies on land susceptible to land degradation should include the poor for payment for ecosystem services, improve access of the poor to resources, reduce high transaction costs, provide effective instructions, reduce high

transportation costs and improve the poor's access to insurance and loan programmes.

3. Conclusion and recommendation from the action perspective

- We need to move efforts in developing methods and indicators for desertification, specifically at the local level. Environmental poverty, specifically induced by desertification, can be targeted through the implementation of the pentagon method.
- Local people are helping themselves and are not solely dependent on policy; action can be achieved by a bottom-up approach.

II. Wednesday, 10 April 2013

A. The new World Atlas of Desertification contributing to economic valuation of land degradation

Special session organized by the European Commission

12. The session introduced the initiative on compiling a new World Atlas of Desertification (WAD). Recently, the need for a new baseline assessment of land degradation and desertification and its causal issues has risen. Coordinated by the European Commission Joint Research Centre in partnership with the United Nations Environment Programme (UNEP) and a network of experts, a more holistic and global approach was chosen to create the new WAD. The new WAD illustrates the local dynamics at time. It aims at documenting environmental and anthropogenic issues and changes (i.e. drought, population or land productivity dynamics) and bringing them into relation to their impact on LDD. A platform for including the most recent findings and interactivity (indicator definitions) is provided through the WAD website.

13. Case studies on consequences of population changes, forestation and agricultural practices on DLDD showed that: (a) we are facing population growth mainly in less developed countries, which is strongly linked to migration into cities and poverty. Poverty is widely accepted to be one of the drivers of land degradation. Further problems arise since former self-sufficient communities are now dependent on others to survive, which led some governments to take advantage of the situation by redistributing land and thereby causing social tensions; (b) environmental degradation can be caused not only by deforestation but also by tree densification. Studies in Southern Africa have shown that the latter is mainly caused by invasive alien species, which threaten biodiversity leading to soil destruction, or bush encroachment from endogenous species, which negatively impact ground water availability; (c) fertile soil has to be protected; 3% of the world's land area produces more than 40 % of the world's food and over 90 % of cereals. However, each region of the world is facing DLDD and already today the soil fertility depletion is very costly.

14. A universal set of indicators is not achievable, but there are a number of global variables related to causal issues that can be integrated into base layers. Further research is needed on focused integration of information, both for global layers and contextual information, ideally collated and available at global levels. WAD aims at contributing to economic studies and to be an instrument in the discussions on approaches to achieve a 'land degradation neutral' world, a goal set at Rio+20.

1. Conclusion and recommendation from the scientific perspective

- Interpreting increased tree cover as a sign of SLM, or an improved environment must be made with caution as in many instances this is actually a sign of major environmental degradation with high social environmental and economic cost.
- Yield the best knowledge but adapt it to local policy perspective needs.

2. Conclusion and recommendation from the policy perspective

- Former self-sufficient communities are now dependent on others to survive, which led some governments to take advantage of the situation by redistributing land and thereby causing social tensions. Governments have to implement more appropriate policies.

3. Conclusion and recommendation from the action perspective

- Generally, science should provide the best knowledge but subsequently it has to be adapted to local needs in order for the implementation to be successful.
- Enabling environment should be created to adaptation of scientific knowledge

B. Good practices in SLM and lessons learned (part 1)

Parallel session

15. Five different case studies of SLM were presented during the session from dry land (Niger and Israel) and humid-wet regions (Bhutan, Nepal, Cuba). All examples were good practices of different management approaches related to different needs. Water and nutrient management was proposed to tackle erosion and landslides, and all the studies showed the impact of investments and their related costs. All studies mentioned the involvement of people in different initiatives, ranging from community forestry to agroforestry and watershed management. The experience of conducting SLM projects and land management campaigns showed that the poorest people are those who benefit less from those investments and that often this is not shown. SLM is shown to be a profitable activity leading to improved livelihoods and economic return. Long-term measurements of yield and biomass production indicated overall low investment costs for SLM and positive return on investments.

1. Conclusion and recommendation from the scientific perspective

- Low investment costs for SLM have positive return on investments. Overall agriculture has been intensified providing additional food for local people.
- Agroforestry systems are a viable alternative to achieve SLM. Farms managed under agroforestry can in fact achieve higher production than deforested sylvopastoral areas.

2. Conclusion and recommendation from the action perspective

- Visualization of DLDD is useful to raise public awareness. We need to show stakeholders measurable and visible results through the implementation of graphic interfaces. Moreover on-site practical demonstrations, such as field excursions and training courses are needed to initiate policy implementation.

C. Economics of land-use change

Parallel session

16. Cost variability is dependent on the spatial variation of an area such as its location, investment cost, and land quality. Mathematic equations can be used to predict this variability. Spatial variation in investment costs of SLM technologies and distance to markets play a key role in defining appropriate SLM strategies and policies. The Federation of Bosnia and Herzegovina is undergoing significant land-use changes and, as a result, soil loss. There is a perception that land is a cheap resource because it has never been evaluated by criteria applied in a market economy. Unreliable public registers, the restoration of land to rightful owners, relocation of populations, and history of violence also hinders the accuracy of land value assessments. In Sarajevo Canton Territory, agricultural land value can be increased as much as 50 times if its use is changed into construction land. The establishment of an efficient cadastre is essential for harmonized land policy within the country. There should be an understanding of urbanization within the policy sector.

Conclusion and recommendation from the policy perspective

- There should be an understanding of urbanization within the policy sector.
- Spatial variation in investment costs of SLM technologies and distance to markets should play a key role in defining appropriate SLM strategies and policies.
- The establishment of an efficient cadastre is essential to harmonized land policy within the country.

D. Toward an analytical framework to assess the value of action and inaction against land degradation: new insights and policy challenges

Special session organized by the International Food Policy Research Institute

17. The valuation of action vs. inaction requires science-based evidence to facilitate the measurement of the costs and benefits, in order to construct a consistent framework, with a cutting edge approach, which takes into account core, desirable and sophisticated accounting methods. It is also important to cross check the compiled information using externally observed and objectively measured land degradation indicators. One step towards a predictive tool for land degradation and the inclusion of climate change effects on food security is the NDVI¹⁶ proxy for land degradation and land carrying capacity assessment, that allows prioritizing actions, has global coverage, single index readily available datasets, and excellent spatial and temporal extensions. Economic productivity without degrading the nature is compulsory. Take into account the lessons from SLM in poor countries, where some degradation took place in the past but experienced some improvement with time. Deliberate efforts to invest in enhanced traditional and local institutions, government effectiveness, efforts to achieve zero net land degradation and economic incentives. Thus SLM needs to be embedded in sustainable, productive and comprehensive strategies, so food security matters can be addressed in a sustainable way.

1. Conclusion and recommendation from the scientific perspective

- Science-based evidence to facilitate the measurement of costs and benefits, in order to construct a consistent framework is needed. Cross check measured indicators with perceptions.

¹⁶ Normalized Difference Vegetation Index (NDVI).

2. Conclusion and recommendation from the policy perspective

- Deliberate efforts are needed to invest in enhancing traditional and local institutions, government effectiveness and efforts to achieve zero land degradation and economic incentives.

3. Conclusion and recommendation from the action perspective

- Develop land economic productivity without degradation.

E. Identification and evaluation of ecosystem services*Parallel session*

18. The session provided three case studies of ecosystem services from Laos, Niger and the Carpathian region. There are thousands of isolated wetlands in the drylands of the Sahel. These wetlands are very valuable to man and biodiversity. From the experience in Niger it was shown that the emergence of drylands could help improve the most valuable resources of the related wetland areas. Research showed that during the dry season crop per hectare, livestock keeping, fisheries and collection of natural products increased in the wetlands of the Sahel region. The wetlands allow use of associated drylands, and vice versa. Wetland quality is at present greatly threatened for all uses and users. Consequently there is a potential for underlining and improving wetlands services. From the study in Laos it was found that maize and rubber production increases the capital of farmers but decreases ecosystem services. Therefore, action should be taken for a transition from agricultural to non-agricultural land considering the economic needs of farmers. The session summarized the tools and methodologies used to evaluate ecosystem services and the opportunities to use those evaluations to inform policymakers. The need for more integrated data was stressed also in order to provide a better economic evaluation of ecosystem services. In addition simple local tools were proposed to inform local people with lower economic means.

1. Conclusion and recommendation from the scientific perspective

- Remote sensing should be used more as it is a great tool to assess ecosystem services. The ATLAS Project (in its inception phase) is a good example of how to develop a comprehensive system that combines satellite and field data.
- We need to link different data from different sources to assess ecosystem services, and we need to adapt data from single sources to multiple analysis and usages.
- Inventory of wetlands and valuation of their services should take place urgently.

