



# Report of the International Workshop on Mapping and Monitoring to Support Land Degradation Neutrality at Global, National and Local Level

*Organized at GIZ Bonn, Germany, 8th and 9th of October, 2018*

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This report is the result of a workshop organized by ISRIC - World Soil Information, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), WOCAT International and the Group on Earth Observations (GEO) in cooperation with the United Nations Convention to Combat Desertification (UNCCD), and funded by the German Federal Ministry for Economic Cooperation and Development (BMZ). The views expressed in this report are not necessarily those of the above organizing and funding organisations.

This report contains personal information about the workshop participants who have given their written consent to make this information publicly available.

We are grateful to BMZ for funding the workshop and to the UNCCD for the cooperation in the design of the workshop. We wish to thank the participants for attending the workshop and sharing their valuable experiences and insight. We further wish to express our gratitude to Niels Batjes, Sara Minelli and Sarah Tietjen for reviewing the report. Finally, we wish to thank Alexander Fröde (P4D) for his excellent facilitation of the workshop.

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## Preface

Earth observation is increasingly used to support the implementation of international conventions and the Sustainable Development Goals (SDGs). Most notably, this is true for SDG indicator 15.3.1 (“proportion of land that is degraded over total land area”) and for the Land Degradation Neutrality (LDN) agenda of the United Nations Convention to Combat Desertification (UNCCD). Earth observation is used for monitoring and reporting progress towards achieving LDN as well as for target setting at national level. It will also be required to support planning of LDN interventions locally.

To date, there has been much emphasis on the three sub-indicators that are required for reporting on SDG indicator 15.3.1 and towards the UNCCD’s objectives. These indicators include trends in land cover, in land productivity and in the stocks of carbon above and below ground. However, the LDN implementation requires a set of indicators broader than this.

This report provides the result of a consultation with over 50 experts and actors implementing the LDN agenda to identify the information needs they require to fulfil the various LDN activities. The workshop was organized by ISRIC - World Soil Information, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), WOCAT International and the Group on Earth Observations (GEO) in cooperation with the UNCCD, and funded by the German Federal Ministry for Economic Cooperation and Development (BMZ). We are grateful to BMZ for funding the workshop and to the UNCCD for the cooperation in the design of the workshop. We wish to thank the participants for attending the workshop and sharing their valuable experiences and insight, and Alexander Fröde (P4D) for his excellent facilitation of the workshop.

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## Abstract

The “International Workshop on Mapping and Monitoring to Support Land Degradation Neutrality (LDN) at Global, National and Local Level” took place at Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) Bonn, Germany on the 8<sup>th</sup> and 9<sup>th</sup> of October 2018. The objective of the workshop was to address the missing link between Land Degradation Neutrality (LDN) target setting and reporting at the national level, and planning and implementation of action to avoid, reduce and reverse land degradation at the local levels.

57 participants from 18 countries representing different LDN-stakeholder groups at international, national and local level, reviewed current use, good practices, constraints, and user needs of Earth Observation (EO) data for mapping and monitoring LDN-related processes. They identified needs in terms of EO data to support planning and local implementation of LDN activities, monitoring and reporting at national and local level, as well as related spatial and knowledge infrastructure. This includes guidance on harmonized approaches, capacity development, and access to EO and other free and open data, maps and tools that support decision making needs of LDN stakeholders at all levels.

LDN activities are carried out at various levels by various actors who do not always cooperate as intensively as desirable. Particular attention was therefore given to the question of how to improve the link between actors and processes that operate at the global, national and local level.

The sessions resulted in four recommendations on data for planning, four on monitoring and reporting, and five on spatial and knowledge infrastructure to support the use of information in planning, monitoring and reporting. Finally, participants proposed ideas for concept notes to define demand-driven activities for the GEO-LDN initiative that are inter-linked with on-going activities. These recommendations and ideas for concept notes were presented and discussed during the GEO (Group on Earth Observation) Week 2018 in Kyoto, Japan.

# Introduction

## Background

Achieving land degradation neutrality (LDN) by 2030 is a stakeholder-driven process facilitated by the United Nations Convention to Combat Desertification (UNCCD). The UNCCD has developed a scientific conceptual framework for LDN<sup>1</sup> and is the custodian agency for the Sustainable Development Goal (SDG) target 15.3, and its indicator 15.3.1 (proportion of land that is degraded over total land area) which has internationally established methods and standards. The UNCCD supports country Parties, through capacity building initiatives, to set and monitor progress towards LDN targets, promotes good practices in Sustainable Land Management (SLM) and assists with resource mobilization.

At recent COP meetings,<sup>2</sup> signatories to the Convention have expressed their intentions to set and implement voluntary LDN targets and report on their progress. This target setting is followed by the development of transformative projects and programmes to achieve LDN. The development and implementation of such projects and programmes requires national to local scale planning, monitoring and evaluation of progress, as well as monitoring and reporting of their impacts.

LDN governance requires information-flow and coordination between stakeholders operating across all levels and sectors. There is a need for connecting the target setting, monitoring and reporting at the national level to the implementation of projects at local level. In addition, the achievements of local level activities should be aggregated at the national level for reporting purposes, thereby enabling local actors to contribute information towards the achievement of national targets. Ideally, to facilitate communication and comparability, various stakeholders at all levels would be able to access and use the same information.

Earth observation (EO) including both, remote sensing and in situ data, as well as mapping products and geoinformation are important in the implementation of LDN. First, EO supports the assessment of baselines, the understanding of trends and drivers of land degradation and the prioritization of areas that require LDN interventions. Tools and techniques utilizing EO data and expert opinion can be used to help identify appropriate options for interventions. Earth observation data further support the planning and implementation of interventions at local to landscape level. Finally, EO contributes to monitoring trends in LDN indicators and demonstrating the impact of the LDN interventions.

In September 2017, the UNCCD invited the Group on Earth Observation (GEO) to support the LDN agenda by providing space-based information and in situ measurements to assist countries in fulfilling the reporting requirements for Sustainable Development Goal indicator 15.3.1 and fostering data access, national data capacity-building and the development of standards and protocols.<sup>3</sup> Over the last few months, GEO developed an Implementation Plan for its LDN Initiative. In June 2018, GEO convened an interim committee to support the further development of this Implementation Plan for approval during the annual GEO Plenary in Kyoto at the end of October 2018.

Among the various EO techniques, remote sensing is an appropriate tool to provide information needed to assess and monitor LDN. It is particularly suited to monitor changes in land cover and land productivity over time and large areas, which can be used as evidence of the progress towards achieving LDN. However, the LDN agenda has a broader demand for EO data than monitoring these

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<sup>1</sup> [https://www.unccd.int/sites/default/files/documents/2017-08/LDN\\_CF\\_report\\_web-english.pdf](https://www.unccd.int/sites/default/files/documents/2017-08/LDN_CF_report_web-english.pdf)

<sup>2</sup> See decision 3/COP.12 and 3/COP.13 available at [https://www.unccd.int/sites/default/files/sessions/documents/ICCD\\_COP12\\_20\\_Add.1/20add1eng.pdf](https://www.unccd.int/sites/default/files/sessions/documents/ICCD_COP12_20_Add.1/20add1eng.pdf) and [https://www.unccd.int/sites/default/files/sessions/documents/2017-11/cop21add1\\_eng.pdf](https://www.unccd.int/sites/default/files/sessions/documents/2017-11/cop21add1_eng.pdf) respectively.

<sup>3</sup> See decision 9/COP.13 available at: [https://www.unccd.int/sites/default/files/sessions/documents/2017-11/cop21add1\\_eng.pdf](https://www.unccd.int/sites/default/files/sessions/documents/2017-11/cop21add1_eng.pdf)



two sub-indicators. It also requires quantifying soil organic carbon (SOC), the third LDN sub-indicator, which is mapped with a combination of in situ and remote sensing data.

Another challenge that must be addressed is the difference in monitoring needs between national and local scales. At the national level, land cover change, land productivity dynamics and changes in SOC stocks represent a reasonable proxy of change in the capacity to deliver many of the ecosystem services flowing from land-based natural capital. However, even at the national level, monitoring some ecosystem services will require indicators/metrics from the other SDGs and/or other national indicators. At the local level, even greater specificity in indicators will be necessary to cover the variability of conditions encountered. Connectivity between project level and national level monitoring is essential. Because of this, it is essential that monitoring and planning design respond to the actual conditions encountered at the local level.

Apart from its use in monitoring, EO data and tools are required to support the implementation of LDN at national to local level. LDN implementation includes various activities such as identifying degraded hotspots and prioritizing areas for restoration and conservation, identifying options to achieve LDN, and the planning of interventions, activities within the institutional context of land use planning. Thus far, there has been far less reflection on the contribution of EO data in support of LDN implementation. For LDN implementation, it is necessary to ensure that the data products and tools serve the needs and reflect the perspectives of the stakeholders managing the land. If EO data is to support them in taking better decisions on LDN implementation, it is crucial that the data and information reflect their perspectives on the degradation status of the land, their priorities where interventions are required and their choice of options for avoiding, reducing or reversing land degradation.

Obviously, a more comprehensive LDN mapping approach is needed that includes the LDN indicators, but also geo-information and local knowledge that support the implementation of LDN activities. The World Overview of Conservation Agriculture Technologies (WOCAT) Consortium has a long-term track record in such inclusive mapping of land degradation and restoration, based on expert opinion. For example, the “WOCAT Questionnaire for Mapping Land Degradation and Sustainable Land Management” describes the procedures for mapping land degradation and SLM that were developed to support decision making on SLM interventions and that can be used for planning of LDN interventions.

At present, several global, regional and national data sets are available to support the countries that have committed themselves to set national LDN targets and that can be used for LDN implementation and reporting purposes. A heterogeneity of approaches will make it difficult to compare and aggregate information, and it might be desirable to strive for harmonization of approaches that can be applied globally and provide guidelines to national and local stakeholders on how to use and implement these data products. For the SDG 15.3.1 indicator and its sub-indicators, the UNCCD and its partners have produced version 1.0 of the Good Practice Guidance (GPG)<sup>4</sup> that was used in the recent capacity building workshops on national reporting.

The UNCCD and its partners developed tools developed to support the calculation and analysis of the SDG indicator. Conservation International for example developed Trends Earth<sup>5</sup>, a tool which facilitates harmonization of monitoring and reporting methods across countries while encouraging country ownership of the process, by implementing the GPG and automating the processing needed to bring nationally developed data into the estimation of SDG indicator 15.3.1.

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<sup>4</sup> [https://prais.unccd.int/sites/default/files/helper\\_documents/4-GPG\\_15.3.1\\_EN.pdf](https://prais.unccd.int/sites/default/files/helper_documents/4-GPG_15.3.1_EN.pdf)

<sup>5</sup> <http://trends.earth/docs/en/>

## Aims and outcomes of the workshop

The objective of the workshop was to address the missing link between Land Degradation Neutrality (LDN) target setting and reporting at the national level, and planning and implementation to avoid, reduce and reverse land degradation at the local levels.

The intended outcome of the workshop was that national and local LDN actors use appropriate and harmonized LDN data products, methods and tools in order to improve the quality of their decisions on targeting LDN, planning, project implementation, monitoring and reporting progress towards the UNCCD and other related processes.

# The Workshop

## Participants and agenda of the workshop

The workshop was organized at GIZ premises in Bonn on the 8th and 9th of October 2018. Participants included national and local level actors in LDN from nine LDN implementing countries, representatives of the UNCCD and GEO, ISRIC and GIZ, partners from the WOCAT Consortium and other experts with background in EO and in LDN. The list of participants is provided in Annex 1. The agenda of the workshop is presented in Annex 2.

The workshop was organized around an introduction and six main sessions. The first two sessions focused on stocktaking: What have we learned? (Session 1) and Where do we stand? (Session 2). These stocktaking sessions were followed by three sessions where participants reviewed [3] the user needs for EO data to support planning and local implementation of LDN activities, [4] the needs for EO in monitoring and reporting at national and local level and [5] the spatial and knowledge infrastructure that is required to support the above applications. Each session had one team capturing the main points and developing recommendations following from the information that the participants provided. Session 6 brought together the discussions and recommendations made during previous sessions. It generated ideas for concept notes for follow up projects to foster the recommendations that were made during the workshop.

## Overview of the workshop

### Introduction

The workshop was opened by Mrs Christel Weller-Molongua of GIZ. She welcomed the participants and highlighted the commitment of GIZ to sustainable land management as an integral part of its broader development agenda.

