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Delivering an enabling environment and multiple benefits for land degradation neutrality: Stakeholder perceptions and progress

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ABSTRACT

Achieving land degradation neutrality (LDN) was adopted by countries in 2015 as one of the targets of the global Sustainable Development Goals (SDGs). As LDN is a relatively new concept there is an increasing need for evidence on the potential socio-economic and environmental benefits of LDN as well as how an enabling environment for implementing LDN measures can be developed. This paper summarises the results from a global survey of LDN stakeholders, and a review of national progress in target setting that was commissioned by the United Nations Convention to Combat Desertification (UNCCD) in 2018. The study presents the perceptions of relevant stakeholders on the key components of an enabling environment for achieving and maintaining LDN (institutional, financial, policy/regulatory, and science-policy) as well as expectations of multiple benefits from its implementation. We also highlight key challenges and gaps in progress to date that are emerging from ongoing national target setting programs to implement LDN. The study finds that progress in implementing LDN has been widespread across countries. However there remains a lack of awareness of LDN and its key concepts along with high-level political buy-in. This may be impeding the integration of LDN into national development planning and budgeting processes where progress was assessed as limited. National capacities for securing land tenure and governance arrangements and integrated land use planning were perceived as comparatively low, further hampering the implementation of LDN. Despite these gaps, most stakeholders (> 90 %) who participated in the global survey expected LDN to deliver a broad range of multiple benefits for human wellbeing, livelihoods and the natural environment. We argue that greater efforts are needed to raise awareness of LDN, educate core stakeholders in its concepts, enablers and benefits, raise its political profile, and provide evidence on national measures that will support implementation of LDN.

1. Introduction

The Sustainable Development Goals (SDGs) adopted by the UN General Assembly in September 2015 include achieving land degradation neutrality (LDN) as one of the 169 targets (Target 15.3) (United Nations General Assembly, 2015). LDN aims to avoid further land degradation while balancing losses in land-based natural capital and associated ecosystem functions and services with measures that produce gains through sustainable land management (SLM) and restoration or rehabilitation measures (Cowie et al., 2018). The aim is to reverse

losses to lands' productivity, to sustain or to improve land-based natural capital and ecosystem services over the long-term for the benefit of human wellbeing and livelihoods.

Progress towards LDN requires the existence of an enabling environment to help LDN measures to be successfully developed, implemented, executed and monitored. In this context, an enabling environment can be thought of as the combination of contextual elements allowing progress to be made towards a clearly defined goal (Akhtar-Schuster et al., 2011). It includes the collaboration of science and policy as well as other relevant stakeholders, the consideration of multifarious

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demands and values existing in society, the availability of financial means, stable institutional arrangements and responsible and purposeful land governance (Verburg et al., 2019).

While LDN is a relatively new concept, there is emerging international experience in operationalising it at the national level in both developed and developing countries. Since 2015, the UNCCD secretariat and the Global Mechanism of the UNCCD have supported a total of 122 countries (as of late 2019) through the LDN Target Setting Programme which aids nations in the definition of baselines, targets and associated measures to achieve LDN by 2030¹. An emerging expert literature (Chasek et al., 2019; Wunder and Bodle, 2019; Okpara et al., 2019; Bodle, 2018; Akhtar-Schuster et al., 2017; Cowie et al., 2019; Kust et al., 2018; Von Maltitz et al., 2019; Solomun et al., 2018; Speranza et al., 2019; Herrick et al., 2019) highlights a range of challenges to the implementation of interventions to attain LDN, including a lack of political will and leadership often due to limited insight into the concept of LDN and its cross-sectoral benefits, inadequate targets, rules and guidelines, land tenure insecurity, disregard for integrative approaches required for SLM, and a lack of earmarked funds as well as other resources, all related to an enabling environment for LDN. In the context of the 17 SDGs, another key challenge relates to the interlinkages between LDN and other targets and the need to understand and manage these interrelationships.

Building upon efforts to date, there is an increasing need for evidence on elements of an enabling environment to support policy makers, subnational decision makers and practitioners to implement and to maintain LDN. Understanding the perceptions and expectations of practitioners and other stakeholders regarding the enabling environment for LDN, progress and challenges to date, and the potential multiple benefits and trade-offs can help to accelerate implementation. The aim of this paper is to summarise the results of a study commissioned by the UNCCD Science-Policy Interface (SPI) in 2018 to determine what are considered the main elements of an enabling environment for LDN as well as the potential for LDN to contribute to enhancing well-being, livelihoods and the sustainable use of the natural environment and to provide evidence on what and how national measures will support implementation of LDN. The analysis is based on a global survey of LDN stakeholders and a review of national LDN Target Setting Programme (TSP) reports from a wide selection of countries. First we introduce the methodological approach for the study, followed by a brief presentation and discussion of the results and finally some concluding remarks.

2. Methodology

2.1. Key components of an enabling environment for LDN

For the purposes of this study, the enabling environment was defined as comprising four key dimensions and 15 enablers (Table 1) based upon a review of the available academic and grey literature relating to LDN (Supplementary Table 1) and consultation amongst experts, particularly in the field and from the UNCCD SPI. A selection was made of those components of the enabling environment judged of importance for LDN, and these enablers were used as a framework of criteria to provide structure for the subsequent analysis.