2. Conclusion and recommendation from the policy perspective

- Decisions about conversion of forest to agricultural land should be based on proper cost-benefit analysis.
- Policymakers need to give farmers the opportunity of labour when reducing agriculture in order to increase ecosystem services. REDD can be an important policy mechanism to compensate farmers for maintaining ecosystem services. When no integration of environmental impacts, REDD subsidies can hardly be interesting compared to main commercial agro-systems profitability.
- Develop and implement national wetland programmes for sustainable wetland use and conservation, which includes management of their dryland catchments.

- The UNCCD should do this in cooperation with the Ramsar Convention, the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on Migratory Species (CMS), the African-Eurasian Waterbird Agreement (AEWA) and their Parties: united we stand.

3. Conclusion and recommendation from the action perspective

- There is a great potential for valuating wetlands, however the action strategy needs to be developed without imposing pressure on natural resources. Actions need to consider the rights of the people directly involved in the management of wetlands. Ecotourism is a possible action.
- PINReM (Participatory Integrated Natural Resource Management) of the wetlands in the Sahel, together with the drylands associated with them, is urgently needed.

F. Economic and social impacts assessment of DLDD at a local scale

Parallel session

19. Environmental degradation is impacted by human activities; in turn land degradation highly impacts human activities. In Rajasthan (India) DLDD is seen as a pressing problem and today's agricultural practices adversely affect the arrest of desertification. Biophysical and socioeconomic factors were named to be important drivers for the phenomenon observed in South Africa of high numbers of smallholder farmers abandoning their land, despite a high unemployment rate (65% of cultivators). Abandoning land correlated with the onset of governmental grants being paid. A case study in Benin showed that desertification has a large impact on women – access to resources (firewood, food plant, medical plants) becomes limited and the prices for the given goods are rising. Apart from these challenges, the social status of women in this region is mentioned as the major problem: they often do not get financial credits and also cannot possess their own piece of land.

1. Conclusion and recommendation from the scientific perspective

- Scientific studies show that an increasing burden on land, arising from agriculture based activities, is likely to adversely affect the efforts to arrest desertification.

2. Conclusion and recommendation from the policy perspective

- Women's rights have to be strengthened to improve their social status. As a consequence they would be able to possess land and take own responsibilities to cultivate their land.
- To fight limitations of resources and thereby increasing prices, restoration policies have to be developed. There is an urgent need for policy intervention to adverse DLDD.
- A large majority of South African smallholder farmers depend on grants. However, governmental grants seem to discourage farmers continuing farming their land. Even though politically unattractive, the grant-paying policy has to be reflected upon.

G. Plenary II: Costs and benefits of policies and practices addressing land degradation and drought in the drylands

20. GDP tells us that growth is occurring but it is wealth that is a better indicator of a country's wellbeing. National capital accounting (NCA) describes sustainable development, stresses global partnership and assesses how to benefit the poorest populations. The system of environmental economic accounting (SEEA) strives to account for natural ecosystems services. It complements the current system, but it does not replace it. SEEA is a methodology that links economy and the environment. The NCA gives a bigger picture on DLDD by including different information and organizing it in a way that can be useful for decision makers for prioritizing and scaling up important issues.

21. It is important to have an effective method to determine the cost of inaction when referring to DLDD. Assessment requires large amounts of data. Although it may be difficult to find them especially on the micro level, it is always possible to find some kind of data. Ideal information includes relatively new surveys along with micro data, which is then used to construct a model for degraded land against non-degraded land. The difference between these two areas is the cost of inaction. Project evaluations must take into account the need to focus on the beneficiaries in order to make smart investments.

22. Economic assessment of policies and practices aiming at sustainable dryland and drought risk management should have an emphasis on resilience. The critical challenge for dryland development is that it is an extremely complex and dynamic social-ecological system. How we are getting the right information is very important. Resilience of drylands is defined as the capacity to survive, adapt, and follow a positive trajectory in the face of external and/or internal changes. Management of resilience includes an acceptance of uncertainty. Mainstream economics do not take into account the specificities of complex ecosystems but are a good communication tool. There is no single approach; rather a variety of different approaches should be used. The state-of-art of the research indicates that an increasing focus on transdisciplinary research is mandatory.

23. The scientific community can help economists and policymakers make smart decisions but a robust cost efficient method of estimating cost, benefits of land is needed. Decision makers have a variety of considerations to make; economy is just one of them. The "know-whys" (hard scientific/white knowledge) and the "know-hows" (local knowledge) have to be combined and incorporated into decision making. The old rhetoric of land degradation and desertification was not grabbing the attention of policymakers, for that reason, the discussion of DLDD now is being turned into a discussion of economics. Total economic value of an ecosystem is made up of use and non-use value, the challenge is to estimate a monetary number for non-use value. When using different methodologies to measure the same thing, results are also different and incomparable. It is very important to provide countries with a harmonized methodology, even in its imperfect state; it will strengthen a country's capability to estimate the true value of land.

24. Social ecological systems are very complex; the challenge is to develop a method to link the elements of the system and the concept of bouncing forward with resilience. Proxies are needed to estimate true land value. Understanding the value of a system is what drives people to be effective stewards of land.

1. Conclusion and recommendation from the scientific perspective

- The critical challenge for dryland development is that it is an extremely complex and dynamic social-ecological system. How we are getting the right information is very important.

- When using different methodologies to measure the same thing, results are also different and incomparable. It is very important to provide countries with a harmonized methodology, even in its imperfect state.
- SEEA is a methodology that can be used to link economy and the environment.

2. Conclusion and recommendation from the policy perspective

- Economic assessment of policies and practices aiming at sustainable dryland and drought risk management should have an emphasis on resilience.
- The NCA gives a bigger picture on DLDD by including different information and organizing it so that it can be useful for decision makers for prioritizing and scaling up important issues.

H. Practical tools for monitoring and assessment of DLDD for economic assessments

Workshop organized by USDA ARS

25. The economic assessment of desertification, sustainable land management and resilience requires simple monitoring and assessment tools that can be used by farmers, development organizations and governments. The presented tools of the USDA ARS¹⁷ automatically generate land health indicators, which are based on standardized data sets, which are entered into the system by any user. The core idea was to add value to existing data collections or systems, rather than replacing or competing with these. All of the tools and guides can be freely downloaded at <http://jornada.nmsu.edu> in different languages.

1. Conclusion and recommendation from the scientific perspective

- Add value by sharing standardized collected data.
- Monitor deviation from expected soil properties (e.g. soil and site stability, hydrologic function, biotic integrity), in order to normalize against naturally occurring changes.

2. Conclusion and recommendation from the policy perspective

- Make finding the appropriate cultivation/restoration practice more efficient by sharing data generated from different sources, thereby preventing repetition.
- The goal is to keep the tools as simple as possible to make them more likely to be applied by various users (scientists, farmers). In future they are aiming for apps, which are more graphic rather than text based.

I. Economic and social impacts assessment of DLDD at regional/national scale

Parallel session

26. The session provided biophysical and economic assessment of the cost of losing ecosystems services for two case studies. This combination of perspectives should enable to recognize the distribution of DLDD impacts on society. The first speaker gave a detailed technical description of the tool used to assess land degradation in Africa (presenting a case

¹⁷ United States Department of Agriculture, Agriculture Research Service (USDA ARS).

study for Uganda). Research showed land degradation hotspots in Africa through land degradation indexes. Project results revealed that the approach behind is a promising tool to track land cover changes and identify risk areas of degradation on regional and national level. Robust results, however, need longer time-spans of monitoring and must be accompanied by on-going ground-truthing for map validation. The latter is only conducted in selected “hotspots”. Moreover, there is a lack of complementary economic impact estimates. The second speaker presented the economic evaluation of water value in the Atacama Desert in Chile. Water prices depend on investment projects (mining, agribusiness) and droughts.

27. The application of the “contingent valuation method” in the study is a classical approach capable of extracting “use” and “non-use” values. From an implementation perspective, the approach will always suffer from its well-known, typical shortcomings. When applied in that case study funded by local government, however, results satisfied policymakers, because they could make use of the price values as benchmark estimates. Water is a very much valued resource, particularly for miners working in desert environments and tending to “grab” water. This ultimately leads to an increase in water prices, which are elsewhere rather low.

1. Conclusion and recommendation from the scientific perspective

- The level of water pollution should be used in the economic evaluation of water value.

2. Conclusion and recommendation from the policy perspective

- Water market has a tremendous political power in Chile and the existence of a water market there is a controversial issue. Moreover water is more valuable in deserts where mining activities are more present.

J. Community-based approaches for sustainable land management

Parallel session

28. Education of the populations living in semi-arid, desert, and degraded land is an essential element in combating DLDD. If people don’t understand what they are protecting, there will be no sustainability. Society and stakeholders from government should promote education on DLDD. Semi-arid areas and other environments vulnerable to desertification should be presented as a positive place in order to foster sustainable development within these regions. Re-education of family agriculture and sustainable practices will combat desertification. Education will also promote a sense of pride and identity within these communities. When human rights are not effective, poverty is generated. Poverty will lead to environmental degradation. Human rights efforts should be linked to efforts working to protect the environment. An integrated approach for multiple global socio-environmental benefits should be used. By assessing current vulnerability, and future land degradation risk, a high need population can be identified. In order for a rehabilitation effort to be successful, the rehabilitation plan must be long term. Strategic approaches should use adaptive collaborative management principles for sustainable land management.