Next, four participants expressed their expectations for the workshop. Barron Orr (UNCCD) suggested that there is a challenge for the EO-community to start working on EO based information beyond the three LDN indicators to support local projects and be able to navigate trade-offs. Valdemar Rodriguez (Brazil) expected to avoid more paperwork and instead work on developing solutions that support people on the ground to change their lives. Mama Zakari Bassarou (Benin) wished to see a strengthening of linkages between local, national and international agendas and vice versa to achieve implementable policies. Finally, Douglas Cripe (GEO secretariat) expected to return from this workshop with a better understanding of how GEO Earth Observation systems and capacity can be leveraged as a knowledge base for LDN.

Afterwards, an icebreaker event allowed the participants to get to know each other. The participants were asked to complete the sentence: "Earth observation data is not used to its full potential because of". None of the participants considered the technical quality of the EO data an issue, 35 participants considered lack of capacity the major factor, while the remaining 15 participants thought that current technical solutions do not meet user requirements. The sessions 1, 2 and 3 were scheduled for day one.

At the beginning of day two, the purpose of the meeting was further explained in a speech by Barron Orr. He embedded the workshop in context of the broader LDN agenda. LDN, he said, is about striking a balance, about avoiding and reducing land degradation as well as restoring land quality, about no net loss and about leaving the land in a better state than how it was found. He pointed out that future tasks for the EO community comprise predicting where land degradation is going to happen, finding a

new balance in a holistic way and to not only think locally. The next challenges will include the implementation and usage of EO that includes both in situ and remote sensing data, as well as working together with different groups that will have to listen to each other.

### Session 1 - Stocktaking 1: What have we learned?

During the first stocktaking session, participants broke up in four groups according to their role in support to LDN: land use planners and SLM implementation experts, national monitoring and reporting experts, data and tool providers and analysts as well as experts supporting the UNCCD implementation. A different set of questions was shared beforehand with the respective groups. Each group produced a poster to address these questions. Photographs of the four posters are presented in Annex 3.1.

Table 1A shows that land use planners and SLM implementation experts use EO data in participatory planning processes. They mentioned that this participation resulted in ownership and better information quality. Surprisingly, no obstacles were mentioned.

**Table 1A.** Response to questions by land use planners and SLM implementation experts

**When and for which activities have you used EO data and tools? Which ones? Which participatory approaches have you used?** Used for development planning for communities and watersheds, participatory GIS, land cover change analysis, land degradation mapping and planning and scaling out of LDN interventions.

**What has worked well?** Participation of local population created ownership and improved information quality; co-designing the planning.

**What have you learned? If you did not use EO data, what were the obstacles?** There is a wealth of information but much of the complexity of this information gets lost in the process of simplification for authorities. LDN promotes conservation while decision makers are interested in production. We need to consider interests and data needs (scale, abstraction level) of key stakeholders.

The national monitoring and reporting experts mainly relied on default data for their reporting (Table 1B). They appreciated the cooperation between the National Focal Point (NFP) and technical experts. The participants further expressed concern about the accuracy of the EO data and the lack of national data for specific regions, which may complicate consistent use and comparison over time.

**Table 1B.** Response to questions by national monitoring and reporting experts

- **Which data did you use to report on the three sub-indicators in your national UNCCD report? Have you used additional national indicators? Did you adjust the land use transition matrix? Have you used Trends Earth? Any additional facts and figures?** Madagascar and Kyrgyzstan used default data while Benin used national land cover data in addition. None of these countries changed the transition matrix. Trends Earth was used in Benin. No additional facts were used.
- **What has worked well?** There was good cooperation between the NFP and the technical experts. What did not work well is that NDVI did not reflect reality. Use of the default data results in over- or under-estimation of the sub-indicators. This questions the accuracy of the default data.
- **What have you learned?** EO data is useful and needed. There are technical issues (data accuracy) that need to be addressed to ensure that data remain consistent over time.

The results of the data providers and analysts are presented in Table 1C. They use a variety of tools and are able to provide data beyond the three sub-indicators. The group was aware that different objectives and LDN processes need different data beyond the three sub-indicators. They engage with

users through projects and capacity building events and consider that there is a need among users for capacity development.

**Table 1C.** Response to questions by data and tool providers and analysts

- **Which EO data and tools do you provide/develop in the context of land degradation?** Providing LDN sub-indicators through Trends Earth, Google Earth Engine and SoilGrids (SOC); additional on NPP, land cover and land use change, national soil maps (Brazil) and erosion model.
- **How do you engage with users of tools and data?** Through projects, fora and capacity building.
- **What have you learned in engaging with the users?** Among users there is a lack of capacity and need for training. They need user friendly tools that are adapted to the capacity and needs of the users.

Experts supporting the UNCCD more generally supported the use of EO in a variety of ways (Table 1D). They report that the monitoring and reporting at national level resulted in country ownership. They consider there is a need for capacity development at national level.

**Table 1D.** Response to questions by experts supporting the UNCCD more generally

- **How do you support the use of EO data to fight land degradation?** Support through organization of regional workshops and assistance with LDN baseline assessments and providing advice and best practice reporting in standardized format.
- **What has worked well in this support?** Building political leadership and country ownership; establishment of small communities of LDN experts. The availability of default data and tools has triggered the collection of custom data for national analysis, which has increased country ownership.
- **What have you learned in this support?** There is need for strengthening capacity at national level; need for harmonization with national statistics; need for inter-sectoral and inter-ministerial cooperation; the gap between science and policy needs to be addressed; need to emphasize LDN and use of reporting data in existing planning procedures e.g. land use planning. The availability of multiple data providers and tools creates transferability issues. Data providers should stop offering competing information products and focus on standardization and harmonisation efforts to offer the best possible uniform products.

The findings of the four groups were presented and discussed in a plenary session. This stocktaking and the discussions supported participants with various backgrounds to catch up and develop a common understanding of the use of EO in the context of the UNCCD and of what has been learned until now. The improved understanding of the use of EO in the participants areas of expertise greatly facilitated the discussions in the following sessions.

## Session 2 - Stocktaking 2: Where do we stand; linking national and sub national level?

During the second stocktaking session, participants from LDN implementing countries were subdivided into four regional groups according to languages: Kyrgyzstan, Ukraine and Russia; Madagascar and Benin; Ghana and Namibia; Dominican Republic and Brazil.

Each group was asked to answer the following three questions:

How did you link the use of geospatial information in national reporting and sub-national implementation??

Which opportunities do you see?

Which obstacles do you see?

Table 2A summarizes the answers given by the four groups, which are available on the sheets (Annex 3.2).

**Table 2A.** Summary of answers to questions by four regional groups

<p><b>Kyrgyzstan, Ukraine, Russia</b></p> <ul style="list-style-type: none"> <li>• <b>Link between national and sub-national:</b> Little so far. Needs additional information from e.g. research and pilot projects.</li> <li>• <b>Opportunities:</b> Involve key stakeholders to define needs and benefits, link with statistic offices and cadastre.</li> <li>• <b>Obstacles:</b> Capacity, resources and knowledge. Variety of biophysical conditions and land degradation processes.</li> <li>• <b>Further comments:</b> LDN data not integrated in national data systems. Data should be tested for reliability in pilot projects. Key stakeholders need to be involved. Cost effectiveness of efforts is important. Which data can be maintained by the state and which international or private sources are available.</li> </ul>
<p><b>Benin and Madagascar</b></p> <ul style="list-style-type: none"> <li>• <b>Link national and sub-national:</b> Implement institutions at local level; simplify and operationalize planning tools.</li> <li>• <b>Opportunities:</b> Building on local knowledge; Mapping hotspots and bright-spots.</li> <li>• <b>Obstacles:</b> Insufficient strengthening of capacity of national and local actors; diversity of local planning tools</li> <li>• <b>Further comments:</b> -</li> </ul>
<p><b>Ghana, Namibia</b></p> <ul style="list-style-type: none"> <li>• <b>Link national and sub-national:</b> -</li> <li>• <b>Opportunities:</b> Contribute to prioritizing interventions, support decision making, verifying national level achievements at local level, identifying hot and bright spots; policy reform.</li> <li>• <b>Obstacles:</b> Capacity, resources and knowledge.</li> <li>• <b>Further comments:</b> Costs, benefit, technical capacity, competition among data providers.</li> </ul>
<p><b>Brazil and Dominican Republic</b></p> <ul style="list-style-type: none"> <li>• <b>Link national and sub-national:</b> We know where degraded areas exist, the question is how to prioritize interventions in specific areas. Linking national to local fundamental to decide on implementation.</li> <li>• <b>Opportunities:</b> Use information to influence decision makers and cross sectoral dialogue. Create synergies between LDN and other social development programmes.</li> <li>• <b>Obstacles:</b> Slowness to set LDN targets; lack of political will.</li> <li>• <b>Further comments:</b> The LDN indicators provide good ammunition to get discussion going with politicians.</li> </ul>

At the same time participants from LDN supporting organizations were asked to report on “something that has gone wrong and what they learned from this”. The results of their discussions are summarized in Table 2B with photographs in Annex 3.2 revealing their detailed feedback.



**Table 2B.** Summary of answers to questions by groups from research and international organizations

<p><b>Research organizations</b></p> <ul style="list-style-type: none"> <li>• We need to have a broader perspective on data (and its applications by whom). The data is needed for decisions on cost-benefit and for transdisciplinary assessments. What works where?</li> <li>• We need adaptive management. There is a lot of information present but the transfer is difficult between researchers, stakeholders and scales</li> <li>• We need to engage the right people and stakeholders from the start: co-development of knowledge</li> </ul>
<p><b>International organizations</b></p> <ul style="list-style-type: none"> <li>• Reasons why projects have failed before include: Short term projects, Not enough co-design, Lack of capacity building. Most funding mechanisms complicate co-financing, yet it is a good way to get buy-in of relevant stakeholders. If these challenges are addressed (intersectorial and interministerial) it might be easier to get funding.</li> </ul>

This session resulted in a reflection on the possibility of linking the use of data at national level for reporting purposes to the use of data in implementation at local level and vice versa. It was a useful exercise to bring participants to a common understanding on linkages between national and sub-national level, a topic that was further discussed in Session 4.

### Session 3 - Tools to support planning and action to fight land degradation

During the third session, participants moved from table to table to answer the following three questions:

1. What EO information would help to reduce land degradation on the ground?
2. What would an ideal tool look like to make EO information usable and used?
3. Who would need to learn what and how?

The posters are available in Annex 3.3. Mariano Gonzalez-Roglich and Fenny van Egmond summarized the answers into the information in Table 3A, 3B and 3C. The statements mentioned most commonly were used to develop a series of four recommendations (see Session 6 and Outputs of the workshop).

**Table 3A.** Answers given to the question “What EO information would really help to reduce land degradation on the ground?” ranked according to number ( ) of votes given by participants.

<p><b>Characteristics of the EO data</b></p> <ul style="list-style-type: none"> <li>• Need for spatial data at appropriate resolution depending on process scale (8).</li> <li>• Field data and in situ data (observation and sensor data) and expert opinion (including indigenous knowledge) which supports the calibration and validation of remote sensing data (8)</li> <li>• Data tailored to different ecosystems; different scales require different EO derivatives (6)</li> <li>• Need for higher temporal resolution, reaching in relevant cases near real time monitoring and on demand (5).</li> <li>• EO to inform investments on the ground (3)</li> <li>• Time series data to allow detecting change (1).</li> </ul>
<p><b>Specific variables</b></p> <ul style="list-style-type: none"> <li>• Effects of urbanization (4)</li> <li>• Provide contextual information to facilitate interpretation of (change in) degradation processes, drivers and causes (for example hotspot identification, forest cover and deforestation patterns, land use, land tenure, population density, water availability and quality) and focus investments (2)</li> <li>• Information about risks of land degradation and potential for restoration (2)</li> <li>• Tracking information of crop development and yields (1)</li> </ul>

**Table 3B.** Answers given to the question “What would an ideal tool look like to make EO information usable and used?” ranked according to number ( ) of votes given by participants.

<p><b>To make EO data usable by a broad range of users, a tool with the following characteristics would ideally be designed and implemented:</b></p> <p><b>Functionalities:</b></p> <ul style="list-style-type: none"> <li>• Should feed into a general database to aggregate information from all the users working in an area (2).</li> <li>• Scenario planning to optimize spatial interventions to maximize benefits beyond project area and estimate chance of uptake (boundary conditions) (2)</li> <li>• Should allow scenario analysis, navigate trade-offs and optimize spatial intervention for LDN (2)</li> <li>• Should have added value for users (1)</li> <li>• Support contextual information (population, crop yields, and surface water to support interpretation) (1)</li> <li>• Possibly applicable in various sectors (industry, agriculture, government) and on different expert levels (0).</li> <li>• Tool functionalities and support incl. capacity building should be provided with the tools (data and tool continuity should be assured) (0)</li> <li>• Useful for planning, implementation and reporting (0)</li> </ul>
<p><b>Technical side:</b></p> <ul style="list-style-type: none"> <li>• Simple, clear, understandable, flexible, user-friendly with different levels of complexity for different users (9)</li> <li>• Open source and FAIR (findable, accessible, interoperable and re-usable) data (4)</li> <li>• Offline support (3)</li> <li>• Leverage cloud computing resources (3)</li> <li>• Design process should be participative and inclusive (different sectors, from national to the local communities using the natural resources) making it politically neutral (2).</li> <li>• Well documented and reproducible (2)</li> <li>• Interoperability with other tools (1)</li> </ul>

**Table 3C.** Answers given to the question “Who would need to learn what and how?” ranked according to number of votes given by participants.