The *institutional* enabling environment for LDN is complex, involving the interplay between a range of stakeholders (Enemark, 2012). Each stakeholder plays a unique role in achieving LDN and often has different objectives, approaches, values, institutions and rules (Akhtar-Schuster et al., 2011; Pierce et al., 2005). It is therefore consistently indicated that LDN needs a national political commitment at the highest level, and that effective mechanisms are put in place to drive coordination, collaboration and engagement. Institutional capabilities are also needed in policy coordination and planning, stakeholder

engagement and implementation, enforcement and progress monitoring.

Establishing an effective *financial* enabling environment includes adequate assessment of financial resource requirements, identification of sources of finance, and securing and allocating finance or setting in place instruments and mechanisms to incentivize the allocation of financial resources towards LDN (Akhtar-Schuster et al., 2011; Chasek et al., 2019).

For effective implementation, LDN needs to be integrated into the land administration and planning system in each country as defined by its *policy and regulatory* enabling environment. This includes governance provisions for securing land tenure and equal access to land, which is a building block not only for LDN, but also for broader economic and social objectives such as the eradication of poverty and hunger (Food and Agriculture Organization of the United Nations, 2012; Higgins et al., 2018; Holden and Ghebru, 2016).

LDN implementation also requires that associated policy procedures in day-to-day operations are in place to enforce, monitor, and verify the impacts of national policies (Chasek et al., 2015). Central to this is integrated land use planning, which seeks to balance economic, social and cultural opportunities provided by the land with the need to maintain and enhance ecosystem services provided by land-based natural capital (Orr et al., 2017). In the context of LDN, a key component of this is a 'neutrality mechanism' which assists land users, land-use planners and decision makers with counterbalancing losses with equivalent (or greater) gains (Chasek et al., 2019; Cowie et al., 2018).

Finally, an effective *science policy interface* includes the establishment of a scientifically sound monitoring system and data infrastructure, technical capacities and tools to support assessment of land degradation as well as progress in LDN implementation, the evaluation of economic, social and environmental benefits and trade-offs associated with achieving LDN, and the effective collation and translation of scientific knowledge to policy-makers, planners and other relevant stakeholders (Akhtar-Schuster et al., 2011; Chasek et al., 2019; Cowie et al., 2018; Orr et al., 2017). In the context of this study, the focus is on enabling the uptake of science in policy-making at the national level where systematic obstacles exist including the lack of scientific understanding of policy makers, limited dissemination of research, lack of incentives, and lack of institutional channels (Jones et al., 2009, 2008). Given the centrality of science to achieving LDN, we include this as a separate dimension, which incorporates key features set out in the LDN scientific conceptual framework such as the national data and monitoring systems and preliminary assessments (Orr et al., 2017).

2.2. Systematic review of national TSP reports

The objective of the review of national TSP reports was to provide an assessment of national progress and challenges in implementing an enabling environment for LDN, as well as approaches to addressing multiple benefits. The framework of four dimensions and 15 enablers in Table 1 provided the criteria for a systematic evaluation.

A total of 30 national TSP reports were reviewed (Supplementary Table 2). The selection of national reports was undertaken to ensure balance across the five UNCCD Regional Implementation Annexes, as well as balance within regions in terms of covering diversity in the level of development of each country and sub-regional differences. To ensure inter-regional balance, where available, a minimum of six countries were selected from each region². To ensure intra-regional balance and a common reference base, the Human Development Index (HDI) (UNDP, 2017) was used as a proxy, with country selection including a spectrum of HDI values ranging from the lowest to highest. Reports were

² In the case of the Northern Mediterranean region, only 2 country reports were available. As such, an additional country from each of the other four regions was selected to reach a total of 30 reports.

¹ <https://www.unccd.int/actions/ldn-target-setting-programme>

Table 1
Four dimensions and 15 enablers of the LDN enabling environment.

Dimension	Enablers (Criteria)
1. Institutional	1.1 National political commitment and agenda: high-level commitment; clear priorities and targets set; targets mainstreamed into NAP and National Development Plan 1.2 Coordination: lead national agency responsible for LDN and integrated land-use planning; mechanisms in place for horizontal and vertical coordination 1.3 Multi-stakeholder consultation: inclusion of civil society and other stakeholders; participatory process 1.4 Institutional capacities: in planning, policy development, monitoring, enforcement
2. Financial	2.1 Finance and budgeting needs assessment or costings identified for LDN implementation (e.g. operational, monitoring, evaluation etc.) 2.2 Identified sources of finance: instruments, mechanisms described or identified; earmarked funds in budget; additional sources of finance
3. Policy/ regulatory	3.1 Land tenure considered: user rights; access rights; control rights; transfer rights and tenure security 3.2 Integrated land-use planning system considered 3.3 Neutrality mechanism to counterbalance losses and gains discussed or proposed; consideration of avoid, reduce, reverse hierarchy 3.4 Regulations and rules around LDN considered: policies, procedures, incentives 3.5 Policy coherence: policy alignment; consideration of synergies/ trade-offs (e.g. synergistic policies operationalised at the same time by different ministries and their subsidiary bodies)
4. Science-Policy interface	4.1 Effectiveness of data and monitoring systems considered; consideration of 3 global indicators (land cover, land productivity and soil organic carbon) 4.2 Consideration of technical capacities in the country for LDN target setting and implementation, including capacity building 4.3 Consideration of information on causes/effects of land degradation and LDN - ecological, social, economic (or information to conduct preparatory assessments) 4.4 Information on multiple benefits of SLM and LDN considered (e.g. biodiversity, climate, livelihoods etc.)

reviewed in English, French, Spanish and Russian by a task team of the SPI and the UNCCD secretariat.