1. Conclusion and recommendation from the scientific perspective

- Scientists should work with non-governmental organizations (NGOs) in order to have the full picture of the issue. This will allow them to familiarize themselves with the stakeholders.

- High need populations should be determined by assessing current vulnerability, and future land degradation risk.

2. Conclusion and recommendation from the policy perspective

- Strategic approaches should use adaptive collaborative management principles for sustainable land management.

3. Conclusion and recommendation from the action perspective

- Society and stakeholders from government should promote education on DLDD. Re-education of family agriculture and sustainable practices will combat desertification.
- Human rights efforts should be linked to efforts to protect the environment.

K. Global Environment Facility session: Carbon – a valuable global benefit of sustainable land management

Special session organized by GEF

29. Availability of soil organic carbon (SOC) increases agriculture stability improves crop yields and restores soil fertility. The concept of SOC saturation appears to be critical; more information of how climate change affects SOC stocks is needed. To that extent, it is also important to take into account socioeconomic implications, and to weigh the trade-offs in order to find out how to deal with negative externalities. Advancing in SLM implementation with multi-focal area projects allows delivering multiple environmental and social benefits from improved management of degraded land, biodiversity conservation, and climate change mitigation and adaptation strategies. To maximize carbon sequestration to improve soil organic carbon, additional funding is needed. Investments contribute to create opportunities for cross-focal area synergies and demonstrate environmental benefits. These require tools for monitoring and measuring the benefits of carbon sequestration. There are emerging global priorities such as food security, climate-smart agriculture and forest landscape management and restoration. New tracking tools measure, monitor and model carbon benefits for SLM projects.

30. The Global Environment Facility (GEF) developed a free system, which can be used for different projects at any stage. It gives spatially explicit output and reports in a standard format. Biochar is charcoal biomass when used as a soil amendment. Biochar is a stable carbon source that lasts for a long time when added into the soil. It enhances mineralization of native soil C, and has potential utilization for GHG mitigation. Other benefits include delayed decomposition of biomass, reduced nitrous oxide emission from soil, increased soil organic matter, avoided fossil fuel emissions, increased plant growth and plant health, avoided emissions from nitrogen fertilizer produce and reduced fuel use in cultivation and irrigation. However, there are also direct and indirect negative implications that arise from its use, including a potential need for more herbicide application, contamination risks and concerns related to sustainability. Thus, its outcome is positive when produced in facilities where emissions are controlled, and harnesses are minimized.

1. Conclusion and recommendation from the scientific perspective

- It is important to take into account socioeconomic implications, and to weigh the trade-offs, in order to find out how to deal with negative externalities.
- New tracking tools measure, monitor and model carbon benefits for SLM projects. They give spatially explicit output and report in a standard format.

- Soil organic carbon management is inevitably a complex challenge requiring both generic research on the processes that may lead to net carbon sequestration and the specific conditions and practices that may be recommended.
- The opportunity in SOC management is to deliver multiple environmental and societal benefits, but this can only be achieved with the right tools and techniques and in full knowledge that some land-use systems may encourage net greenhouse gas (GHG) emissions.

2. Conclusion and recommendation from the policy perspective

- Advancing in SLM implementation with multi-focal area projects allows delivering multiple environmental and social benefits from improved management of degraded land, biodiversity conservation, climate change mitigation and adaptation strategies.
- Conditions need to be created that reinforce linkages between sustainable land management, climate change adaptation and food security.
- Embrace momentum of information availability to join-up parallel initiatives (WOCAT,¹⁸ LADA¹⁹) and make it more available to land users.

3. Conclusion and recommendation from the action perspective

- SLM must be approached in an integrative way, where strategies to sequester more carbon in soils are linked with high-profile human development goals such as food security and protection of ecosystem service functions.
- A focus on integrated approaches involving simultaneously food, fibre, and climate change, must emphasize collective action at the field and local levels, and on securing the benefits desired by land users.
- The science must target land users' needs and the needs of UNCCD countries; it must not just be biophysically-based but must put land users as the guardians of soil and land resources central-stage

L. Sustainable dryland management for multiple benefits: opportunities for linking carbon storage, ecosystem services and livelihoods

Special session organized by the University of Leeds

31. The goal of Climate Compatible Development is to achieve sustainable economic growth and social development while cutting emissions or storing carbon to mitigate threats of climate change. Carbon, stored in the form of SOC is mostly located in the biological crust of dryland soil, close to its surface. There is a trade-off between livelihood and ecosystem services benefiting from SOC, thereby depleting SOC is contributing to CO₂ release and CC. From this perspective, intensification of grazing has a double negative effect on the soil's SOC content; CO₂ efflux is increased and at the same time carbon input is decreased. Implementing managed grazing would represent an opportunity to keep the soil composition intact, since light grazing has few adverse impacts on the carbon store. To increase the interest in non-overexploiting carbon storages, carbon payment could be an attractive tool. However, the accounting would be complex. Furthermore it is seen as more important to look at the overall value of the ecosystem services rather than isolating the

¹⁸ World Overview of Conservation Approaches and Technologies (WOCAT).

¹⁹ Land Degradation Assessment in Drylands (LADA).

value of carbon. The attempt to increase the carbon content by biochar was not yet successful. Biochar has a low density and is easily washed away by rain.

1. Conclusion and recommendation from the scientific perspective

- There is a need for scientific advancements to quantify carbon in soil and to also develop community based monitoring systems.
- It is important to understand carbon finance to mobile landless pastoralists in a livelihood context. This includes assessment of their impact on ecosystem service provision.
- There is a risk that biochar has a limited effect on improving soils. We need to do careful assessments before adopting biochar application on large scale.
- More research is needed into the cultural issues surrounding the adoption of new rangeland management practices.

2. Conclusion and recommendation from the policy perspective

- Need an institutional framework to make sure that benefits of CB-PES are felt across the communities.
- There is scope for using jatropha curcas for rural electrification but household level production limitations must be overcome. Potentially there are trade-offs with other cash crops such as cotton. Policies need to recognise these.
- UN-REDD does not seem appropriate for dryland soils as quantities of C are small and potential payments would be small. Productivity depends on carbon use and not its storage.

3. Conclusion and recommendation from the action perspective

- For successful implementation of UNCCD the following cues should be considered: include community input, establish a multi stakeholder partnership, have clearly defined roles and responsibilities and use a site-specific appropriate monitoring system. It is crucial to find not only environmentally but also culturally acceptable solutions of SLM of rangelands.
- There is a need to identify project boundaries in CB-PES (community based payment for ecosystem services) projects to avoid leakage: monitoring tools are required that are appropriate for rangeland communities.

M. COST Action ES1104 – Arid land restoration and combat of desertification: Setting up a drylands and desert restoration hub

Workshop organized by COST Action ES1104

32. COST is a European network of scientists with the goal of enhancing arid land restoration (ALR) and combatting desertification. COST was funded in order to reduce the fragmentation in European research in ALR and to open cooperation worldwide. The ALR hub is formed by a holistic group of scientists that can identify problem typologies, exchange knowledge and give tools, guidance and outreach. During this special session different scientists presented their work in the COST network. Practical measures of ecosystem functions and services were proposed in a holistic framework, and new strategies of ALR were presented through several case studies. Due to the high non-linearity of ecological responses, ALR can take advantage of specific, synergistic measures of

functionality. Highly degraded areas can be used as a test for dryland restoration and these new metrics can be tested. Disciplinary boundaries need to be crossed to overcome DLDD. For example, the developing science of eco-hydrology is gathering experts from different fields to solve issues related to DLDD. Another aspect considered among scientists of the COST network is a need for good agricultural practices for soil management.

Conclusion and recommendation from the scientific perspective

- Functional diversity was proposed as an indicator of ecosystem functions and was related to ecosystem services in a case study. Moreover, the use of historical data to test management practices through new integrated functional metrics was found relevant in another case study.
- There is a need for more interaction between theoretical and empirical scientists.

N. Economics of Land Degradation initiative – Bridging the science/policy/practice divide

Workshop organized by the ELD initiative (www.eld-initiative.org)

33. Environmental issues are taken more seriously by decision makers in both policy and business when they are put into a monetary context. In consideration of desertification, there is a current global lack of sustainable choices being made by decision makers. By framing DLDD in economic terms, land managers can be convinced to choose actions that have the most benefit to society as a whole, set fairer compensation levels, enable better rural development and food/water security, and promote sustainable land management (SLM). The ELD approach determines land values in terms of service flows, which include; provisioning services, regulating services, and cultural services. Once land value is more clearly and inclusively defined, the cost of protecting the land can be put into more accurate economic contexts. The ELD approach finds cost-benefit compromises in restoring, protecting, or sustainably developing an area, and demonstrates to public and private sectors the economic viability of SLM. The approach seeks to create harmonized land value evaluation methodologies that communicates to all stakeholders and highlights the benefits derived from adopting SLM practices, thus providing effective tools to meet the perilous gap in global SLM decision-making. The ELD initiative will build on the findings of the 2nd conference and will produce separate reports for the scientific community, political decision makers and the private sector.