<p><b>All stakeholder groups need to improve on communication between the different stakeholder groups and understand each other’s needs, e.g.:</b></p> <ul style="list-style-type: none"> <li>• Planners need to integrate data types on various topics (6)</li> <li>• To build and use a transparent, open, inclusive knowledge system (5)</li> <li>• Researchers need to learn how to show (relevant) cost-benefits and how to communicate limitations/uncertainties (2)</li> <li>• Awareness raising for different stakeholders including media, general population and youth (0)</li> <li>• An LDN literacy campaign can be a way to inform ministries (0).</li> <li>• We need to think and operate outside project boundaries and keep the final goal in mind (0)</li> </ul>
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#### Session 4 - Monitoring and reporting on LDN, linking national and sub-national level

During the fourth session, participants worked in four groups. They were asked to make a schematic model to represent the interactions between actors at national and sub-national level. These schemes are displayed in Annex 3.3. Besides, they were asked the following questions: “Please imagine a perfect world ... How would stakeholders at national and local level do reporting, monitoring and evaluation with limited external support? How would national and local level link?”. Table 4 summarizes the answers provided by the four groups. Photographs of the outputs of Session 4 are presented in Annex 3.4.

**Table 4.** Answers of four groups to the question how stakeholders would do reporting monitoring and evaluation in an ideal world and how local and national level would link.

<p><b>Group 1 (Moderator: Carl Fiati, Ghana)</b></p> <p>In the perfect world local, national and scientific players work together, exchange of information have access to technical and economic resources. The barriers between monitoring, reporting and evaluation are removed. In a transparent, iterative process solutions are developed and quality tools and information (easy to interpret and works offline) are supplied. Communication is key for this.</p>
<p><b>Group 2 (Moderator: Simeon Hengari, Namibia).</b></p> <p>In a perfect world, decision makers at all levels have all the information they need about the current degradation and its impact on land, understand the consequences of this. They also have information to allow assessing the impact of interventions (scenario studies). Different stakeholders work together with clear responsibilities and organisational structures (e.g. of land users) and with sufficient capacity and skills. Decisions are implemented locally using a harmonised approach in tools and data. Data feeds back into national, international and local databases.</p>
<p><b>Group 3 (Moderator: Annette Cowie, Australia)</b></p> <p>In a perfect world, many feedback loops and participatory processes are used for generation and using information that is stored in a cloud-based central knowledge system. Research institutions provide initial ideas, quality control and extra application layers for interpretation. There is one central representative organisation responsible for reporting which also provides feedback to land users. NGO's are a liaison between local stakeholders and government levels and help to translate the aims of government to local level.</p>
<p><b>Group 4 (Moderator: Amos Kabobah, Ghana)</b></p> <p>In an ideal world, the focus must be on local communities. They take all critical decisions that are not reflected at government level. Land is owned by local people, therefore land tenure plans are very important and should be accessible to all. It is important to understand what happens on the ground: Who are the inhabitants, Where are the villages, What are the resources, What migration is occurring as a result of search for better pasture land? Identify hotpots and the reason why, for immediate action. Scenario building to allow cost benefit and show the potential of land can prevent migration to better lands. NGO's are key as they work directly with farmers. We must find a way to make information directly accessible to all stakeholders by mobile phone.</p>

The discussion that followed this group work and presentations showed that transformative projects require more and different indicators and information than just the three SDG 15.3.1 sub indicators. It is a challenge to link local and national levels and to create iterative information feedback loops. Local information helps in national reporting and planning and to improve the quality of reported information for regular monitoring every four years. National research, technical and economic resources can help local implementation using targeted local indicators. In situ data is needed to complement other data. GEO can ask countries to release their in situ data by being a trusted broker of data.

## Session 5 - Spatial data infrastructure and capacity building

In the fifth session participants reviewed the data and knowledge infrastructure to support the user requirements that were the outputs of the previous sessions. The session started with five presentations. Douglas Cripe presented the GEO LDN Initiative,<sup>6</sup> an initiative that aims to support the UNCCD and its LDN agenda. Mama Zakari Bassarou stressed the importance of engaging with stakeholders in local decision-making. Hans Peter Liniger presented the WOCAT partnership and the usefulness of a mobile phone tool that could serve several of the user requirements that had been identified. Valdemar Rodrigues and Rodrigo Nogueira de Vasconcelos shared their experiences with

<sup>6</sup> <https://www.earthobservations.org/activity.php?id=149>

planning for SLM (ARIDA Initiative and URAD Platform) in the Cerrados of Brazil. Finally, Mariano Gonzalez-Roglich of Conservation International presented Trends.Earth.

This was followed by a plenary discussion on the question “What data and knowledge infrastructure would support the LDN processes and decision making at national and local level?” A wide variety of issues was discussed (see also poster in Annex 3.5). Below, the contents of the discussion are presented in alphabetical order in accordance with topic and organization.

- **Benin**

The Ministry of Environment has an interest in a tool for real time monitoring of forest degradation. Benin also wishes to develop mechanisms to ensure that local data and information flows to sub-national and national level and vice versa.

- **Brasil**

The Ministry of Environment supports the ARIDA initiative, a cloud-based platform which identifies areas at risk of degradation. Complementary to UNCCD indicators, e.g. high-resolution Landsat data and carbon flux modelling. Makes use of dashboards and apps. State government supports the URAD project which foresees impact of land use decisions for use in local planning to achieve social, productive and environmental outcomes. It aims at local communities and farmers as beneficiaries and has a capacity building module.

- **Data continuity**

The UNCCD needs data continuity for future indicator monitoring and reporting, but if we do not act there will be data discontinuity for the SOC sub-indicator.

- **Data cubes**

What is proposed is time series of analysis ready EO data in a free and open environment with participation of governments. Some wish to see this broader with real time data including socio economic data to understand the reasons for change in the indicators, this can be in a data cube. Can the data cube assist to solve the SOC data discontinuity issue?

- **GEO**

Presenting GEOSS as its meta data hub providing access to various data sources. Could this be broadened / transformed to a knowledge hub for LDN? GEO can assist to get data cubes up and running.

- **Harmonization and standardization**

People get lost in the variety of datasets and tools, there is a need for greater harmonization and advice on data and tools.

- **Planning tools and in situ data collection**

The need for support to planning of LDN interventions as well as local on-site data collection and modelling was discussed. We also need scenario studies to compare impacts of current and projected land use change.

- **Trends.Earth**

Attractive because its free and open with easy data access. So far supporting national reporting on LDN. Desire to include scenario building in the “decision theatre”. Wish to make analysis relevant for local level by integrating local information. Which data should be added? SOC; Land Productivity? Urban extent (SDG 11.3 and 11.7?). Benin would be interested to develop a tool for monitoring land degradation real time.

- **WOCAT**

Sharing local land management system for better decision making. One national knowledge platform. User inclusive, easy and open access, flexible to changing user needs, decision support framework.

At the end of this session, Antje Hecheltjen provided a wrap up. The various presented data systems and tools serve and include a range of stakeholders and data providers active at different levels and with different roles. The options do not need to be exclusive but can build on each other and should be co-designed with users. Solutions on how local in situ data can be collected (best) need to be identified. Benin indicates a willingness to fund a forestry management system. GEO can help to get datacubes up and running in the countries and offers GEOSS as a knowledge platform. With partners, this could possibly also help to solve the problem of SOC and productivity data continuity.

### Session 6 - Towards recommendations and follow up action

During the last session the recommendation teams presented their findings. Their recommendations were reviewed by participants with suggestions for improvement (see Annex 3.6). This process led to the following recommendations that are presented in the section below (see outputs of the workshop).

In addition, participants were asked to propose ideas for concept notes to be developed as a follow up of the workshop (see Annex 3.6) and as summarized in Table 7 (see Outputs of the workshop).

During the workshop participants expressed an interest to bring the agenda forward with specific activities. First, Benin expressed an interest to fund a forest management system. Second, GEO indicated that through GEOSS it could take up the role of a trusted broker for data owned by parties at national to local level with. Finally, GEO could also assist countries to get datacubes up and running.

Finally, participants were asked to provide their comments on the workshop (see Annex 3.6). Overall, participants evaluated the workshop as well organized with a great facilitator and organizing team. They also appreciated the focus on active participation of the workshop participants.

## Outputs of the workshop

### Recommendations

Following each of the first three sessions, a small team drafted a set of recommendations. These were reviewed by the entire group in Session 4 to produce the recommendations below.

#### **Session 3: Data for planning and local implementation**

Mariano Gonzalez-Roglich and Fenny van Egmond compiled the results of Session 3 and developed four recommendations to:

1. Focus on: [a] EO data (including in situ observations) of appropriate spatial and temporal resolution (in most case higher than currently available); and [b] contextual information (including expert opinion) to validate and contextualize EO-derived products to support decision making.
2. Develop simple, clear, understandable and well documented, flexible, user friendly, open source and findable, accessible, interoperable and re-usable tools.
3. Develop tools that allow to predict scenarios, navigate trade-offs and optimize selection of spatially explicit interventions for LDN.
4. Build and use transparent open inclusive knowledge systems that integrate remotely sensed and in situ data and knowledge to facilitate learning between stakeholder groups and understand each other's needs.

#### **Session 4: Monitoring and reporting at national and Local Level**

Douglas Cripe, Luuk Fleskens and Annette Cowie developed recommendations for Session 4:

1. The final purpose of monitoring, reporting and evaluation is to support enhanced natural capital and livelihoods at the local level; because of this there needs to be a feedback from data collection and interpretation to support adaptive land management.
2. Monitoring, reporting and evaluation should be organised in a multi-level multi-stakeholder knowledge exchange platform, with options for crowdsourcing information with built-in quality assessment and on the ground validation, delivering data required for reporting by the government and local authorities.
3. Information on land potential and the expected impacts and benefits of interventions is needed before planning LDN interventions and realized impacts of interventions need to be monitored to document what works well where.
4. The potential for international support (e.g. GEO) for data reporting needs to be explored to support continuity in data and leverage.



## Session 5: Spatial data and knowledge infrastructure

Recommendations from Session 5 developed by Harafidy Rakoto Ratsimba, Godert van Lynden and Simeon Hengari are to:

- 1 Develop procedures and an interactive tools allowing LDN actors the possibility to assess the most appropriate Sustainable Land Management intervention options (from biophysical and socio-economic perspectives) and their likely impacts on the LDN indicators.
- 2 Develop a tool to upload, share and retrieve local knowledge and link this to remote sensing data.
- 3 Develop a tool to facilitate the collection of in situ data (e.g. SOC and other land characteristics), its integration with remote sensing data and further processing and analysis to meet requirements for national reporting and other relevant LDN processes.
- 4 Review the data continuity assumption that is underlying the GEO LDN Initiative data cube ambitions and develop appropriate action to ensure this in case of foreseeable data discontinuities.

### Ideas for concept notes for follow up action

In a final session, participants were asked to propose ideas for concept notes, indicating who would like to take a lead in developing these. The following list (Table 5) was compiled. Participants were invited to submit a one-page concept note to Antje Hecheltjen for further consideration by the workshop organizers and submission to GEO for further funds acquisition.