A rating scale and scoring template were developed to provide a consistent approach for evaluating the reports across each of the criteria. The rating scale adopted a simple scoring approach (Supplementary Table 3). Reviewers were asked to use this rating scale to evaluate the evidence of an enabling environment for LDN contained in the TSP reports, documenting their analysis in a standard reporting template.

2.3. LDN global stakeholder survey

The survey was designed to collect information in two key areas: firstly, regarding what is needed to achieve and maintain LDN in terms of policies, enablers, incentives, and support; and secondly, how LDN initiatives contribute to achieving multiple benefits in terms of environmental objectives as well as improving human well-being and livelihoods. The survey questions were developed with advice from experts in the field including members of the UNCCD SPI through several rounds of consultations. The majority of the questions adopted either Likert-scales or rating-scales to collect responses.

The survey was implemented as an online survey and circulated to practitioners and experts involved in the LDN TSP and associated activities in mid-November 2018. The survey was delivered via SurveyMonkey and comprised a maximum of 25 questions (Supplementary Annex 1). Question logic was used to determine the final set of questions viewed by respondents, based on their affiliation or function (i.e. national focal point (NFP), national consultant, regional consultant, researcher/scientist, Civil Society Organisation (CSO), Intergovernmental Organisation (IGO), business). As a result, the number of questions varied between 11 and 25, depending on the function of the respondent.

2.4. Integration of results

The final stage of the study triangulated results from the review of TSP reports and the online survey to evaluate overall progress and potential gaps, priority challenges moving forward with LDN implementation and key messages. This was again structured using the framework of 15 enablers of the LDN enabling environment (Table 1). To identify higher priority gaps/challenges, each of the enablers was

reviewed in terms of the ranking of its perceived importance as well as progress made. Priority gaps were considered to be those where an enabler was perceived to be of high importance for the enabling environment for LDN and where progress was limited (Supplementary Fig. 1).

The *importance* of each enabler was rated as high, moderate, or low based on the results from the stakeholder survey, in particular questions relating to perceptions around important measures or priority challenges for implementing LDN. Enablers that were in the top-third of rankings or scores were considered of comparatively high importance, those in the middle third were considered of moderate importance, and those in the bottom third were considered of comparatively lower importance.

The *progress* made on each enabler was rated as good, moderate, or limited based on both the results from the TSP review as well as the stakeholder survey. For the results from the TSP review, a rating of good progress aligned with an average score of equal = > 3, moderate progress as = 2 < 3, and limited progress as < 2. In addition, the perceptions from the survey relating to progress made or existing capacities for specific activities were also factored into the analysis and ratings were adjusted accordingly.

3. Results

3.1. Results from the systematic review of national TSP reports

Fig. 1 summarises the results from the review of national TSP reports, presenting the mode and average scores (out of a maximum of four) for each of the 15 enablers/criteria across all 30 reports reviewed.

Based on the average scores, there was greater progress in terms of the institutional enabling environment than other enablers, in particular in establishing the national political commitment and agenda (including target setting) (criterion 1.1), coordination mechanisms (1.2), and stakeholder consultation (1.3). Other enablers that scored relatively high included regulations and rules around LDN (3.4), policy coherence and alignment (3.5), data and monitoring systems (4.1) and consideration of causes and effects or drivers of LDN (2.4).

Key gaps were evident in terms of establishing financing needs and costings (2.1), consideration of land tenure/rights (3.1), integrated land use planning (3.2) and establishing or embedding a neutrality mechanism (1.2).