1. Conclusion and recommendation from the policy perspective

- Inclusive economic land valuation should be used for improved public and private decision making in land management, leading to politically and environmentally sustainable and effective policies.

2. Conclusion and recommendation from the action perspective

- The goal of ELD is to focus equally on all stakeholders involved. Economic valuation of land creates a language that is understood and applicable by scientists, the private sector, the public sector, NGOs, and policy makers.
- By framing DLDD in economic terms, land managers can be convinced to take actions that; have the most benefit to society as a whole, set fairer compensation levels, enable better rural development and food/water security, and promote sustainable land management.

O. Assessing actions to combat desertification, what valuations

Special session organized by CSFD

34. Evaluation and restoration of actions to combat desertification are designed as an integrated and participatory assessment method, which tries to address a number of increasing demands, such as the integration of biophysical data and socio-economical data. The protocol is a science-based suite of general common indicators that are later combined with the indicators proposed by the stakeholders. It has been tested in more than 20 countries with the intention to make it flexible enough to adapt it to different places and conditions. The main activities are fully participatory, and integrate scientific and technology knowledge with local knowledge; and integrate global criteria with site-specific criteria.

35. Continental Scale Valuation stresses the importance to measure the costs of inaction on land degradation and the resource allocation processes; measuring losses of productivity, production, income and employment are considered as well. The information includes census micro-data, cross-section analysis, temporal series and satellite information. Construction and validation of data was carried out in some countries of South America (e.g. Chile, Peru, Ecuador) through aggregated and non-aggregated analysis, which demonstrates the loss of economic value, production value and total productivity factors are derived from the difference between degraded and non-degraded areas.

36. The IRR is a tool for evaluating projects to combat desertification. It gives valuable economic valuation. This can be presented as a mechanism that does not only provide information on the importance for institutions to report their activities to support the policy making process, but also is a highly useful tool for improving local development and enhancing capacity building. Assessing environmental commitments with guidelines and an evaluation framework for on-board approaches illustrates the effectiveness of environmental actions.

1. Conclusion and recommendation from the scientific perspective

- Complexity of the integration of biophysical data and socio-economic data to be addressed.

Conclusion and recommendation from the policy perspective

- The IRR is a tool to evaluate DLDD projects. It provides information on the importance for institutions to report their activities to support the policy making process.

2. Conclusion and recommendation from the action perspective

- Contribution to the reinforcement of capacities, elaboration of participative alternative scenarios for territorial development strategies.
- Focus evaluation on learning and exchanging knowledge between the different stakeholders and scientists; and engage them in participatory approaches.

P. Water and sustainable land management

Parallel session

37. Experiences from the German Development Cooperation in Soil and Water Conservation (SWC) as well as Soil Protection and Restoration (SPR) have shown that it is essential for contributing to SLM and resilience building to think in big scales: Long term

commitment is required, landscape approaches have to be based on site specific analysis, with a plan for up scaling already in mind.

38. Their suggestions regarding policy making to ensure transparency and local people involvement is reinforced by a case study on sustainable water management. According to that study, market based water allocation would economically be more beneficial than fixed water use rights. However, the authors of the study are aware that there is also a social component of the issue, namely that heterogeneous distribution of water resources causes tensions. Social and biophysical factors are also crucial determinates of water vulnerability. The economic aspect of water is further assessed by comparing economic models of water resources vs. eco-hydrological systems.

39. An open dialogue and exchanges between the two different approaches is proposed to get a more sound reflection of water resources and its value. Water harvesting is an appropriate measure to retain water and prevent land degradation, shown by a case study conducted in Oman. Furthermore, water also has an indirect positive effect on DLDD prevention; due to properties of a variety of hydrological processes it helps mitigating global warming.

1. Conclusion and recommendation from the scientific perspective

- Water management studies need to combine physical, ecological, economic and social aspects, if they are to be used successfully for making water management Conclusion and recommendations. They should look not only at water availability, but also at access to water, and encompass both surface water and groundwater.
- Studies of effects of climate change should look not only at vegetation quantity (biomass), but also at vegetation quality (species composition).
- Study further the extremely import role of hydrological processes, as opposed to carbon, as drivers of climate change and associated processes. In particular the role of microbes in hydrological processes deserves further elucidation.
- Comparing economic models of water resources vs. eco-hydrological systems may be beneficial for getting a more sound reflection of water resources and its value.

2. Conclusion and recommendation from the policy perspective

- Policies have to be transparent and inclusive: The issues of money and success factors are addressed; farmers are involved in decision-making and sustained national effort is ensured (secure land tenure arrangement, support from community organizations).
- There is an urgent need to reform water management institutions to reverse environmental degradation and introduce marked based water allocation.
- Legislate and provide funding so that water management and soil & water conservation at various geographic scales are participatory (including all stakeholders) and holistic (with due attention to the ecological and social aspects as well as the economic ones).
- Create the conditions so that all stakeholders, but especially the local ones, can participate in water management and soil & water conservation in a meaningful way.

3. Conclusion and recommendation from the action perspective

- For making policy implementations more effective and long lasting, consultation and empowerment of communities is suggested. Furthermore transparency of the process should be ensured.
- In nature conservation, establish and maintain wide and effective corridors between protected areas, so that, as the vegetation changes due to climate change, animals can move to other areas.
- Practice Soil and Water Conservation at a landscape level, actively involving all stakeholders and using a variety of techniques, building on past experiences.
- When attempting to manage water, look at an entire hydrological system, not just a part of it. Include e.g. feedback mechanisms, time lags and emerging properties at different scales, as well as socio-economic aspects.

III. Thursday, 11 April 2013

A. Catastrophic shift in drylands: How can we prevent ecosystem degradation? Special session on how to overcome the difficulties of successful engagement of non-scientific stakeholders

Special session organized by the European Commission

40. The session presents a European based scientific project (CASCADE), which aims to produce ecological knowledge and communicate it to stakeholders and policy makers. The project is based on theory (dynamical systems modelling) and experiments (mesocosm and landscape experiments in the Mediterranean region), and is producing tools to assess and predict tipping points in degraded ecosystems. It is crucial to have reliable estimates of the costs and benefits of preventing catastrophic shifts in order to inform policy makers.

41. The timing of possible interventions is another key factor when communicating to stakeholders. The financial aspect is, in fact, related to timing and labour opportunities. The evaluation of model results and the development of land management is an interactive process that requires continuous dialogue with all stakeholders. It is crucial to communicate and co-develop knowledge with stakeholders at local, regional and national scale. Economic evaluation can then be coupled to scientific assessments and channelled into policy.

1. Conclusion and recommendation from the scientific perspective

- We need to develop new integrated ways to unravel processes behind tipping points, and predict catastrophic shifts coupling theoretical models and experiments.
- Models should include economic and financial evaluation of catastrophic transitions and produce optimum timing of interventions.
- There is a need to identify local drivers of change in land use & management to enable scenario development for integrated modelling. Eliciting Choice/preference values of different stakeholders may be a way forward to communicating complex science.

2. Conclusion and recommendation from the policy perspective

- Policy makers should make clear what kind of communication is needed in terms of the tools, the content, and the focus of the research.

3. Conclusion and recommendation from the action perspective

- Community involvement is critical both for monitoring and implementation of policies; therefore producing institutional maps could help identifying key communication channels.
- There is a need to engage with each sites study teams to ensure land-use decision-making links from small-scale plot studies.

B. Adapting to Climate Change and Disaster Risk Reduction through Sustainable Land Management: Experiences in Tajikistan, East Africa, United States of America, Argentina and Mongolia

Special session organized by the Centre for Development and Environment, University of Bern

42. Land use problems are causing and exacerbating disasters relating to climate change. Sustainable and land use issues should be targeted in productive protective measures. In planning actions, it should be accepted that a certain level of change is inevitable. Under this perspective, the land with the best potential to recover should be targeted for protection actions. Preventative measures should include improved land use and agro ecosystem management practices, the development of participatory land management plans, and improved natural resource knowledge sharing. Policy discussions should focus on mainstreaming SLM.

1. Conclusion and recommendation from the scientific perspective

- Policy discussions should focus on mainstreaming SLM.

2. Conclusion and recommendation from the action perspective

- In planning actions, it should be accepted that a certain level of change is inevitable. Under this perspective, the land with the best potential to recover should be targeted for protection actions.