**Table 5.** Proposed concept notes with potential lead authors.

Proposed Concept Note	Lead	Comments
GEO to support Kyrgyzstan with carrying capacity assessment of pastures in Kyrgyzstan (or alternatively develop generic tools for carrying capacity assessment)	Kanat Sultanaliyev	Overgrazing is a problem in many countries incl. Kyrgyzstan, GEO could support with EO based carrying capacity assessment to advise on appropriate stocking rates
Develop tools to support the planning of implementation of SLM interventions	Jan de Leeuw	This idea will be discussed during the WOCAT SCM meeting
Tools (e.g. mobile apps) for crowdsourcing based data collection enabling local community collecting data	Louis Zoungrana, Mama Zakari Bassarou	
Tools and approaches for integration of in situ data (sensor, lab, measurements, observations) with EO data	Harifidy Rakoto Ratsimba, Fenny van Egmond	Fenny van Egmond volunteered to contribute on soil related issues (e.g. SOC)
Evaluating Rift valley lake health for targeting SLM practices in the watersheds	Ermias Betemariam	
Capacity development on using EO data in LDN documenting and reporting	Ermias Betemariam	
Risk assessment for land degradation to be used for awareness raising and planning purposes AND impact of land use on land degradation	Luc Arnoud Ezinmegnon	
Development of a high resolution map for Pakistan to support identifying interventions to achieve LDN targets	Munazza Naqvi	
Assessment of land data interoperability: what needs to be the same to allow other things to differ?	Thomas Hammond, FAO	
Assessing impact of SLM, restoration and conservation efforts from satellite imagery	Claudio Zucca/ Jan de Leeuw	

## Annex 1

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Group photo



## Annex 2 Workshop agenda

<b>Monday, 8<sup>th</sup> October 2018</b>	
8:45 - 9:30	<b>Registration and Coffee</b>
9:30 - 9:40	<b>Welcome remarks GIZ Ms. Christel Weller-Molongua</b>
9:40 – 10.20	<b>Speed dating, Agenda &amp; Logistics</b>
10:20-10:50	<b>Context and expectations for this workshop</b>
10:50 – 11.10	<b>Coffee break</b>
11:10-11:25	<b>Ice-breaker</b>
11.30-12.30	<b>Session 1 Stocktaking - What have we learned (in professional groups)</b>
12.30 – 13.30	<b>Session 2 Stocktaking - Where do we stand - Bridging the gap between national reporting and local implementation (by country teams)</b>
<b>13.30 – 14.30</b>	<b>Lunch</b>
14.30-15.00	<b>Energizing Start</b>
15:20-17:00	<b>Session 3 Looking into the future - Tools to support of planning and action to fight land degradation (Coffee break included)</b>
17:00-17.15	<b>Closure of day</b>
<b>18:30</b>	<b>Joint dinner in town</b>

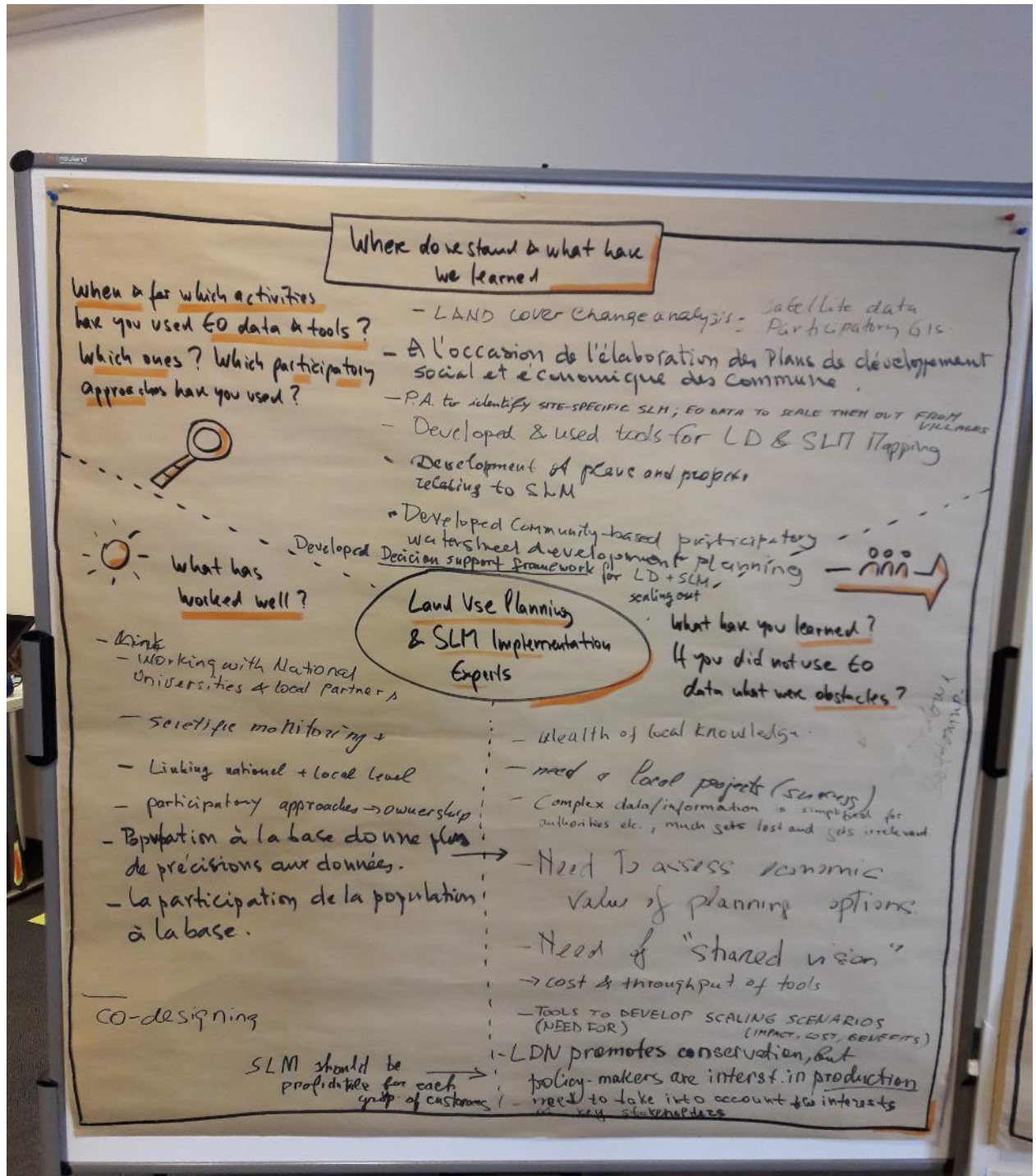
<b>Tuesday, 9<sup>th</sup> October 2018</b>	
9:00-9:15	<b>Re-cap Day 1</b>
9:20-11:30	<b>Session 4 Looking into the future: Monitoring and Reporting on LDN</b>
<b>Coffee</b>	
12:00-13:30	<b>Session 5 Looking into the future: Spatial-data infrastructure and capacity building</b>
<b>Lunch</b>	
14.30-14.45	<b>Interactive start</b>
14:45-15:45	<b>Session 6 Seeing the full picture and planning</b>
<b>Coffee</b>	
16:00-17:00	<b>Closing session</b>



# Annex 3 Photographs of sheets produced during the workshop

## 3.1 Stock Taking 1: What have we learned?

### LAND USE PLANNING EXPERTS







**DATA AND TOOL PROVIDERS AND ANALYSTS**

**Where do we stand & what have we learned**

**Soilgrids: SOC texture soil properties types**

**NDVI analyses land assessments**

**Soil Mapping**  
- Land Use/Mgt Mapping

**What are the main drivers of land degradation?**

**Soil types**  
- Statistique des types d'occupation du sol  
- WOCAT mapping (LD/SUM)  
- UNCCD-WOCAT BP-SLM  
- Soil quality

**TransTrends-Earth**  
Google Earth Engine (GEE)  
ERDAS IMAGINE, QGIS  
Sensor data  
Arcgis / Quantum GIS

**DATOS: Cobertura de la tierra (LAI)**  
Dinamica de l'occupation du sol  
Land productivity

**Contribuição de dados**  
- Mapeamento de Solos Brasil (1:250.000)  
- Mapeamento e Coleta de Terra (1:250.000)

**How do you engage with the users of tools & data?**

**Data/tools providers & analysts**

**What have you learned in eng**

**Projects/Research and Capacity building**

- Projects
- Forum/Workshops
- Local actors/Persons
- Academics/Researchers
- Capacity Building (Local/National/International)
- Working Tables
- Publishing (National/International)

**Local/National/International**

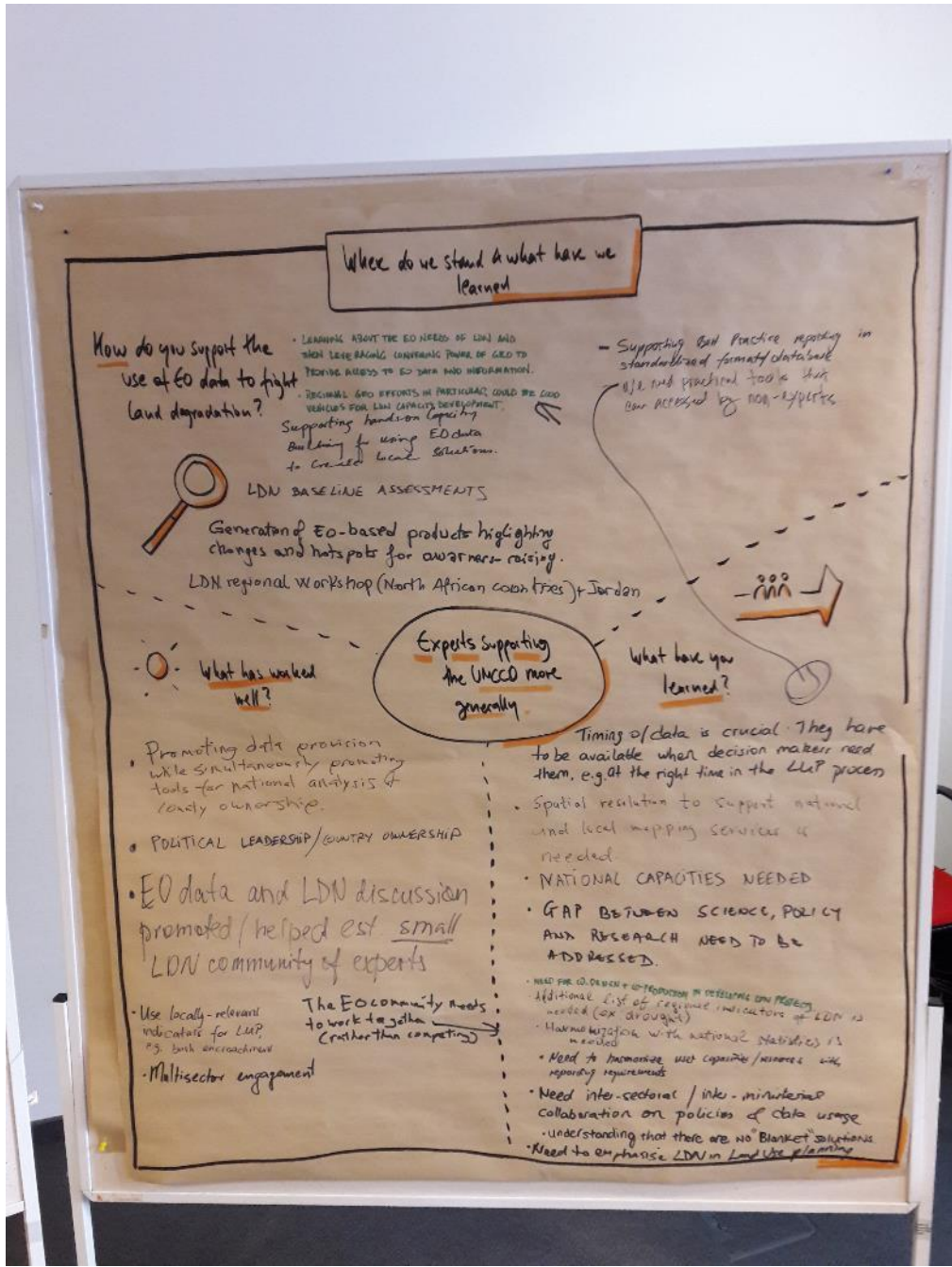
**General Data Base**

- User friendly tools
- Common Reporting Platform
- A bigger capacity to build data.
- Data needs of users which change over time
- Demand of data by Users.
- Precise and accurate data
- (Technical data should be in a form where users will be easily to understand)
- Lack of training for users to use the data
- Data don't meet users' needs expectations
- Soil data is too basic sometimes soil functions are needed.