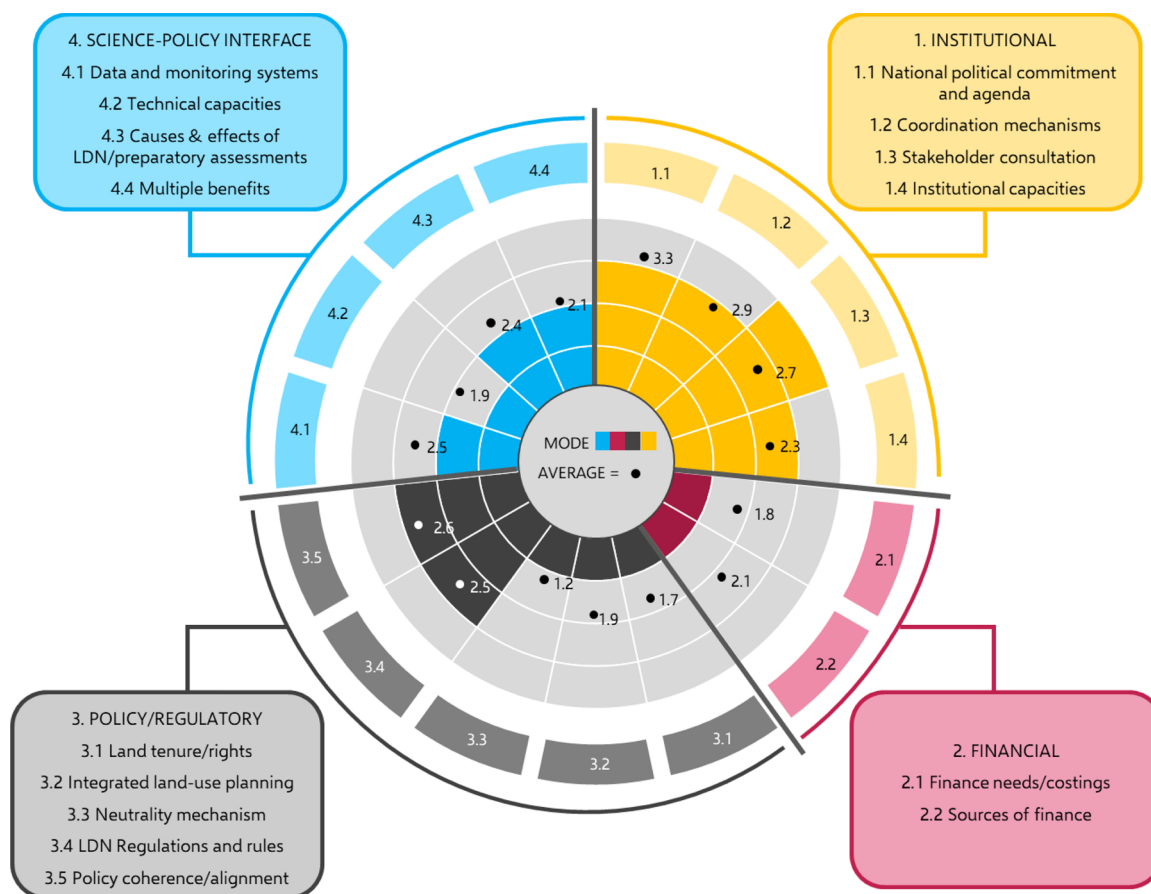


Fig. 1. Summary of results from the review of 30 TSP reports: mode and average scores for each criterion. Results are presented based on the four dimensions and 15 criteria developed for evaluating the enabling environment for LDN (Table 1). Numbers in the outer ring represent criteria numbers, as listed in the associated text boxes. The results from the scoring across all 30 reports are presented as mode values (coloured bars) and average values (dots with numbers). Scores are out of a maximum of four points across all reports reviewed. Scores can be interpreted as follows: 4 = ‘Completed or Achieved’; 3 = ‘On Track’; 2 = ‘Some Advancement’; 1 = ‘Off Track’ or ‘Insufficient Information’.

When mode values are substituted for averages, the results highlight that a greater number of countries had *individually* made good progress (scores 3 or 4) on the institutional enabling dimension (1.1–1.4) as well as on regulations and rules around LDN (3.4) and consideration of policy coherence and alignment (3.5). Overall, stakeholder consultation had the highest mode value (mode = 4/4). Enablers lagging furthest behind in terms of individual country progress correspond to the financial dimension (2.1 and 2.2), some elements of the policy/regulatory environment (3.1 land tenure, 3.2 integrated land-use planning, and 3.3 neutrality mechanism), as well as national technical capacities for LDN assessments and implementation (4.2).

Averages for each of the four enabling dimensions were also aggregated across all regions as well as for each of the five regions (Fig. 2). In most regions (except for Northern Mediterranean), greater progress was evident in the institutional dimension compared with other dimensions. Progress on the science-policy interface dimension was higher in the Northern Mediterranean (NM) and Latin America and Caribbean (LAC) regions, while progress on the financial dimensions was higher for NM and Central Eastern Europe (CEE). Overall progress was most limited in the financial dimension, particularly Africa and LAC, while progress on the policy/regulatory environment also lagged behind, particularly in NM, CEE and Africa.

3.2. Results from the LDN online survey

The complete results from the survey across all questions are provided the Supplementary Annex 2. A subset of the results is presented

here. A total of 353 responses to the survey were received with good coverage and balance in terms of the affiliation, expertise and geographic distribution.

With regard to their function, respondents comprised three relatively balanced groups: National Focal Points (NFPs) of the UNCCD or consultants engaged in supporting national LDN target setting (35 %), researchers/scientists (35 %), and CSOs/IGOs or private sector (30 %). The most common areas of expertise were land degradation (62 %) and environmental management (56 %), with a relatively small proportion having expertise in economics (7%) or social sciences (13 %). Close to 50 % of respondents indicated that they had been involved in the implementation of an LDN initiative in a specific country or countries across all five of the UNCCD regional groupings. A total of 61 % of respondents indicated that they had participated in the LDN TSP.

Respondents were asked to rank the three most important policies, procedures and incentives that can help implementation of measures to avoid, reduce and reverse land degradation. Based on a selection of ten potential options, those with the highest rankings were ‘a common national long-term vision and commitment to LDN’ (35 % ranked in first place), ‘a national budget for LDN’ (18 % ranked in first place), and ‘secured land tenure and access to land’ (12 % ranked in first place) (Fig. 3a). These three measures also ranked the highest based on their relative weighted averages calculated across all three rankings, with ‘a common national long-term vision and commitment to LDN’ identified as a clear overall priority by respondents (Supplementary Annex 2, Figure 13b).