C. Good practices in SLM and lessons learned

Parallel session

43. The session was focused on best practices of SLM. Case studies in Tajikistan, Uzbekistan and in the arid west of South Africa exhibit that successful SLM practices have to generate multiple benefits from both socio-economic and environmental perspectives; there must be synergies and there is a stringent need for multidisciplinary approaches. Therefore, combining best practices analysis with economic analysis is key for designing interventions that satisfy a range of needs. Another important finding demonstrates that the incorporation of participation from communities and local ownership are compulsory. To that extent, a more active involvement of regional and local stakeholders is needed, through the generation of knowledge for decision making at regional levels, development of technologies and policy strategies that can be transferred to comparable regions, and thus enhance the interactions between stakeholders and practitioners. Schemes such as the CDM

(Clean Development Mechanism) can be an option for improve SLM, however, this still has some constraints (e.g. high initial investments and transaction costs). For instance, afforestation strategies in Uzbekistan reveal that farms would obtain greater benefits through CDM implementation, with a higher CO₂ sequestration magnitude and fair division of operational benefits.

1. Conclusion and recommendation from the scientific perspective

- SLM best practices need to generate multiple benefits and create synergies between objectives of arresting land degradation, mitigate and adapt to climate change and meeting socio-economic objectives.
- A multidisciplinary approach is needed to understand the drivers of land degradation.

2. Conclusion and recommendation from the policy perspective

- Institutional strengthening is essential to scale up SLM.
- Afforestation of marginal lands: alternative land use for livelihood uses less irrigation for crops and they can rely on groundwater sources.
- Afforestation strategies in Uzbekistan reveal that farms would obtain greater benefits through the implementation of schemes such as the Clean Development Mechanism.

3. Conclusion and recommendation from the action perspective

- More active involvement of regional and local stakeholders is needed, through the generation of knowledge for decision making at regional levels.

D. Scaling-up SLM: What is the missing link? Bridging the science-policy-practice divide, making the case through valuation of ecosystem services

Special session organized by the Global Mechanism

44. This special session was focused on reducing the gaps between science and policy through the evaluation of the potential value of natural capital and ecosystem services. Land has a broad range of impacts on people and the evaluation of ecosystem services is often heterogeneous, therefore there are gaps that have to be targeted. Reducing tensions between science and policy requires targeting regulatory, participatory and learning gaps, requires undertaking a stakeholder analysis, and requires a revision of training and capacity building. The more partners are involved, especially in the private sector, the more trust and shared visions can be developed. Tools for the private sector, which is the major user and investor on land, need to be developed in order to unlock its potential. We need to create a new language to dialogue with the private sector, making the business case for SLM. Companies have to be encouraged and enabled to adopt SLM.

1. Conclusion and recommendation from the scientific perspective

- There is a need of return investment evaluation i.e., more data collection and economic tools for the private sector to evaluate land use potentials. There is an increasing need to prove scientifically that SLM has an economic return.
- Solutions exist to bridge the gap between science, policy and practice in SLM. This includes ecosystem services economic valuation studies and technical guidance

papers, capacity building initiatives and other enabling activities to support decision making in the public and private sector.

- The OSLO (Offering Sustainable Land-use Options) Consortium's methodology to the Economic Valuation of Land, for example, helps to identify SLM investment opportunities that yield better returns than business-as-usual activities.

2. Conclusion and recommendation from the policy perspective

- Policies should be designed in order to enable the private sector adopting SLM. Illustrating the impact to the investment community is our best bet: we need to prove that activities are socially equitable, environmentally sustainable and economically viable.
- Despite evidence of good practices and success stories in land rehabilitation and ecosystem restoration, huge barriers and challenges to the adoption of sustainable land management exist.

3. Conclusion and recommendation from the action perspective

- Sustained effort is needed on partnership building, participation and multi-stakeholder involvement to ensure successful and meaningful engagement of all relevant stakeholder groups.
- Energies must be directed into forging public-private partnerships: the potential is enormous and such partnerships constitute a win-win situation if we can develop compelling models and arguments to dispel doubts on the risks, provide proof of the impact and guarantee a return on investment.

E. Cost – benefit analysis of (in)action

Parallel session

45. In about 75 % of the cases, SLM pays off in longer terms (<10 years), whereas 43 % of SLM is fully self-financed already in short terms (<3 years). However, its importance is not always expressed in monetary terms. The CBA tool for zero net land degradation (ZNLD) was introduced. The approach, which compares cost and benefit of restoration vs. cost and benefit of land degradation, is seen as a more suitable method than the method where only the benefit of restoration is compared to the cost of LD. Cost estimation differences caused due to chosen methodologies of data acquisition and cost estimation are better equalled out. It is proposed to structure the participatory process to combat DLDD in form of a learning process: first do a baseline evaluation of actions, second select and weigh site-specific indicators and finally collectively perform an integrated assessment.

1. Conclusion and recommendation from the scientific perspective

- Further refinement of methodologies of WOCAT tools (= online tools) are needed in order to make results more precise.

2. Conclusion and recommendation from the policy perspective

- Engage stakeholders already at the very beginning to give them the opportunity to include other stakeholders of their choice in the process.

3. Conclusion and recommendation from the action perspective

- Costs and benefits of technologies used for project implementation should be considered in a CBA.
- It should be considered to enrich a participatory approach to combat DLDD by a (social) learning process.

F. DLDD and climate change

Parallel session

46. There is a large inequality in the number of scientific papers being produced in countries in Latin America. Research, particularly in agriculture and climate change, is very important because it increases a country's adaptive capacity and resilience to climate change. Policy should develop incentives that promote research in countries lacking in scientific paper production. Among family farmers there is a general perception of climate changes, such as changes in rainfall, which is very congruent with climate data from weather stations. To encourage environmentally positive adaptations to climate change, such as afforestation and protection of ecosystems, policies should be developed that offer "green grants" to farmers.

1. Conclusion and recommendation from the scientific perspective

- Research should be undertaken in countries currently lacking scientific paper production. Research increases a country's adaptive capacity and resilience to climate change.

2. Conclusion and recommendation from the policy perspective

- To encourage environmentally positive adaptations to climate change, such as afforestation and protection of ecosystems, policies should be developed that offer "green grants" to farmers.
- Policy should develop incentives that promote research in countries lacking in scientific paper production and also encourage scientific collaborations between countries.

G. Plenary III: Drivers of change and resilience increase

47. Misconceptions of drylands have taken away attention from realizing their importance as unique ecosystems, resulting in failed funding initiatives and exacerbating the existent constraints such as their fragility, overuse and misuse of water. They provide several benefits, e.g. biodiversity, carbon storage, fresh water resources. Recognizing these values will help address the issue of resilience and challenges for sustainable dryland management, especially in developing countries where these ecosystems are essential for their inhabitants' subsistence and economy. To that extent it is important to avoid confusion between sensitivity and fragility, since sensitivity is how resilience has been manifested in these ecosystems allowing drylands to react swiftly to changes and threats. In order to approach this issue it is necessary to achieve consensus between the three main actors: decision makers, the scientific community and society.

48. Transformative land regeneration requires understanding the drivers of land crisis; and second identifying grassroots solutions to build resilience. There is an overlap between terrorism and political violence hotspots and drylands, a problematic exacerbated by food

insecurity, labour migration and poverty, and the indirect correlation of low literacy rates (specially for women) with the difficulty to cope with land degradation. On the other hand, there is positive evidence of systems that are gaining ground at a national scale by reversing desertification through biological resources such as the “albida halo effect”, rainwater harvesting and others. These call for moving to a climate-smart agriculture and show towards what the international community shall move its efforts, such as building more productive and growth resilient farming systems at scale, empowering women, improving food security and nutrition, and contributing to the reduction of conflict by increasing the resource pie.

49. The major challenge concerning drylands will be to recognize its resources and start using these in a beneficial, sustainable way (e.g. in the form of tourism or smart agriculture). In Southern Africa we find the fastest growing population in the world, which coincides with the highest loss of arable land per capita. Severe deforestation leads to a loss of carbon and land degradation. In the same area looking at agricultural performance, there is a wide gap between potential yield and actual yield. Interpreting these negative facts from a more positive viewpoint we can say that it also bears a high level of potential. Scientific research needs to invest in analysing drivers of change in cropland areas in order to provide a good basis for innovative agriculture to be developed. The special overlap (but not causal correlation) between female illiteracy and dry-land degradation is an interesting observation and considerable for further investigations. It was again emphasized that the system of ‘evergreen agriculture’ is worth continuing working. Even though new and inventive for scientist, this method has been known long before already by the local population. Furthermore it was again brought up that the terms fragility and degradation in terms of drylands have to be used with caution.

1. Conclusion and recommendation from the scientific perspective

- Scientific research needs to invest in analysing drivers of change in cropland areas in order to provide a good basis for innovative agriculture to be developed.
- Other success stories must be analysed, such as the story of fertilizer micro dosing.

2. Conclusion and recommendation from the policy perspective

- Technological advances can never be used by poor people in drylands if there is no link between decision makers and science. Prioritizing drylands as state policies.

3. Conclusion and recommendation from the action perspective

- The albida halo effect that regenerates drylands, improves soil fertility, and provides microclimate buffering should be applied more.
- Implement rainwater harvesting.
- Recognize the resources of drylands and start using these in a beneficial, sustainable way.
- Explore climate-smart agriculture opportunities.