**Flexible / Friendly tools**  
- User needs capacities/kapabilitas



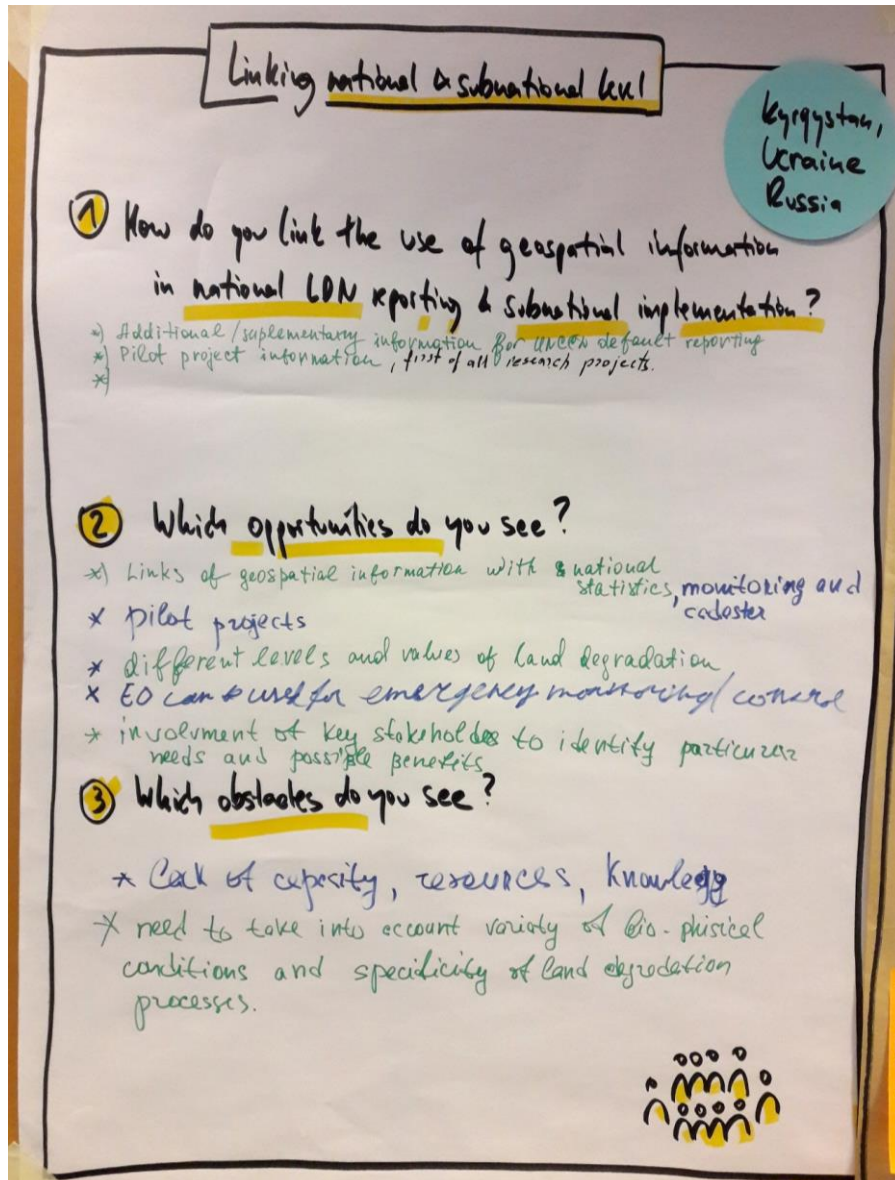
**EXPERTS SUPPORTING THE UNCCD MORE GENERALLY**



## 3.2 Stock Taking 2: Where do we stand - linking national to sub-national level

Below are photographs of the sheets completed by the six groups, with participants as follows: Kyrgyzstan, Ukraine and Russia; Madagascar and Benin; Ghana and Namibia; Dominican Republic and Brazil; research organizations and international organizations.

### KYRGYZSTAN, UKRAINE AND RUSSIA



Linking national & local level

Benin  
Madagascar

① Comment associez-vous l'utilisation de l'information géospatiale dans les rapports nationaux LDC et la mise-en-œuvre subnationale ?

Mise en place de cadres institutionnels au niveau local

Opérationnalisation et simplification des outils de planification

② Quelles opportunités voyez-vous ?

Capitalisation des connaissances locales

Hotspots / Brightspots

③ Quels obstacles voyez-vous ?

Disparités dans les outils de planification locales

Insuffisance renforcement des capacités des acteurs (nationaux & locaux)





# Linking national & local level

Ghana,  
Namibia

① How do you link the use of geospatial information in national LOM reporting & Subnational implementation?

The Contribution to the national level is as a result of the Community level

- ①
- ⊕ Disaggregation of GIS at
    - National level
    - Regional level
    - District level
    - Community level

opportunities do you see?

- ②
- Identify Hot Spots as Bright Spots
  - Prioritization of interventions
  - Support decision making

- Policy Reforms

Verification of what has happened at National level is done at the Community level

③ Which obstacles do you see?

- Cost
- Technical Capacity
- Socioeconomic
- Competition among data producers



## Linking national & local level

Brazil  
Dominican  
Republic

① Como asocia el uso de la información geospacial en los informes nacionales de LDM y la implementación Subnacional?

- \* Useful, fundamental to decide on implementation; lack of political will.
- \* We know where degraded areas exist / lots of pilot projects
- \* Brazil: land rehabilitation units  $\Rightarrow$  larger scale data set + proxy indicators to 3 global

② Que oportunidades existen?

- \* Influence more the decision-makers. (open data access)
- \* We have baselines  $\Rightarrow$  influence cross-sectoral.
- \* Join land degradation (LDM) with other social programs.  
+ The LDM concept as opportunity to achieve political decisions

③ Que obstáculos existen?

- \* To define a LDM target? (Brazil)





Research institutions

Learning from the past



Something that went really wrong... and what we've learned from this

SLM PROJECT  
ABSOLUTELY NO COMMITMENT & SHARING OF DATA  
SO ONE MUST WORK WITH RELEVANT AUTHORITIES FROM START!

DECISION MAKERS NEED TO KNOW ABOUT COST BENEFITS OF LDM/SLM OPTIONS, BUT SUCH INFORMATION IS RARELY AVAILABLE.  
WHAT IS NEEDED  
TRANSDISCIPLINARY ASSESSEMENTS

YOUNG PEOPLE ARE TRAINED IN ACADEMIC RESEARCH WITH LITTLE SOCIETAL IMPACT.  
UNIVERSITIES SHOULD EXPOSE STUDENT TO REAL LIFE PROBLEMS AND COMMUNITIES OF ACTORS

RESEARCH TO IMPLEMENTATION RESEARCHERS SHOULD BROADEN THEIR EFFORTS AND SUPPORT <sup>ACTORS</sup> SOLVING THEIR LDM PROBLEMS

KNOWLEDGE TRANSFER. RESEARCH PROJECTS SHOULD HAVE MECHANISMS TO TRANSFER RESULTS TO RELEVANT ACTORS  
COMMUNICATION KNOWL. MANAGEMENT

BRAINDRAIN AND LOSS OF INSTITUTIONAL MEMORY.  
WE NEED TO BUILD MECHANISMS TO RETAIN CAPACITY IN RELEVANT LDM ORGANIZATIONS

SUPPLY VERSUS DEMAND DRIVEN EFFORTS.  
WE NEED TO FLESH OUT LDM USER REQUIREMENTS TO DEVELOP & DELIVER DEMAND DRIVEN PRODUCTS

COST-BENEFIT ANALYSIS SHOULD ALSO CONSIDER TRADE-OFS AND CO-BENEFITS ON SITE AND OFF-SIDE AND LOCAL TO NATIONAL LEVEL

CO-DEVELOPMENT OF KNOWLEDGE

International  
Organisations

Learning from the past



Something that went really wrong & what we have learned from this ...

WRONG

LESSON LEARN

- short-term projects & capacity building

- need for co-design / co-production for involvement of <sup>appropriate stakeholders,</sup> end-users => relevance, longevity

- Sufficient National resources availability. (wrong assumption)

- data + info not enough, need analytic capacity

need buy-in from national institutions -> they need to plan resources for long-term implementation

- Co-financing requirement for global environment funds. it is not met.

- to prevent capacity "leakage", need to focus on institutional development.

-> also prevent "silos" across agencies.

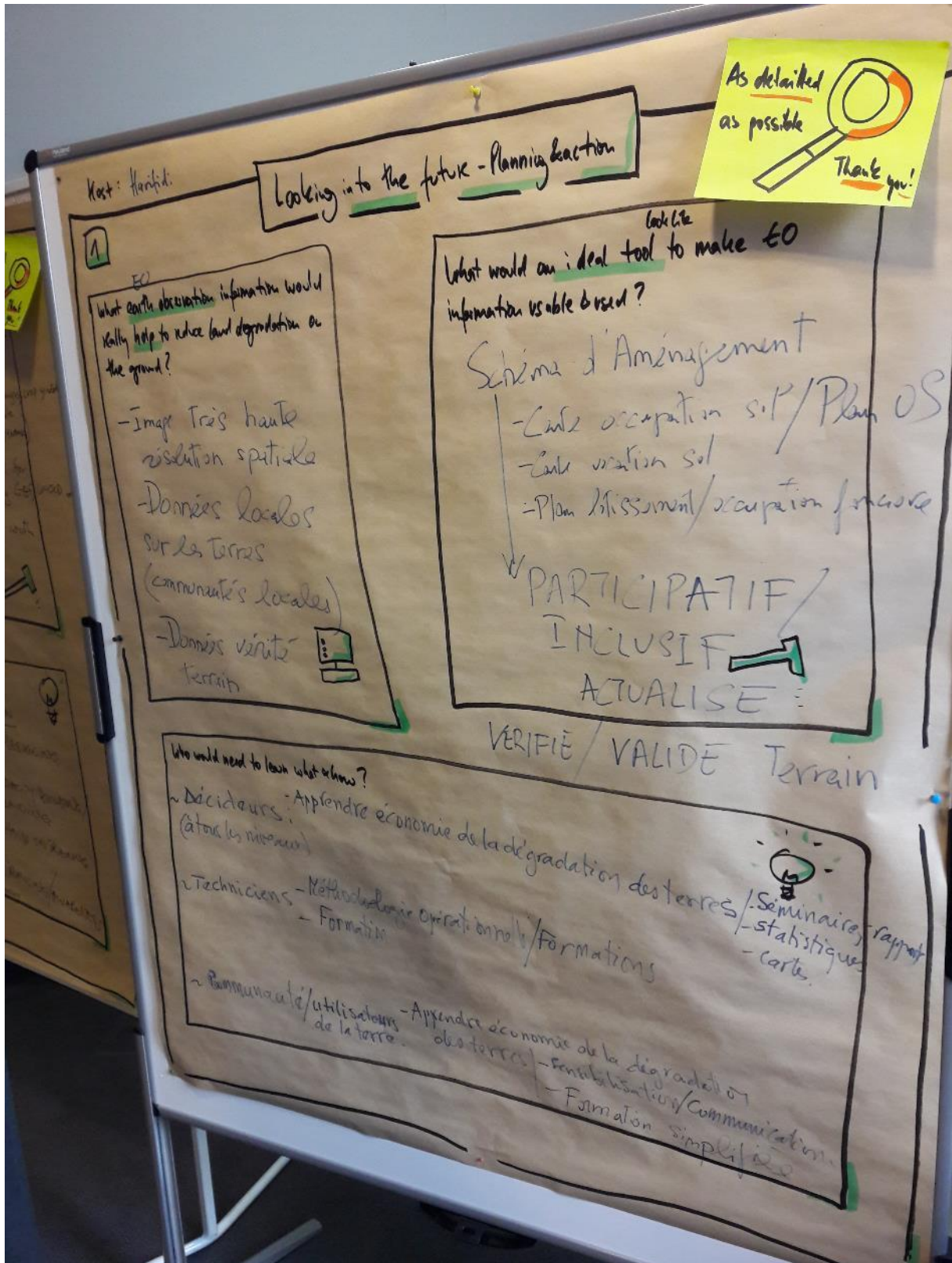
=> build analytical capacity, including through the provision of co-designed & user friendly tools.

- Need for improved LDM & SIN mapping tools at ntl/reg. level & their integration.



### 3.3 Session 3 Looking into the future: Planning for action

Six groups produced posters with answers to the questions



Host: Anous

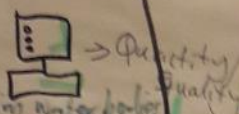
2

## Looking into the future - Planning practice

As detailed as possible

What earth observation information would really help to reduce land degradation on the ground?

- DEFORESTATION PATTERNS
- combination of remote sensing and field survey
- Dynamics of change: W/LD/SLM → impacts local obs
- really help in hot spots
- information about risks of land degradation and droughts
- Tracking of specific crops vegetation patterns;
- Effect of Urbanisation of forest cover, land use etc.
- Population density
- additional services: plant nutrition
- Water Detection - activity of farmer polluting water bodies



What would an ideal tool look like to make EO information usable on the ground?

- ⊗ Supports contextual information eg population change and surface water to enable INTERPRETATION (OPEN/DYNAMIC)
- ⊗ Collaborative tool for project inventory eg WFP
- ⊗ Matching projects with indicators



- Clear evidence and interpretation

Who would need to know what & how?