The sensitivity of the results to the type of respondent were also

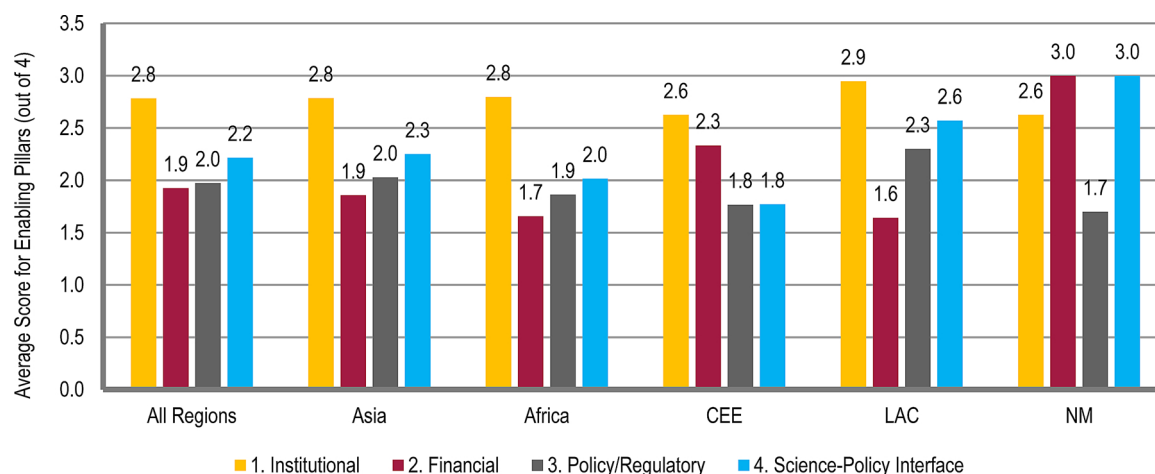


Fig. 2. Average scores for enabling dimensions across all countries reviewed, by region (score out of a maximum of four). CEE = Central Eastern Europe; LAC = Latin America and Caribbean; NM = Northern Mediterranean.

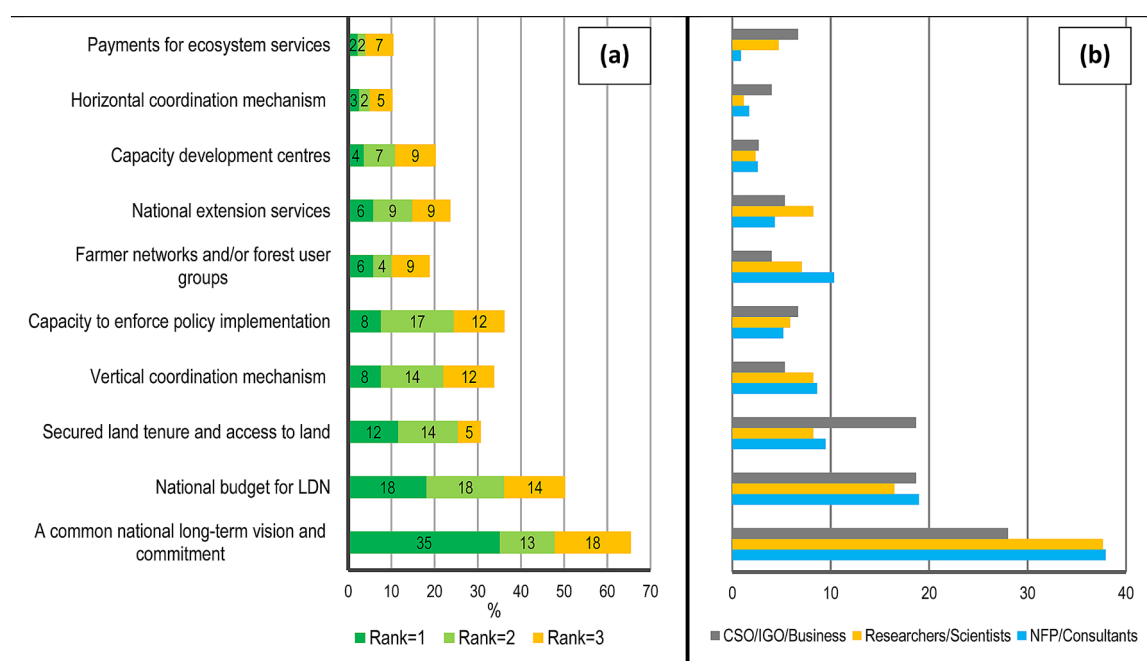


Fig. 3. Results from the survey: perceptions of the most important policies, procedures and incentives that can help implement land degradation neutrality: (a) % of respondents in each rank; (b) the most important (i.e. rank = 1) policy, procedure or incentive that can help implement LDN, by respondent type³ (n = 204).

analysed to highlight differences in priorities. Fig. 3b shows the differences in the top-ranked (i.e. rank = 1) most important measure for implementing LDN across three stakeholder groupings. This highlights a high degree of consistency across the three groups, however some variation can be seen for specific measures. For example, the CSO/IGO/business grouping gave a stronger preference for secured land tenure and access to land than the other groups.

Respondents were also asked to rank the five most important challenges to the implementation of LDN moving forward. Based on a selection of 11 potential options, those that were ranked the highest were ‘insufficient awareness of LDN and understanding of concepts’ (24 % ranked in first place), ‘insufficient finance’ (16 % ranked in first place), and ‘insufficient high-level commitment to LDN’ (13 % ranked in first place) (Fig. 4a).

A high degree of consistency across the three stakeholder groups can again be seen (Fig. 4b). However, some variations are evident, for example the researchers/scientists grouping gave a lower priority to insufficient finance compared with the other groups, while NFPs/

consultants gave a higher priority to insufficient LDN implementation guidance.