H. Agro-ecology as a powerful tool for the development of drylands?

Special session organized by CARI

50. The session introduced the paradigm of agro-ecology in its many interpretations and applications. Agro-ecology embeds many theories and good practices, which are relevant to combat DLDD and increase agricultural production. Several case studies, bringing science

to practice, were presented. Classic agriculture is at a dead end and needs new paradigms. We need to put good practices in the forefront and include small farmers into this process (70 % of the food is produced by small scale farmers). Participatory agricultural research contributes to enhancing socio-cultural heritage of farmers, giving them a sense of selfhood. The same production is obtained without pesticides and monocultures by increasing agricultural biodiversity. Despite this evidences the main global trend of agriculture is still in increasing productivity through monocultures and pesticides. Agro-ecology has a role to play in feeding the world and if doesn't, biodiversity will be destroyed together with our wellbeing.

1. Conclusion and recommendation from the scientific perspective

- We have to invent a new market and for that we need the scientific validation of agro-ecology.
- Develop research likely to catch up ecological agriculture practices worldwide.
- Recognize the relevance of people-centred solutions for dryland management and go beyond the laboratory research by working with people in drylands to address their concerns and research questions.
- Be aware that your research should be used for specific political decision-making.
- Engage with civil society organizations (CSOs) and hear how your research might be interpreted and used by other parties.

2. Conclusion and recommendation from the policy perspective

- There is a gap between decision makers, scientists and farmers. We need to create more synergies between different parties in sharing agricultural knowledge.
- Engage with scientists, CSOs and above all with people in drylands. Develop mechanisms for participation of land users in land use planning, e.g. improve access to information, include Free, Prior and Informed Consent and/or implement the Committee on World Food Security (CFS) Voluntary Guidelines on the Responsible Governance of Tenure of Land.²⁰
- Support participatory knowledge development on agro-ecological farming by earmarking research budget lines.
- Review policies for the benefit of agro-ecological practices in order to fight climate change, combat land degradation and improve agricultural production.

3. Conclusion and recommendation from the action perspective

- It is proved that putting researchers and farmers at the same level will improve agricultural production at all levels.
- Engage with scientists and policy makers and introduce realities from communities to scientists and promote an ethical and equitable relationship between scientists and local communities.
- Increase the capabilities of local communities and CSOs to engage in scientific debates and policy processes related to dryland management.
- Develop innovative ways of information and experience sharing about sustainable dryland management.

²⁰ See: <<http://www.fao.org/nr/tenure/voluntary-guidelines/en/>>

- Involve multiple stakeholders in all research stages in order to conjointly test, verify and contribute to sustainable dryland management.

I. Macroeconomic policy drivers of land management

Parallel session

51. Complementation and not completion between irrigated and non-irrigated drylands land management decisions can be made at a countrywide macroeconomic level but should consider the microeconomic level. The presenters highlighted different perspectives regarding the policy drivers within land management. It was highlighted that well intended macroeconomic policies can marginalize already neglected and deprived regions even further and scientific data and monitoring is essential to highlight these negative impacts and adjust the policies accordingly. It was also highlighted that existing global indices do not appropriately account for environmental measures; therefore a new index was presented on which basis countries performance can be compared. An all-encompassing index tool should be developed to create quantitative goals for the UNCCD. The proposed index is based on land use - beyond agricultural production - and identifies ways and means to bring them into the global environmental and sustainable development agenda with particular regard to land degradation neutrality. The index tool will be able to simplify main DLDD indicators and standardized DLDD communications between policy makers.

1. Conclusion and recommendation from the scientific perspective

- An all-encompassing index tool should be developed to create quantitative goals for the UNCCD.

2. Conclusion and recommendation from the policy perspective

- Decision makers are recommended to design and implement public policies aimed to achieve complementation and not completion between irrigated and non-irrigated drylands. Land management decisions can be made at a countrywide macroeconomic level but should consider the microeconomic level.
- Land degradation should be framed within a monetary, economic perspective.

J. Traditional knowledge related to DLDD/ SLM

Parallel session

52. The project “Reviving indigenous community conserved areas” (ICCAs) about Iranian nomadic pastorals refers to the empowerment of indigenous and local communities for the supporting of their livelihoods and conservation of their territories. Through customary traditions and the crucial role elders have on land management, they deal with climate change by implementing vertical migration and horizontal migration of livestock; and applying customary laws and practices, such as selecting a calendar for seasonal migration, renting the farmland residues, storage of water, among others. Fung Su (wind and water) is a unique and highly systematized ancient Chinese art of selecting auspicious sites and arranging harmonious structures. It includes a very complex theory, which is the result of self-organization and highlights the role of the land-owner. It has a set of multi-scale approaches to classify hierarchy nature of environmental processes related to landscape characteristics, and captures three-dimensional interpretation of landscape with limited or minor human interventions.

1. Conclusion and recommendation from the scientific perspective

- Relevance of customary traditions and knowledge to contribute to science development.

2. Conclusion and recommendation from the policy perspective

- Stress the importance of precious indigenous knowledge impact on country level policies, and understand its value in a wide range of studies.

3. Conclusion and recommendation from the scientific perspective action perspective

- Reviving indigenous community conserved areas (ICCAs) in customary territories of Abolhassani mobile pastoralists, Iran. Coping with the effects of climate change and drought through local initiatives.

K. Towards a land-degradation-neutral world: from science to policy (part 1/2)

Special session organized by IUCN and UNCCD

53. Rio+20 gave a real change to the paradigm of DLDD management. Bringing the attention to the economic effect of SLM will enable to develop Rio's agenda further, for example, setting the target to ZNLD by 2030 is a realistic feature. The first part of this special session was based on scientific interventions. There are in fact several scientific challenges related to ZNLD. There are societal constraints in the implementation of SLM such as conflict with traditional institutions. There are also monitoring challenges: remote sensing is the most reliable monitoring instrument but can be used to measure few DLDD indicators, and indicators themselves are not operationally feasible. Managing resilience of complex-social-ecological systems such as dryland systems requires nonlinear thinking. The economics of land degradation is the tool to communicate with decision makers about SLM. Economic arguments contain the opportunity for an inclusive partnership with policy makers and the private sector to fill the gaps on awareness and information about DLDD. The legal aspect has to be considered as well in this process. Only few states have clear legal provisions on land, which allows private companies to buy land and make investments that may cause DLDD.

1. Conclusion and recommendation from the scientific perspective

- We need economic assessments of resilience to be included in cost-benefit analyses.

2. Conclusion and recommendation from the policy perspective

- Developing and developed countries have different interpretations of desertification that need to be uniformed.
- ZNLD can be achieved only via a phased approach, from restoration of degraded land to reduction of DLDD rates via appropriate monitoring.

L. Tackling key challenges in the economic assessment of desertification

Special session organized by the University of Leeds

54. Land degradation is closely linked with food security mechanisms such as improved food storage and waste minimization. Global production and consumption is very unevenly distributed and, as a result, it is difficult to be managed by SLM. Efforts addressing land

degradation can help to mitigate food issues but cannot create food security by itself. White papers on desertification need to be established to support cooperation among countries by increasing links and collaborations. One way to increase international communication is to translate research into multiple languages.

1. Conclusion and recommendation from the scientific perspective

- White papers on desertification need to be established.

2. Conclusion and recommendation from the policy perspective

- Efforts addressing land degradation can help to mitigate food issues but cannot create food security by itself.

3. Conclusion and recommendation from the action perspective

- Global production and consumption is very unevenly distributed and, as a result, it is difficult to be managed by SLM.

M. Indicators for DLDD and SLM

Parallel session

55. Local attempts to mitigate land degradation should actively foster the implementation of best practices, combining local traditional knowledge with scientific expertise. This promising framework for evaluating restoration and management actions provides site-specific indicators, allows locally-contextualized assessment and evaluation, and when stakeholders are part of the process, the acceptance of results increases. Nevertheless, time, budget and distances are constraints that hamper the timing and frequency of data collection. Driving forces sometimes are similar but the effects might be different. Therefore, finding patterns is crucial to identify the tipping points (a small amount that change completely the scenario) before change occurs, and to learn about the use of gradients not only in time, but also in space, to identify possible good indicators and formulate a functional approach that is comparable all over the world and at an ecosystem level. It is important to be clear about the context in which indicators are developed and implemented; whether at local, regional or global scale, or at an ecosystem level.

1. Conclusion and recommendation from the scientific perspective

- There is still remaining work for improving existing models and indicators for assessing DLDD and SLM, in order to understand the interactive mechanisms between land use systems and desertification processes.
- Suggested is a framework for evaluating restoration and management actions, providing site-specific indicators to allows locally-contextualized assessment and evaluation.

2. Conclusion and recommendation from the policy perspective

- Better collaboration among universities, local-level institutions and governments' structures is needed to make an impact on policy making.
- A monitoring approach at the local level is key for policy making; and addressing land degradation and food security.