WHO	WHAT	HOW
1. DATA PROVIDERS	DEMAND FROM STAKEHOLDERS	CO-DESIGNING
2. EXTENSION PROVIDERS SERVICE PROVIDERS	HOW TO USE THE DATA	CAPACITY BUILDING TRAINING
3. LOCAL LEVEL POLICY MAKERS PLANNERS	HOW TO INTERPRET EO DATA WITH LOCAL LIFE PLANNING	HAND ON TRAINING
4. DEVELOPMENT PARTNERS	HOW TO INTERPRET EO DATA WITH LOCAL LIFE PLANNING SERIAL FROM WITH DOCUMENTATION	RENAME/ANALYSIS





Host: Sasha

3

# Looking into the future - planning & action

As detailed as possible  
Thank

## What earth observation information

would really help to reduce land degradation on the ground?

one that measures accurately, interpreted correctly by user. need for high (sufficient) resolution information w/ time series. sensitive to change.

tailored - hotspots/worst spots. depends on ecosystem/NR type.

historical & projection mapping for LUP.

EO to focus investment

LCC linked to socio-economic migration

biodiversity/endemic species

rainfall/temperature

link to DSSIR

link to vulnerability/risk

link to yields - imports - TTM

Who  
when  
How

## What would an ideal tool look like

to make EO information usable & used

Simple/clear/understandable/flexible.

user friendly - most know their needs first

well documented/reproducible.

cost-effective -> benefits high

identify user - area

looks at history/time series.

constantly maintained/updated/confidence

assess potential - monitor impact

open source - open data

should not be too data intensive.

different layers of complexity for diff. users

interoperability w/ other tools - SDGs

identify potential risk

prediction/scenarios

navigate toolkits

optimize # of metrics for EO

## Who would need to learn what or how?

Researchers need to show cost/benefits. -> translational research -> application

minimize what we need to learn -> ie maps. out workers use

Planners to integrate env. data. w/ other factors used for LUP

active listening -> comms. skills of Scientists - feedback incorporation

youth awareness. Society. corporations. understanding value of soil

Farmers/project managers/extension services

easy ways to access/learn to results of EO data. mobile apps

direct interaction of stakeholders. - show added value of data/tool

Policy makers/negotiators. (legal) - keep up w/ development

tools to help incentive. Sch

Operate outside the boundaries - landscape



Host: Simeon

4

# Looking into the future - planning & action

As detailed as possible  
Thank you.

### What earth observation information would really help to reduce land degradation on the ground?

- \* Combination of RS, expert opinion, field observations etc. (e.g. WLEAT)
- Clarity on potential benefits from earth observation data/actions → Impacts
- Baseline assessment
- Scenarios, building/prioritization of Action on ground
- \* Applicable RS data resolution/meters
- Do NOT OVERESTIMATE EARTH OBSERVATION DATA.

### What would an ideal tool look like to make EO information usable on the ground?

- Should provide info. to the general database
- Should have added value to the user
- Should propose SLM interventions that will be easily adopted by land users
- \* Plug & Play
  - Easy to use
  - Accessible
  - Offline
  - Interactive
- Specific Applications to users of different expertise (multi-disciplinary eg. payments, soil science to approximate accessibility)
- \* Open Source (Free)
- \* Scalable
- \* possibly applicable in various sectors (eg. industry, ngo's, agriculture, governments etc.)

RS: Remote Sensing

learn How

### Who would need to learn what or how?

Local community/land users (who)

What?

- Which tools exist
- How can it be used
- What benefits can be obtained from the use of the tools
- What is the quality of my land?
- What are the risks & dangers?

How?

- Awareness creation
- Capacity building

National level - Gov. (who)

- Comparison of regions
- Accommodate national plans & programmes

Research (who)

- ~~Access~~ to open source databases to develop national estimates
- Land-based solutions
- International cooperation

Land owners (who)

What?


- What is the quality of my land?
- Cost of action & in-action?
- What SLM actions are needed - based on the baseline data






5

### Looking into the future-planning traction

As detailed as possible  
  
Thank you!

Spanish  
(Español)

What earth observation information would really help to reduce land degradation on the ground?

- \* Mayor resolución espacial y temporal
- \* Agregar otras indicadoras de degradación (socioeconómicas, biológicas), además de las indicadoras NDT
- \* Informaciones avanzadas en terreno (INF, imágenes satelitales, degradación del bosque)
- \* Tenencia de la Tierra 

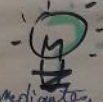
What would an ideal tool look like to make to information usable & used?

Plataforma on-line abierta que proporcione datos y mapas por zonas y/o sitios específicos.  
(amigable con cualquier nivel de usuario)



Who would need to know what or how?

- Usuario de la tierra : información sobre procesos de degradación, <sup>mediante</sup> <sup>metodo</sup> educativo
- Técnicos - Metodología para análisis de la degradación, <sup>monitoreo</sup> <sup>de</sup> <sup>los</sup> <sup>recursos</sup>
- Políticos - Estado de la degradación y los compromisos con los ODS (2030)
- Planificadores) y metas nacionales NDT






6

### Looking into the future - planning & action

As detailed as possible!  
Thank you

What earth observation information would really help to reduce land degradation on the ground?


- info that helps interpret RS; validation of hot spots
- quantifying RS images, calibration, understanding
- hyperspectral bands → algorithms to classify (SOC)
- spatial resolution (RS) depends on objectives → automate hot spot identification
- temporal resolution - on demand/near real time in problem areas



What would an ideal tool look like to make EO information usable & used?

attributes	functionalities
• simple, easy to use	• statistics (derived + integrated)
• low bandwidth requirements	• free license
• visualisation - mapping	• open source
• politically neutral	• combines layers of information
• potential for cloud computing	• on the fly capabilities

apps



### Who would need to learn what & how?

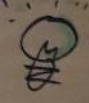
WHA?/HOW?/WHEN?

- capacity development - right tools → evidence based decisions
- literacy for media (pre-dissemination)
- identify priority areas (link to cost-benefit analysis - who will benefit?)
- technical reporting capabilities within agencies → inform Ministers
- understand reports & tools
- decisions based on clear transparent evidence
- be inclusive (NGOs, gov, ...)
- neutral voice on feasibility w/ RS
- WAT country indicators
- usable, transparent knowledge platform

realistic, usable

WHO

- decision-makers (local, sub-national, national levels)
- project managers
- lead users
- NSD's / CSO's
- media → disseminated (understandable, mainstream)
- investors - ROI
- scientists, academia
- researchers



# Aha Moments Day ①



ANA, JUST A NEW START!  
LOT OF WORK TO DO  
TO MAKE "DEFAULT" DATASET  
USEFUL (!) / INTERPRETABLE

Evaluation of land  
improvement

Greater understanding of  
how LDN & EO works together  
to better the life of  
citizens

Constatare que  
NÓS AINDA NÃO  
TEMOS UMA SOLUÇÃO  
PARA MONITORAR AS CES

THERE IS NOTHING BETTER  
than having a goal fail!  
to achieve the objective  
a Workshop!

Earth observation  
should not be limited  
to remote sensing!

SCENARIO  
APPS TO INFORM  
REAL AND LAND MANAGERS  
are highly needed.

- NIST 2015 Une Chaire  
de la recherche en  
Géomatique, chacun à son  
niveau pour atteindre  
les objectifs de la 45-3 de 2015

Nécessité de traduire les  
outils de mise en œuvre  
de la NDT aux fins de  
l'intégration effective par  
les communautés locales

Tool Providers should raise  
their capacity building goals  
beyond that scope, and include  
understanding of sources of error  
and uncertainty to improve  
quality of output.

COLLABORATION AMONGST LIKE  
MINDED ORGANIZATIONS &  
PARTNERS ESSENTIAL TO  
SUCCESS IN TACKLING LDN  
IMPLEMENTATION

LITERACY FOR  
MEDIA

EO Data tool in the  
form of smart phone  
app - open & available  
for all.

Not much that  
we think we  
do not know

EO information becomes  
more and more user-  
friendly and  
accessible.

Many people express  
the need/desire for  
tools, methods, data that  
facilitate to link local  
national level

TROCA DE  
EXPERIÊNCIAS

Tool = Apps linked to  
Cloud computing  
capacity

Need solutions for  
the brain drain

Information provided by  
MORR during the "context  
adaptation" phase

Dynamic participation  
of participants at all  
times

LDN  
IMPLEMENTATION  
HAS NO CASES  
AT LOCAL LEVEL

- COMMENCE À NECESSAIRE / REQUIS-  
SITES DE GÉOMATIQUE / LOCALIS-  
PROCESSES DE MONITORING  
# MEMOIR ANA!

Identification of Land use/  
Designation needs, accessibility,  
appropriability, adaptability, data  
relevant users & potential partners

Different communities/  
Topics → same challenges  
Cooperation and transdisciplinary  
need to be improved

Podemos tener buenos datos  
y herramientas sobre la  
degradación, pero si no hay  
buena implementación, no  
servirá de nada.

Language of GEO regional  
institutions with local needs  
is very valuable.

- Reliable internet  
facility / Capacity of  
processing units  
- Regulation among Global  
partners / players. This affects  
impact of quality data

Cost of data collect  
- Technical assistance/  
Capacity - collecting,  
Computing, processing,  
analysis and storage of  
data

- Time frame of env. data  
affect quality data  
- Socio-economic issues  
such as land tenure

the concept of  
LDN is still not  
fully understood

El interés e implicación  
de los participantes  
en la disciplina es

Internet promotion in  
Spain is not good enough  
for trade work

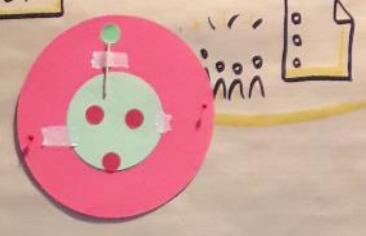


3.4 Monitoring and Reporting at National and Local level



# Monitoring & reporting for LDM

Please imagine a perfect world...  
How would stakeholders at national & local level do reporting, monitoring & evaluation with limited external support?  
How would national & local level link?



- In an ideal world there should be access to data in an applicable way at all times at all levels.
  - Transparency
  - iterative platform
  - Iterative process
- Communication & Exchange between levels have to be strong
- Strengthen local level.
- Quality tools → easily interpretable.
  - ↳ offline software
  - in-situ measurement to validate EO data
- National mechanism to ensure funding to facilitate processes
- regional level as platform for exchange.

2

1. Inicial

1. Inicial  
- list de temas, objetivos  
- lista de datos de reportes  
- list de preguntas

3. Inicial

Informacion  
data base

Advisory  
Services  
- Support &  
- Extension on  
- (AR)

Tools  
- data collection  
- data analysis  
- data management &  
- distribution