3.2.1. Perceptions on the enabling environment for LDN

In terms of securing a national political commitment to LDN, 45 % of respondents indicated that LDN was considered of ‘high importance’ to the national government and politicians, while 35 % indicated that it was of ‘some importance’, and 16 % that it was of ‘low or no importance’ (Supplementary Annex 2, Figure 6). Respondents also confirmed considerable progress in national LDN target-setting, with 50 % of respondents indicating that targets had been adopted or that the process was underway, and a further 27 % indicating that they intended to adopt targets but that the process was yet to commence (Supplementary Annex 2, Figure 7a).

When asked to rate national capacity to complete LDN-related

³ CSO = civil society organisation; IGO = intergovernmental organisation; NFP = national focal point.

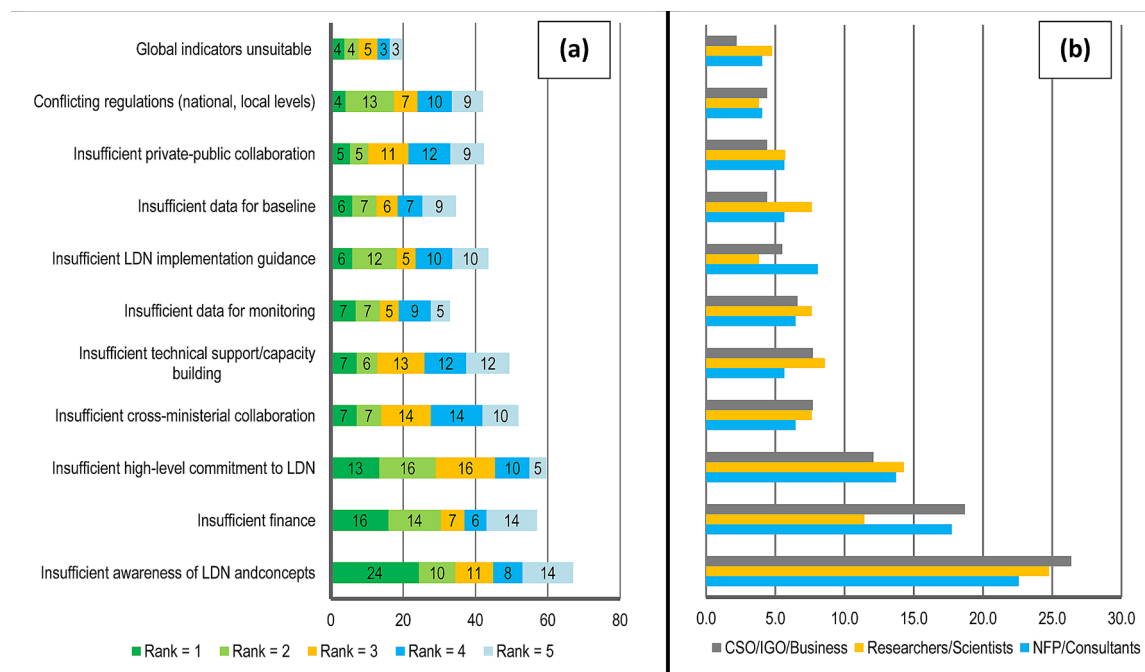


Fig. 4. The five most important challenges to implementation of LDN moving forward: (a) % of respondents in each rank; (b) the most important (i.e. rank = 1) challenge to LDN implementation moving forward, by respondent type⁴ (n = 190).

activities, respondents rated their capacity for LDN target setting and alignment with policy frameworks and plans as fair-to-good (based on a weighted average score 3.3 out of 5, on a scale of 'very poor = 1' to 'fair = 3' to 'very good = 5') (Supplementary Annex 2, Figure 8b). National capacity to undertake stakeholder consultation was rated slightly higher (average of 3.4 out of 5), while national capacity to solve land conflicts and secure land tenure arrangements was rated the lowest out of nine available options (average of 3 out of 5, or 'fair'). Almost one-third (32 %) of respondents rated their national capacity for this activity as poor or very poor.

In terms of the sources of finance, 'national government budgets' received the most top rankings (27 % ranked in first place), followed by the Global Environment Facility (GEF) (24 % ranked in first place) and the UNCCD Global Mechanism (14 % ranked in first place) (Supplementary Annex 2, Figure 19a). When asked if their country had secured finance for LDN as yet, only 16 % of respondents indicated that being the case.

The implementation of operational or advanced integrated land-use planning systems was quite limited in countries (22 % of respondents, Figure 25-SI). Overall, 8 % of respondents indicated that their country had no integrated land use planning at all, while 34 % indicated that they used land use planning, but that it was not fully integrated. Integrated land use planning was defined as land use planning that seeks to balance the economic, social and cultural opportunities provided by land with the need to maintain and enhance ecosystem services provided by the land-based natural capital.

Only 8 % of respondents reported that a neutrality mechanism had been fully embedded into their land-use planning system, while 34 % reported that such a mechanism had not been embedded (Supplementary Annex 2, Figure 9). Almost half of respondents reported that a mechanism was 'somewhat embedded', while 10 % of respondents didn't know.

A total of 64 % of respondents reported that they had national data systems in place to support land-use planning. However, approximately

half of these respondents (49 %) indicated that their national data systems were rated 'fair' in terms of providing the information necessary to determine land potential and assess land condition, while a further 11 % rated them as 'ineffective' or 'very ineffective' (Supplementary Annex 2, Figure 16).

With regard to the three global indicators for monitoring LDN, the vast majority of respondents (88 %) reported that their country will make use of land cover change, while 73 % reported that they would use net primary productivity, and 68 % would use soil organic carbon stocks. Progress on setting baseline values for each of the three global indicators was also relatively advanced, where 70 % of respondents had set a baseline value for land cover change, 55 % for net primary productivity, and 53 % for soil organic carbon (Supplementary Annex 2, Figure 18).