N. Towards a land-degradation-neutral world: from science to policy (part 2/2)

Special session organized by IUCN and UNCCD

56. The second part of the session featured a general discussion on the scientific and economic subjects addressed in the previous part and about the conference in general. It was recognized that the economic arguments have not been addressed enough during the conference. Civil society should play a leading role in the implementation of UNCCD and in the dialogue with scientists. Often academics adopt blindly scientific approaches without any collaboration with local stakeholders. Politically there has been sufficient deliberation (from Rio+20 on). Now the goal is explaining and translating this into mechanics. The economic arguments in favour of ZNLD need immediate interlocutors in financial institutions and their intermediates. It is important to have clear metrics and tools to communicate the financial risks associated to SLM. Another related problem is that long term in the financial market means 2-3 years while in SLM it means 20-30 years. The political negotiators have to be influenced and the role of the United Nations system must be stressed. Governments as well as the private sector compete for resources. For this reason it must be shown that SLM is a viable option. As most of the decisions are based on GDP, the more complex notion of well-being should be embraced in developing assessment metrics. Shifts in perception will bring about shifts in the decision process.

1. Conclusion and recommendation from the scientific perspective

- The scientific community should embrace the dialogue with local people.
- Creating expert groups in different aspects of ZNLD could be a good action.

2. Conclusion and recommendation from the policy perspective

- There is a need for more investments in research, especially in the developing countries.
- Politicians should open their hearts to indigenous people who know how to manage their land.

O. Integrated modelling of climate impacts on food and farming at regional to supra-national scales

Special session organized by the Johann Heinrich von Thünen-Institut

57. Resource modelling can increase a region's adaptive capacity to climate change by giving stakeholders insight on future resource availability. Country specific modelling incorporates foreign specific variables. Resource availability model predictions should be used to prepare for resource price changes and market shocks. Future research should aim to enlarge the number of country specific sub-models, enlarge analysis to include more commodities, and link large models to micro models. Water availability, even when reduced, is key to the adaption of agriculture to future climatic scenarios. Water accumulation systems need to be considered for dealing with the changing variability of climatic variables. Rain fed agriculture needs to be sustained in order to preserve the vitality of regions.

1. Conclusion and recommendation from the scientific perspective

- Future research should aim to enlarge the number of country specific sub-models, enlarge analysis to include more commodities, and link large models to micro models.

2. Conclusion and recommendation from the policy perspective

- Scientists and decision makers need to have greater interaction in the creation of soil degradation policies.

3. Conclusion and recommendation from the action perspective

- Rainfed agriculture needs to be sustained in order to preserve the vitality of regions.

P. Methodologies and tools for assessing DLDD*Parallel session*

58. Mapping with harmonized state base information is an interactive tool that helps people to understand land conservation. The LADA WOCAT national appraisal tool, implemented through the LADA project, funded by GEF, executed by UNEP, and implemented by FAO is a scale independent method to map land degradation and sustainable land management that and shows the importance of participatory mapping in supporting the planning and the scaling up of sustainable land management. The method is based in national baseline GIS data, including remote sensing land cover data, and participatory approach. The method allows to identify hotspots and to prioritize intervention. The creators of this mapping tool are comparing their results with remote sensing data, to verify the information directly in the field.

59. Short-term inexpensive solutions are attractive, but not enough efficient and costly in the long run. The best long-term solution to the problem of sand encroachment is to establish suitable, self-sustaining vegetation on the ground. The problematic of sand dunes in Kuwait has been usually controlled in a trial-and-error basis. The problem of Aeolian sand transport can be mitigated through the Sand Control System; however, this tool has never been tested as a whole. To that end, an assessment of the system is mandatory, so that in improved SCS can be replicated in other places that share similar conditions.

1. Conclusion and recommendation from the scientific perspective

- The limitations of the Sand Control System show the necessity of an assessment method to control sand dunes so that an improved SCS can be replicated in other places that share similar conditions.
- Other schemes to prevent and control sand and dust storms must be developed for regions with different characteristics and limited budgets.
- National level participatory appraisal of land degradation is feasible and has been realised in more than 10 countries.

2. Conclusion and recommendation from the policy perspective

- Including field verification when applying remote sensing will certainly improve the valuation of methodologies and tools for assessing DLDD that will later support the formulation of intervention strategies and policies.

- The LADA WOCAT method has been mainstreamed into technical intervention assessment schemes in Argentina, Cuba, Tunisia, Senegal, China and South Africa. Furthermore, the outreach process is ongoing in other countries as the methods allow prioritizing investment and depicting hotspot and brightspots.

IV. Friday, 12 April 2013

A. From agro-ecological practice to policy: bridging the gap in dryland management

Workshop organized by ILEIA - AgriCultures Network

60. Agro-ecology seeks to uncover farmers' knowledge and practices in arid areas, develop these practices alongside relevant scientific insights, and communicate farming knowledge in order to build community resilience. The underlining principles of agro-ecology are practice, science, and a global social movement. The conservation and promotion of healthy soil should focus on recycling nutrients, energy and water rather than bringing external elements, such as fertilizers, into the system. Changing agricultural practices to agro-ecological practices demands that mind-sets be changed through practical trials where stakeholders can experience change. While policy engagement is critical for agro-ecology approaches to be implemented, this engagement is faced by many challenges.

61. These challenges include stakeholders with diverging perspectives and narratives on agriculture, "invisible hands," or figures unknown to the public arena, who are shaping policy, and the need to create policy that is long term. To overcome these challenges policy officials and media should be brought into the field to demystify agro-ecological practices. Also, invisible hands should be identified and large political alliances should be developed so that even when there is a change in policy officials, agro-ecological knowledge is constant. Policy makers should be actively engaged in capacity-building.

1. Conclusion and recommendation from the scientific perspective

- It is vital that scientists develop a close relationship with local farmers to share agro-ecology practices, knowledge, and experimentation. Researchers can provide farmers with evidence.

2. Conclusion and recommendation from the policy perspective

- Key decision makers should be included in field visits to community farms in order to demystify agro-ecology practices.
- Policymakers should be actively engaged in capacity-building.

3. Conclusion and recommendation from the action perspective

- Agro-ecology seeks to uncover farmers' knowledge and practices in arid areas, develop these practices alongside relevant scientific insights, and communicate farming knowledge in order to build community resilience.
- Changing agricultural practices to agro-ecology practices demands that mind-sets be changed through practical trials where stakeholders can experience change.

B. DLDD and SLM assessment tools

Parallel session

62. WOCAT addresses actors at the local level and encourages them to be proactive. This is achieved by stimulating self-evaluation and learning and by assisting monitoring and adapting. A case study in Chile showed that mitigation of desertification can be achieved by financial investment and changed land use (reduced grazing). A critical factor controlling plant productivity is water availability in the soil. The Green Water flow Indicator (GWI) is a measure of water retention in the soil. It is claimed to be a valuable proxy to evaluate water-related ecosystem services. Available geographically specified information on biomass, soil and weather (precipitation) are used for identification and mapping of on-going ecosystem degradation. Mapping and zoning is described as an effective tool to define major threats and promote decision support.

1. Conclusion and recommendation from the scientific perspective

- The Green Water flow Indicator (GWI) is claimed to be a valuable proxy to evaluate water-related ecosystem services.
- Approaches that integrate socio-economic and biophysical aspects are key for DLDD and SLM analysis
- Scientific tools and approaches should also be: scalable, participatory and innovative (e.g. WOCAT)

2. Conclusion and recommendation from the policy perspective

- UNCCD should take a leading role in bringing partners together for joint management and decision report.
- There is a global impact chain that requires a global policy response: desertification generates numerous social and demographic problems not only at sites of desertification but also in neighbouring regions (labour force decline; decreasing birth rate; and worsening living standards, jobs emigration, etc.)

3. Conclusion and recommendation from the action perspective

- For a beneficial outcome of fighting DLDD it is essential to address actors at the local level and encourage them to be proactive. This is achieved by stimulating self-evaluation and learning and by assisting monitoring and adapting. An example for this approach is the WOCAT programme.

C. Policy analysis and good examples

Parallel session

63. Establishing a dryland fund for SLM projects is a very difficult task, often those mechanisms fail to drive long term sustainability since need exceeds government ability to fund them. More economic resources from the private sector are required. However, it is necessary to show them the benefits. Furthermore, it is important to understand that scaling up green economy is a slow process, which relies on committed and dedicated individuals and state support. A suggested framework for calculating the costs of land degradation and the benefits of land restoration proposes pragmatic ways to estimate the economic value using as much data as available, by decomposing the economic matters into different segments of the economic services. This approach calculates the total economic value from

the sum of the use value and the non-use value (that society allocates to the ecosystem services). This evaluation results in the direct estimation of total economic values and captures the trade-offs of ecosystem services. A benchmark approach provides an appraisal of desertification processes and establishes guidelines for public policies.