data  
collected

recomendation

Formers  
associations  
Farmers

Committee  
↑ ↓

Committee  
↑

↑

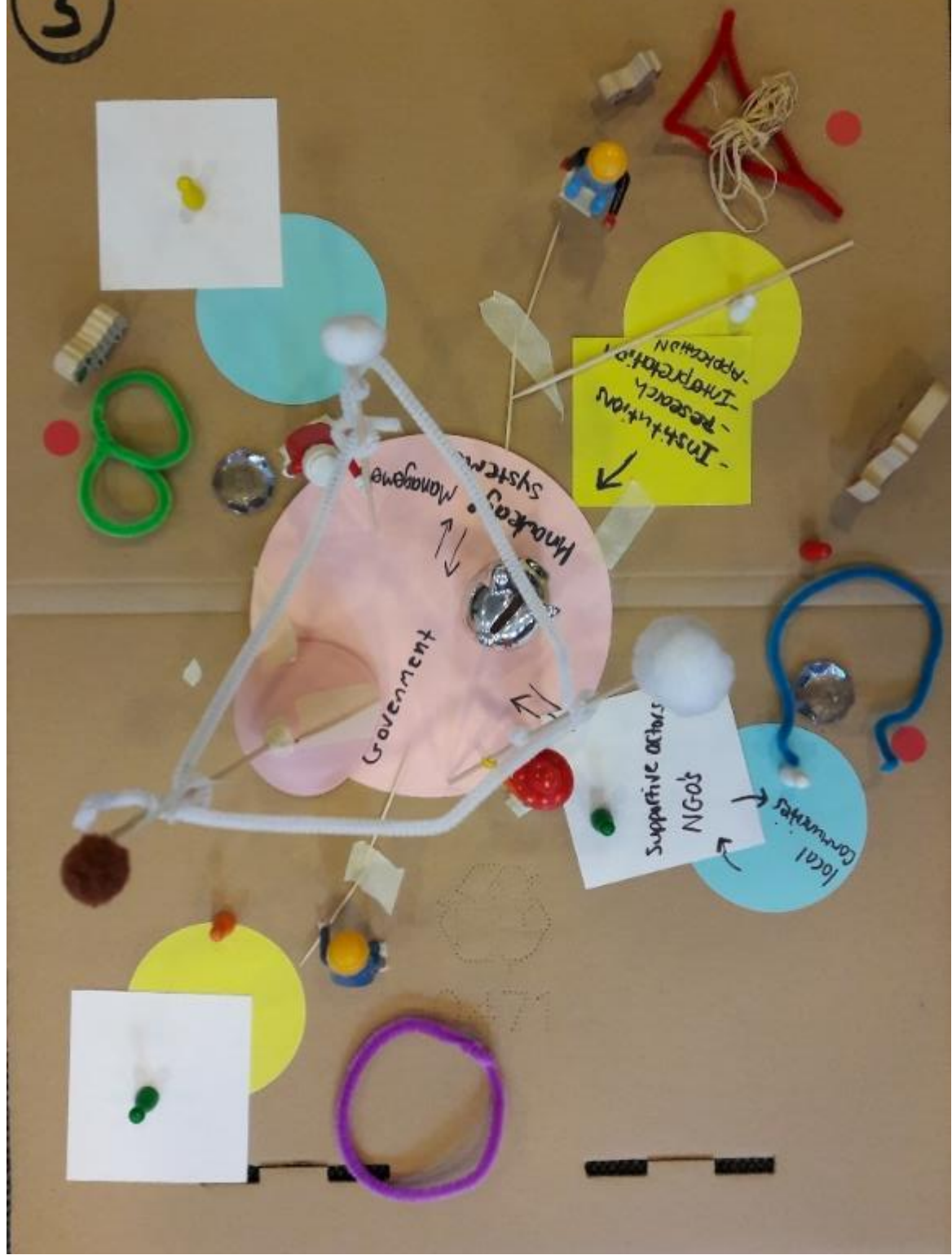
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3



# Monitoring & Reporting for LDN

Please imagine a perfect world...

How would stakeholders at national & local level do reporting, monitoring & evaluation? - with limited external support

How would national & local level link?



DM = Decision maker  
LUP = Land use plan

## FOCUS DOWN, LOCAL (ACTION)\*

farmers have real in data collection, understand need to take care and monitor; get INCENTIVES (ES); DO THAT THROUGH COMMUNITY\* ORGANIZATION (role of OPINION LEADERS)

DM get information about areas under degradation, & take over <sup>conserve historical memory</sup> understand implications (SCENARIOS) (IMPACT) of their LAND DECISIONS <sup>CC BIODIV, ES (HOLISTICALLY)</sup>

TOOLS ARE AVAILABLE TO SUPPORT DM in this <sup>WHAT WORKS WHERE</sup> <sup>ENABLING ENVIRONMENT/BUDGET</sup>

Clear responsibility, institution level, at national level, for reporting; <sup>HAVE CAPACITY, SKILL; better a consortium of INST./AGENCIES</sup>

All authorities with mandate in LUP, work together (no silos) <sup>cross-fertilization through mechanisms</sup> <sup>(e.g. delegate contact persons)</sup> <sup>coordinating LUP committee</sup>  
Decision taken, are implemented locally (NATIONAL LEVEL)

LAND PLANNERS (LOCAL, SUB-NATIONAL) have harmonised approach to Land management & get needed info for that



FACILITATOR: Graciele

SCRIBE: SASHA

PRESENTER: Jackie

# Monitoring & reporting for LON

3

Please imagine a perfect world...

How would stakeholders at national & local level do reporting, monitoring & evaluation - with limited external support?

How would national & local level link?

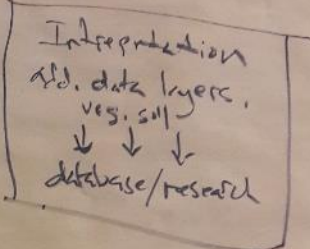
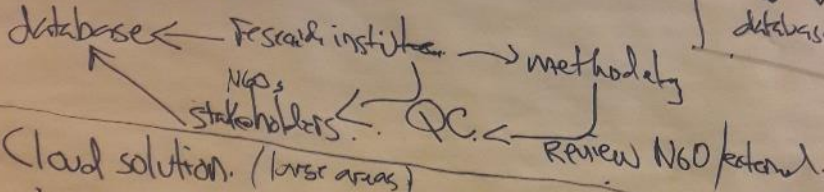
Local level / project level - limited resources.

Natl → local. disconnect. rep. to talk w/ each other. Govt needs to go to local thru NGOs. activate the process.

NGOs added value. usable data. make connections.



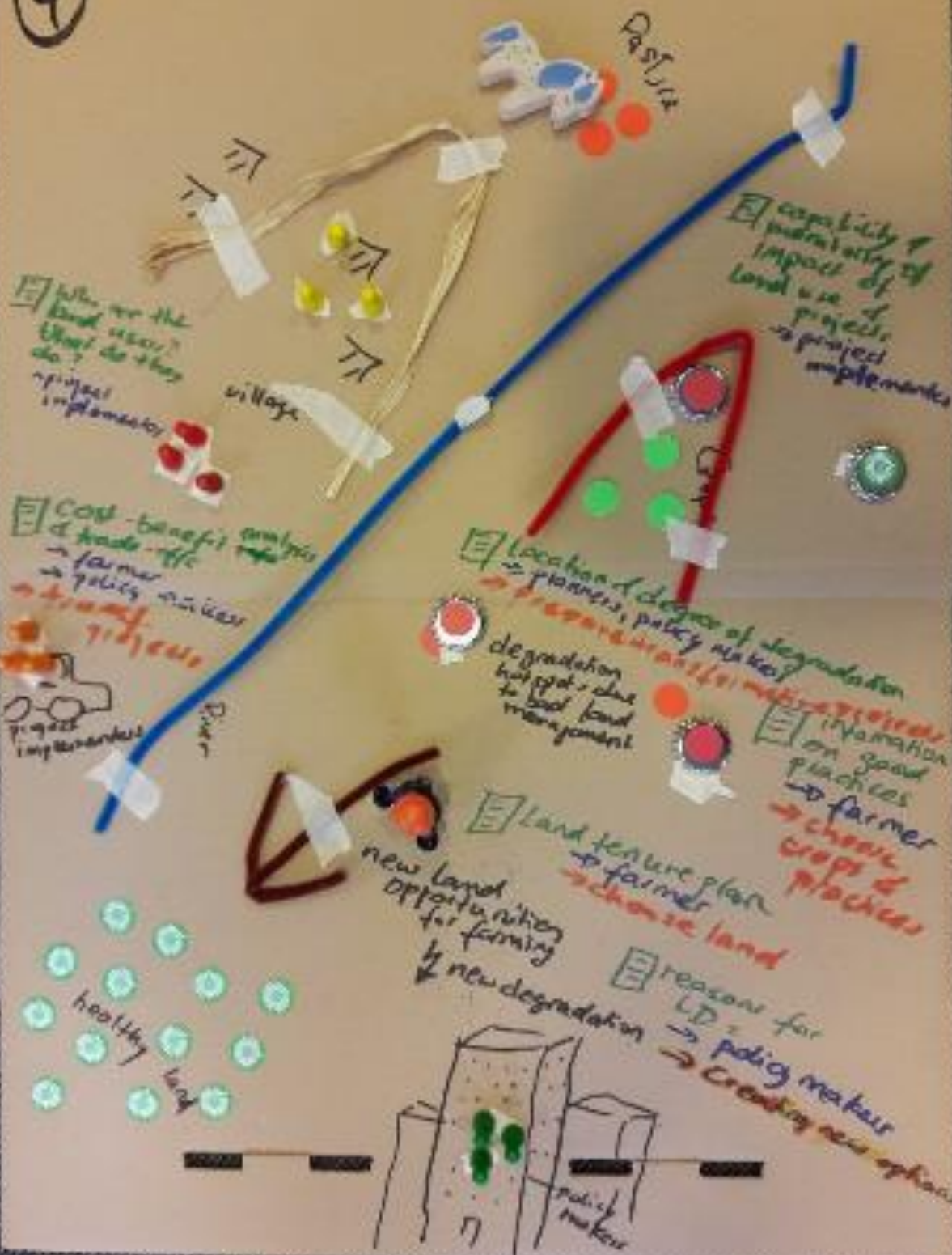
Ministry. Govt / research institute → provide data for MRV. processing



Cloud solution. (large areas)

↓ collect local level data → self assessment/validation QC (cloud sourcing) - open source. (keys) ICRAF  
↑  
Brazil NSO → natl reporting

4





# Monitoring & reporting for LDN

4

Please imagine a perfect world...

How would stakeholders at national & local level do reporting, monitoring or evaluation - with limited external support?

How would national & local level link?



## Needs assessment on local level:

Information on:

- land location + quantity <sup>②</sup> (Planners, Policy makers, ③ propose transformative projects)
- number of inhabitants
- degree of degradation (Status quo)
  - ↳ hotspot identification
  - ↳ how human activities are affected
  - cause of degradation (+ activities)

## Problem + Processes:

- existing degradation combined with ~~new~~ need for new land (population growth)
- new land explored for farming
  - ↳ new degradation

## Entry points for reducing existing land degradation and avoiding new land degradation:

- Land tenure plan → ① farmer → ② to choose land
- Information on good practices → ① farmer → ② to choose crops + practices
- Identify causes of degradation to develop targeted ② policy makes strategies for reducing LD → ③ to create new options
- Cost-benefit to understand what is the financial consequence of transformative project.
- Project implementers

Guiding questions:

① WHAT INFORMATION IS USED?

② WHO NEEDS THE INFORMATION?

③ WHAT IS THE INFORMATION USED FOR?

# 3.5 Data and Knowledge Infrastructure

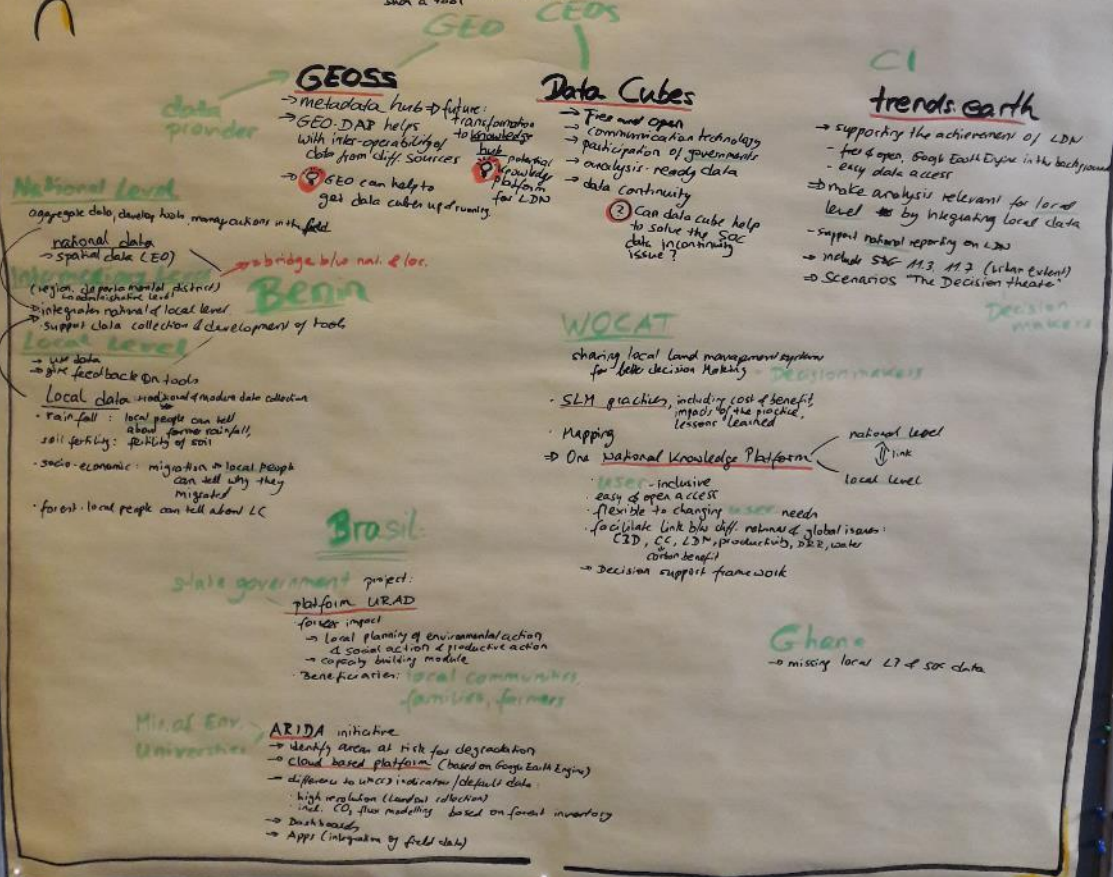
## Session 3: Data & Knowledge Infrastructure

What kind of data & knowledge infrastructure would support LDM processes on national & local level & decision making?