Overall, respondents rated their national capacity to set baseline values for LDN indicators and track progress as relatively low compared to other options (average seventh from nine options) (Supplementary Annex 2, Figure 8b). National capacity to undertake target setting and alignment with policy frameworks was rated slightly better (average fifth out of nine options). Technical activities with low levels of capacity included 'resilience assessment' (31 % rated as 'poor' or 'very poor') and 'economic and social assessment' (26 % rated as 'poor' or 'very poor') (Supplementary Annex 2, Figure 8c).

Respondents reported higher completion or commencement rates for land condition and degradation assessments (18 % completed, 45 % underway), and the lowest levels for resilience assessments (5 % completed, 27 % underway) (Supplementary Annex 2, Figure 12a).

3.2.2. Perceptions on multiple benefits of LDN and SLM

Respondents ranked the 'full and effective participation from local communities and stakeholders' as the most important factor for ensuring that social co-benefits are maximised in LDN initiatives (Supplementary Annex 2, Figure 24a). Approximately 42 % of respondents ranked this measure as the most important element.

The vast majority of respondents either strongly agreed (59 %) or agreed (32 %) that they were expecting positive effects on human well-being and livelihoods as a result of SLM and LDN (Supplementary Annex 2, Figure 21a). A majority of respondents also indicated that they

⁴ CSO = civil society organisation; IGO = intergovernmental organisation; NFP = national focal point.

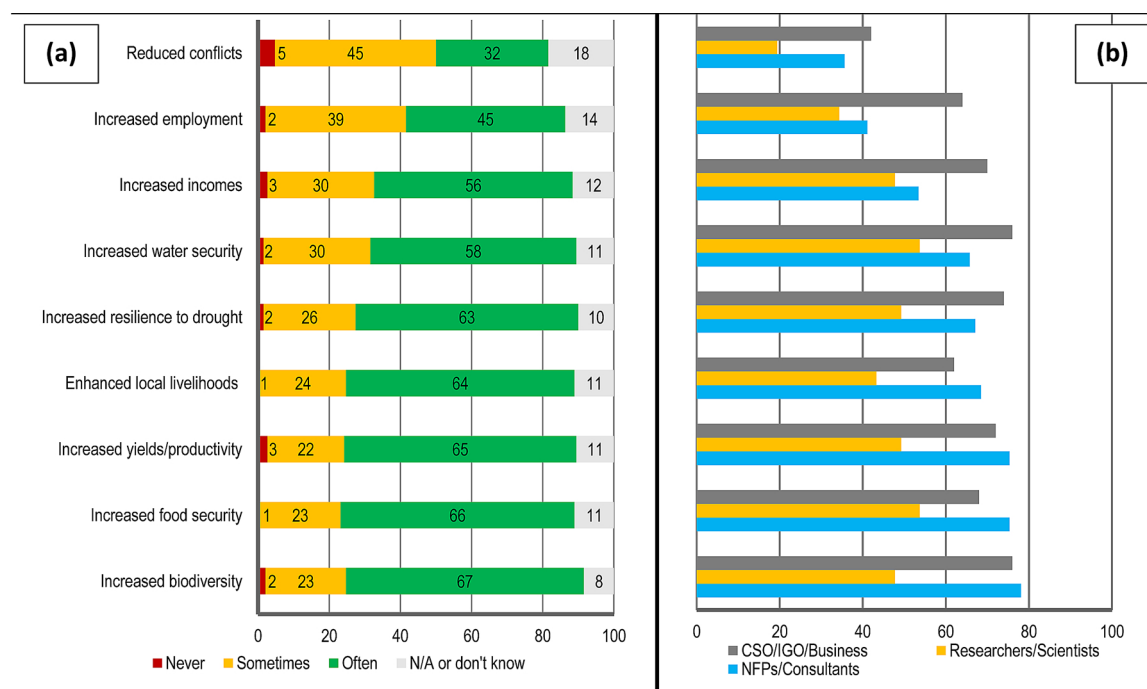


Fig. 5. Perceptions of multiple benefits expected from LDN implementation: (a) % of respondents (b) Multiple benefits expected 'often' from LDN implementation, by respondent group (% of responses for each benefit rated as 'often' by each group)⁵ (n = 190).

strongly agreed (28 %) or agreed (41 %) that consideration of multiple benefits makes planning for LDN easier. However, less than half of respondents agreed or strongly agreed that it was clear how to manage trade-offs associated with LDN initiatives.

Respondents reported that a range of multiple benefits were expected from LDN implementation (Fig. 5a). The multiple benefits expected most often on average were increased biodiversity, increased food security, enhanced local livelihoods, increased yields/productivity, and increased resilience to drought (Supplementary Annex 2, Figure 22b).

The sensitivity of these results to the type of respondent were also analysed to highlight differences in expectations regarding multiple benefits from LDN. Fig. 5b shows the differences in perceptions across three different stakeholder groupings regarding multiple benefits that are expected 'often'. The most obvious difference can be seen in the researchers/scientists grouping, where values are consistently below the other two groups. This highlights that this group is expecting multiple benefits less often than other groupings.

In terms of the monitoring of multiple benefits, the survey results highlight considerable gaps in the availability of quality data (Supplementary Annex 2, Figure 23a). Areas with absent or particularly poor data quality included resilience (56 % not monitored or data quality is poor), soil organic carbon (56 %), and gender equality (45 %).