64. The objectives of international conventions such as the UNCCD have to be translated and enforced into national public policies, in order to formulate state action programmes and enhance participatory management, especially for countries with a high number of stakeholders such as Brazil. The institutionalization of desertification monitoring in Argentina is a successful example of partnership building between the political and the scientific sector to create the National Observatory of Land Degradation and Desertification, in which efforts were joined to establish a dynamic framework that works as a network that shares experiences with local people and the government.

1. Conclusion and recommendation from the scientific perspective

- There is still a lot of work to do toward the creation and harmonization of economic assessment tools that provide decision makers with enough and reliable information about SLM practices benefits and DLDD costs.
- A suggested framework for calculating the costs of land degradation and the benefits of land restoration proposes pragmatic ways to estimate the economic value using as much data as available, by decomposing the economic matters into different segments of the economic services.

2. Conclusion and recommendation from the policy perspective

- The objectives of international conventions such as the UNCCD have to be translated and enforced into national public policies, in order to formulate state action programs and enhanced participatory management.

3. Conclusion and recommendation from the action perspective

- More economic resources from the private sector are required. However, it is necessary to show them the benefits of funding SLM projects.

D. Plenary IV: Strategies and policies for local, national, regional and international level

65. The UNCCD 2nd Scientific Conference provided evidence about the cost of DLDD and options for action i.e., investments strategies and policies enabling good science to reach real change. The conference was a hybrid event allowing policy makers and scientists to interact.

66. The Drought Disaster and Sustainability Initiative led by the Intergovernmental Authority on Development (IGAD) (IDDRSI) is a strategic political framework acting at the international, regional and national level. During the severe drought (2010/2011) in the Horn of Africa (HoA) IDDRSI led the coordination of different stakeholders and helped to establish partnerships, all together having the mission to end drought emergencies in HoA. The subsequently declared goal of IDDRSI was to ensure commitment of stakeholders, enhance partnerships, undertake common programming, transferring financing from humanitarian aid to resilience and development. Components of IDDRSI actions included natural resource management, providing market access and trade, ensuring livelihood support and basic services, providing support in pastoral disaster risk management and promote research. The achievement of IDDRSI are the better coordination of existing

projects, establishment of better coordination mechanism, new drought resilience projects, more technical assistance support to the Intergovernmental Authority on Development (IGAD) secretariat, financial support of the IGAD, better programming at the national as well as regional level, enhancing partnerships and institutional frameworks, ensuring a better knowledge management and exchange of experiences, contributing to better capacity building frameworks, helping to establish an enhanced resource mobilization framework and being drivers for the establishment of a NGO/CSO unit.

67. The session presented evidence of agroforestry good practices in the Sahel region. Comparing pictures of agro-fields at different times, it showed how farmers increased substantially their yield, planting and protecting trees in reaction to an environmental crisis. From this kind of examples we need to take tools for scaling up re-greening success. Identifying successes is just the first step of a strategy that includes bottom-up and top-down actions and a better communication between stakeholders and policy makers. There are, however, several challenges in scaling up this re-greening process; in fact agroforestry has no institutional home in the conventional agricultural modernization paradigm.

68. The German Ministry for Economic Cooperation and Development (BMZ) supports SLM through targeted policies and strategies at different levels (international, national and local). According to the BMZ the requirement for SLM targeted policies reach from strengthening policy reforms, learning from existing practices, engaging at multiple levels by using local as well as governmental knowledge and international conventions, to the collection of better economic data for better policymaking. Furthermore it is seen essential to consider synergies and trade-offs of different conventions (climate, biodiversity, desertification) at the global, national and local level. The German developmental concept has two focuses: Firstly, agriculture has an impact on poverty reduction and food security and secondly, the protection and management of natural resources together with climate neutrality. Economic assessments are vital to provide input to policy making for achieving SLM and it was once more emphasized on how important it is to establish linkages and synergies between different approaches (assessing climate change, biodiversity and desertification, food security, rural development etc.). Therefore, integrated approaches are the most promising way to reach SLM.

69. The idea of a great green wall for the Sahara and the Sahel was based on combining solutions to the problems of DLDD, climate change and biodiversity loss. A number of initiatives were taken, including development of infrastructures and economic activities. The project became a metaphor to raise awareness, multiply good practices and intensify the dialogue between stakeholders. Experience shows that the full commitment of decision makers in this inter-sectorial dialogue is essential. The participation of local people is essential as well and their involvement must be pursued.

70. We can be confident of what has been achieved in terms of SLM so far. However, there are still major challenges lying ahead of us, among them linking assessments at regional level to equivalents at the global level. Science will play a key role since it is shaping choices at all levels. The exchange and knowledge transfer between science and policy still bears major opportunities. For efficiently tackling SLM, governments will need clear and explicit targets (special and temporal). The role of the GEF is to contribute to sustainable food production by financing support to fight DLDD. The GEF helps countries to understand causes leading to DLDD and to ensure implication for food security and climate change mitigation measures are undertaken. It is their expectation that science will provide cross scale linkages to effectively support policymaking.

1. Conclusion and recommendation from the scientific perspective

- Research shows that agroforestry is a great tool to improve soil fertility and fodder production. Moreover agroforestry can create microclimate, and be beneficial to people, crops, livestock and water harvesting.
- Scientific research is expected to elaborate clear and explicit targets (special and temporal) and provide cross scale linkages to effectively support policymaking.

2. Conclusion and recommendation from the policy perspective

- Long-term solutions have to be identified and implemented through the participation of local farmers. To reach this scope we need to amend legislation about land property entitlements.
- Planning and identification of priorities in SLM must be based on real data and a balance has to be found between environmental, socioeconomic and cultural issues.

E. Closing session / Closing ceremony

71. The content of the conference represents the interdisciplinary nature of land degradation. The varying levels of integration between science and other disciplines confirm there is still a lot of work to be done in moving forward. A consolidated overview of the conference shows that sessions were less oriented to seeking consensus over a particular way to deal with the challenges of DLDD, but rather to share experiences and search for more evidence and data regarding costs benefits of SLM practices, from both a socio-economic and a scientific perspective at various levels (local, regional, national), in order to work more effectively with policy makers. Such integration has a lot of value in the UNCCD 2nd Scientific Conference since it allows face to face meetings and feedback from participants. During this conference we were presented with new ways to deal with and prevent DLDD. There is a need for a more holistic and integrated approach to combatting desertification that can bridge communication between key players in the science, policy, and technology fields. Sustainable land use practices must be implemented to achieve a more resilient society.

72. The initiatives of the conference will contribute to the objectives of the UNCCD, the contributions were found very useful, with good background material and a high level as well as a good participation of young scientists. The quality of the discussions was remarkable and made the conference a benchmark for the process of the UNCCD, bringing together science, technology, policymaking, stakeholders' participation and the knowledge of social and economic impacts to combat DLDD as well as of the costs and benefits of undertaking SLM practices. One of the most significant lessons of the conference is the realization that "the costs of doing nothing are much higher than doing something". Therefore, action must be promoted and this is the opportunity to establish benchmarks to combat DLDD.

73. Major findings and themes came out of the UNCCD 2nd Scientific Conference. Because of a lack of market land evaluation, land is treated as a cheap commodity; in order for a community to be resilient they need to understand the true value of land. Farmers worldwide are adapting when they notice land degradation changes. Preventing soil degradation is a smarter investment than investing in the rehabilitation of degraded soil. Future goals from the conference are to have a greater understanding of how land owners make decisions, to eliminate investment deserts, to develop a method that can measure DLDD while also accepting that no single method can be perfect, to keep knowledge flowing between stakeholders, and to commit to combating desertification. Scientists

should continue their work and research on DLDD and outline incentives. Scientists should also continue to publish and share their knowledge to allow multiple platforms to work together on this issue. Policymakers and the business community should update their policies and invest based on scientific evidence.

1. Conclusion and recommendation from the scientific perspective

- Scientists should continue their work and research on DLDD and outline incentives. Scientists should also continue to publish and share their knowledge to allow multiple platforms to work together on this issue.
- The different levels of integration between disciplines confirm there is still a lot of work to be done. An overview of the conference shows that sessions were less oriented to seeking consensus about a particular way to deal with the challenges of DLDD, but rather share experiences and search for more evidence and data regarding costs and benefits of SLM practices.

2. Conclusion and recommendation from the policy perspective

- Policy makers should update their policies and invest based on scientific evidence.

3. Conclusion and recommendation from the action perspective

- There is a need for a more holistic and integrated approach to combatting desertification that can bridge communication between key players in the science, policy, and technology fields. Sustainable land use practices must be implemented for a more resilient society.
- Integrate science, technology, policy making, stakeholder participation, and knowledge of social and economic impacts to combat DLDD. This integration should also be used to determine the costs and benefits of undertaking SLM practices.
- Because of a lack of market based land evaluation, land is treated as a cheap commodity; in order for a community to be resilient they need to understand the true value of land.
- Preventing soil degradation is a smarter investment than investing in the rehabilitation of degraded soil.