- ⇒ Different options for data infrastructure can build upon each other!
- ⇒ GEO/CEOS: goal to provide a solution that has value & increases the impact of satellite data
- ⇒ The user-friendlier a system is, the more costly it is (eg. WOCAT)
- ⇒ Which of the many available tool/platforms are the best for a specific situation?
- ⇒ Need local on-site efforts to collect data for scenario-building.

② ⇒ Which data layer should be added to trends.earth?  
 local SOC data  
 local LP data  
 real time degradation of forests

Benin Min. of Env. would provide resources for the development of such a tool



### GEOSS

- metadata hub → future transformation to knowledge hub
- GEO-DAP helps with inter-operability data from diff. sources
- GEO can help to get data cubes up running

### Data Cubes

- Free and open
- communication technology
- participation of governments
- analysis-ready data
- data continuity
- ② Can data cube help to solve the SOC data incontinuity issue?

### trends.earth

- supporting the achievement of LDM
- free & open, South East Europe in the background
- easy data access
- make analysis relevant for local level by integrating local data
- support national reporting on LDM
- include SDC 11.3, 11.2 (urban extent)
- Scenarios "The Decision theatre"

### National level

- aggregate data, classify, hold, manipulate with field
- national data → spatial data (EO)
- region, geospatial district, administrative level
- integrates national & local level
- support data collection & development of tool

### Local level

- use data
- give feedback on tools
- Local data: traditional & modern data collection
- rain-fall: local people can tell about farmer rain-fall, soil fertility: fertility of soil
- socio-economic: migration → local people can tell why they migrated
- forest: local people can tell about LC

### BRIN

→ bridge b/w nat. & loc.

### WOCAT

- sharing local land management system for better decision making
- SLM practices, including cost & benefit, inputs of the practice, lessons learned
- Mapping
- One National Knowledge Platform
- national level
- link
- local level
- inclusive
- easy of open access
- flexible to changing user needs
- facilitate link b/w diff. relevant global issues: CBD, CC, LDM, productivity, DRE, water carbon benefit
- decision support framework

### BRASIL

- state government project
- platform URAD
- forest impact
- local planning of environmental action & social action & productive action
- capacity building module
- Beneficiaries: local communities, families, farmers

### MIND OF ENV. UNIVERSITY

- ARIDA initiative
- identify areas at risk for degradation
- cloud-based platform (based on Google Earth Engine)
- difference to WOCAT indicators (default data):
  - high resolution (landsat reflections)
  - incl. CO<sub>2</sub> flux modelling based on forest inventory
- Dashboards
- Apps (integrated by field data)

### Ghana

→ missing local LT of SOC data



### 3.6 Recommendations and Follow-up Activities

#### RECOMMENDATIONS FROM SESSION 3

## Looking in to the future ①

### Tools to support planning & action

#### Recommendation / Workshop Results

**Activity 1: Looking into the future: planning for action**

What earth observation information would really help to reduce land degradation on the ground?

Earth observation data plays a critical role in identifying degraded areas, we live below the main data needs listed by participants in this activity.

Characteristics of the EO data:

- Time series data which is sensitive to detecting change.
- Need for higher temporal resolution, reaching in relevant close near real time monitoring and on demand.
- Need for higher spatial resolution data.
- Tailored to different ecosystems.
- Field data (expert opinion, observation and sensor data) which supports data collection and validation of remote sensing data.
- EO to inform investment on the ground.

Specific variables:

- Provide contextual information to facilitate interpretation of change in degradation processes, drivers and causes for example hotspot identification, forest cover and deforestation patterns, land use, land tenure, population density, water availability and quality.

Information about risks of land degradation an potential for restoration:

- Tracking information of crops, developments and yields.
- Effects of urbanisation.

What would an ideal tool look like to make EO information usable and used?

To make EO data usable by a broad range of users, a tool with the following characteristics would ideally be designed and implemented:

Functionalities:

- Useful for planning, implementation and reporting.
- Should have added value for users.
- Support contextual information (topography, crop growth, and surface water) to support interpretation.
- Should feed into a general database to aggregate information from all the users working in an area.
- Scenario planning to explore spatial interdependencies to maximize benefits beyond project area and evaluate impact of various (boundary conditions).
- Possibly applicable in various sectors (industry, agriculture, government) and on different expert levels.
- Should allow to predict scenarios, integrate multi-scale and multi-scale spatial information for LCA.

Technical side:

- Design process should be participatory and include different sectors, from national to the local communities using the natural resources making it politically neutral.
- Simple, clear, understandable, flexible, user-friendly with different levels of complexity for different users.
- Well documented and transparent.
- Open source and open data.
- Interoperability with other tools.
- Offline support.
- Leverage cloud computing resources.

Who would need to learn what and how?

All stakeholder groups need to improve on communication between stakeholder groups and understand each other's needs:

- Representatives need to learn how to share (project) case demands and communicate.
- Institutional arrangements.
- Partners need to investigate different data type types.
- Researchers working together.

To build and use the required system, involves knowledge system.

We need to think and operate outside project boundaries and keep the local goal in mind.

#### Comments & suggestions

Comment: every scale/level has/requires its appropriate indicator and it is not only a question of "zooming in" with the help of hi-res data


Interpretation  
Indigenous experiences and knowledge

IT WOULD BE USEFUL TO HAVE COMMON AGREEMENT ON A COMMON SPATIAL UNIT OF INTEREST (I.E. THE PIXEL?) TO WHICH WE COULD CORRELATE ANY SPATIALLY EXPLICIT DATA COLLECTED BY ANY INDIVIDUAL/AGENCY, & THEN BUILD THE VARIETY OF TOOLS/PRACTICES/APPROACHES THAT COUNTRIES OR ANY INSTITUTION OR RESEARCHER NEEDS TO ADDRESS SPECIFIC USER NEEDS.

continuity of tools and data

Should be harmonized system  
Or low bandwidth requirement.

LAN is not only about LD, but we need to put land restoration and pro-gradation processes → SLM



# RECOMMENDATIONS FROM SESSION 4

## Looking into the future ②

### Monitoring & reporting on LDN

### Recommendations/Workshop results


Recommendations from Session on Monitoring and Reporting at local to national data.

natural capital and

1. The final purpose of monitoring, reporting and evaluation is to support enhanced livelihoods at the local level; therefore there needs to be a feedback from data collection and interpretation to support adaptive land management. ●●●●●●●●
2. Monitoring, reporting and evaluation should be organized in a cross-sectoral integrated platform open to different types of stakeholders, with options for crowdsourcing information with built-in quality assessment and on the ground validation, where the government can source data required for reporting. ●●●●●●●●
3. Information on land potential and the wise use impacts of interventions is needed before planning LDN interventions, and realized impacts of interventions need to be monitored to document what works well where. ●●●●●●●●
4. The potential for international support to data reporting needs to be explored, to support continuity in data, leveraging in providing for data needs. ●●●●●●●●

(eg & EO)

### Comments & suggestions



Are we still talking about mapping?

→ Platform ⇒ opportunity to work share ideas through meetings/workshops  
 ⇒ Cloud based platform

→ AT NATIONAL LEVEL?

→ not clear. Too long ● (region)


→ and benefits

\* To harmonize national statistical indicators with SDG indicators  
 \* not understood the practice

→ what works well where should be assessed in prior (eg through mapping) (advantages of existing work)

**RECOMMENDATIONS FROM SESSION 5**

Looking into the future ③  
Data & Knowledge Infrastructure



Recommendations / Workshop Results

Comments & Suggestions

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**Group Spatial Data and Knowledge Information Infrastructure**

1. **SLM PLANNING.** Develop an interactive tool to provide land management actors location based <sup>quality assured</sup> <sup>best procedures</sup> advice on the most appropriate (from biophysical and socio-economic perspectives) Sustainable Land Management Interventions.

\* - specific

with estimates of potential inc in SOC + other co-benefits <sup>ie to contribute to LDM + other SDGs</sup> and estimates of GHGS

how are they different?

giz

2. **SLM KNOWLEDGE SHARING.** Develop a tool to upload, share and retrieve local knowledge and link this to remote sensing data

\* platform (not tool)

WE ALREADY HAVE THE TOOL/PLATFORM. IT'S CALLED THE INTERNET. THE CHALLENGE IS TO BETTER ORGANISE SEARCH FUNCTIONALITY WITH SEMANTIC SEARCH FUNCTIONS. ALL OF OUR AVAILABLE DATA & INFORMATION NEEDS TO BE READILY AVAILABLE TO AN INTERNET SEARCH WITH APPROPRIATE TAGS.

+ planning for LDM

\* utilize project MBE

+ pilot studies (pilot territories) to verify cube

\* comment: ensure ownership at country level!

don't data points

GeoSP

giz

3. **IN SITU DATA.** Develop a tool to facilitate the collection of in situ data (e.g. SOC and other land characteristics) for integration with remote sensing data and processing to meet project M&E and national reporting requirements

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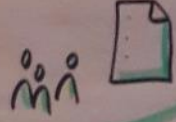
4. **DATA CONTINUITY.** Review the data continuity assumption which is underlying the GEO LDM Initiative data cube ambitions and develop appropriate action to ensure this in case of foreseeable data discontinuities

Revisar este redacción (no está muy claro)



IDEAS FOR CONCEPT NOTES

Ideas for GEO LON  
Concept Notes



KANAT SUCANALIEV

① Carrying capacity of pastures is a big problem in KYRGYZSTAN. It would be good if GEO would support the country on it.

- **PLANNING TOOL TO ASSESS LON IMPACT OF SLM** Socio-Economic + IAN INTER-VENTIONS

Dividing data for current needs (ex. water content in soil profile) and general information (Soil texture and so on)

You can also send more detailed ideas (1 pager) to ontje.hecht@giz.de within 1 week from now.

- Integrating crowdsourcing<sup>into the</sup> system - mobile apps for data collection or for local community data collection

Louis Evence - Momo ZAKARI

- Integration of in-situ data <sup>HARIFIDY</sup> - sensor - lab - observations - expert knowledge for soil and other data

- Evaluating Riparian lakes health for targetting SLM practices in the watershed, + other large basins in Africa

- Capacity development on EO for LON Documenting & Reporting (ERMIAS)

- Risk assessment for land degradation, including environmental risk, population pressure, economic aspects. → to be used for awareness raising & planning

Impact assessment of land use degradation **Arnaud EZINMEGNON**

- Development of a high resolution land-use map for Pakistan with an aim of identifying interventions to achieve LON targets (Munazza)

- LAND ASSESSMENT <sup>DATA</sup> INTER-OPERABILITY: WHAT NEEDS TO BE THE SAME SO THAT EVERYTHING ELSE CAN BE DIFFERENT

- TRACKING (AND ASSESSING IMPACT OF) RESTORATION PROJECTS IN ARID BRYCANDS (e.g. JORDAN, TUNISIA) SUB-COOPERATION AND CLAUDDO SAN

- Reconsider GEO working groups after this user consultation

# MY COMMENTS ON THE WORKSHOP

## My Comments on the Workshop



- Great workshop, but no excursion.)
- \* Great facilitator and able support technical team.
- \* Full of interaction and participation.
- \* 20 minutes walk was very helpful to keep participants activity after heavy lunch.
- \* Très bon atelier, mais la réflexion continue sur les besoins réels et données et informations
- \* Great facilitator & team. I like the conduct of workshop without powerpoints and focussing more on group work & discussion.

GREAT MEETING. REALLY WELL FACILITATED. WE KEPT THE FOCUS ON HIGHER LEVEL IDEAS, CRITERIA, & FEATURES. GREAT IDEAS CAME OUT, & WE NEED TO KEEP THE DIALOGUE GOING. THE ONLY SESSION THAT WASNT VERY USEFUL WERE THE TOOL PRESENTATIONS ON MORNING OF DAY 2

Best part was presentation from Brazil. Would have liked to hear similar from other countries.

A general overview of all available tools would have been useful  
Well organised workshop - well done!!

And what about further communication?  
Excelente participación de los asistentes y fue bueno el intercambio de conocimientos.



Together with our partners, we produce, gather, compile and serve quality-assured soil information at global, national and regional levels. We stimulate the use of this information to address global challenges through capacity building, awareness raising and direct cooperation with users and clients.