3.3. Integration and triangulation of results from the TSP review and global survey

Table 2 provides a brief synthesis and triangulation of results from the TSP review and the stakeholder survey. A more comprehensive analysis is in Supplementary Table 4. The analysis is structured around the 15 enablers that were used to define the enabling environment for LDN and adopted the framework defined in the methods (Section 2.4 and Supplementary Fig. 1). An enabler was evaluated as a priority gap

when it was perceived to be of high importance and where limited progress had been made. This included finance, land tenure and user arrangements, integrated land-use planning, and neutrality mechanisms for counterbalancing gains and losses.

4. Discussion

The study results represent stakeholder perceptions on the key components of an enabling environment for LDN and highlight key challenges and gaps in progress to date, and are discussed briefly here across the four dimensions of the LDN enabling environment.

4.1. Institutional enabling environment

A common national long-term vision and high-level commitment was perceived by stakeholders as comparatively more important than any other measure (ranked 1st out of 10 measures). Overall, good progress has been made on target-setting at the national level (50 % adopted or underway and 27 % intended), however gaps remain in terms of mainstreaming targets into national development plans (only 12 % mainstreamed into national development plans, and 18 % into National Action Plans). While this reflects that a political commitment has been made to LDN in most cases, the TSP reports show that these commitments are sectoral, primarily made by environment or agriculture ministries.

This was also supported by the survey results, where LDN was not considered to be a top policy priority for most countries (51 % rated it of low or some importance). This may stem from a lack of awareness of LDN and its concepts, which was ranked as the top priority challenge for LDN implementation moving forward. While progress has been made on setting LDN targets through the TSP, our results also suggest that high level political buy-in for LDN will be a fundamental enabler for national implementation, and it remains lacking at present. Advancements made in integrating LDN into national planning may also be undermined by weak monitoring and enforcement capabilities.

⁵ CSO = civil society organisation; IGO = intergovernmental organisation; NFP = national focal point.

Table 2

Priority gaps in the enabling environment for LDN: summary of the triangulation of results from the TSP review and LDN survey.

Dimension	Enabler	Importance	Progress & Capacity
1. Institutional	1.1 National political commitment and target-setting	High	Good
	1.2 Institutional Coordination – lead agency; horizontal; vertical	Moderate	Good
	1.3 Multi-stakeholder consultation	Moderate	Good
	1.4 Institutional capacities	Moderate	Moderate
2. Financial	2.1 Finance needs assessment or costings	Moderate	Limited
	2.2 Sources of finance	High	Limited
3. Policy/ regulatory	3.1 Land tenure/user rights	High	Limited
	3.2 Integrated land-use planning system	High	Limited
	3.3 Neutrality mechanism to counterbalance losses and gains	High	Limited
	3.4 Regulations and rules around LDN	Moderate	Good
	3.5 Policy coherence	Moderate	Good
4. Science-Policy interface	4.1 Effectiveness of data and monitoring systems	High	Good
	4.2 Technical capacities for LDN target setting and implementation	Moderate	Moderate
	4.3 Information on causes/effects of land degradation -completion of preparatory assessments	High	Moderate
	4.4 Information on multiple benefits	High	Moderate

4.2. Financial enabling environment

The study results show that finance is essential for implementing LDN initiatives, however limited progress has been made both in assessing needs as well as identifying and tapping into potential sources. Insufficient finance ranked as a high priority challenge to LDN moving forward (ranked 3rd out of 11 challenges), while a national budget for LDN was seen both as an important measure for addressing land degradation (ranked 2nd out of 10 measures) and as the most important source of finance for LDN (ranked 1st out of nine sources). Despite the perceived importance, few countries have secured necessary finance to date (only 16 % of respondents indicating that aspect being fulfilled). The TSP reports evidence that some countries see potential synergies between existing environment or climate finance opportunities and LDN. However, very limited progress had been made to understand the financial needs and costs associated with LDN interventions, or to allocate resources for implementation. In terms of regional progress, the NM regional grouping (Italy and Turkey) had made considerably more progress than other regions in this enabler (Fig. 2), which could reflect their status as high or upper-middle income countries and higher HDI scores.

The results show that a priority next step would be supporting countries to assess the financial requirements for LDN in the medium-to long-term (operational, monitoring, enforcement) and to develop national financial plans or integrated financing strategies linking to sources of finance including national budgets, investment instruments and potential partners (global funds, private sector, bilateral donors, CSOs, and philanthropy).

4.3. Policy/regulatory enabling environment

Based on the survey results, secured land tenure and access to land was ranked as one of the top three most important elements for supporting LDN implementation (3rd out of 10 measures), while national capacity to secure land tenure was rated the lowest from nine available options. The few TSP reports that addressed land tenure identified it as a weakness or barrier to SLM, or as a cause of land degradation.

The survey results highlight that the evaluation of environmental, economic, and social trade-offs was seen as important for maximising multiple benefits from LDN (ranked 2nd from seven options), however capacity to manage these conflicting interests was ranked lowest out of nine options. This may be due to the limited adoption of effective integrated land-use planning systems, with only 22 % of respondents describing their systems as either advanced or operational. Only 8% of respondents to the survey reported that a neutrality mechanism had

been effectively embedded into their land-use planning system, highlighting that progress on this measure has been very limited to date.

4.4. Science-policy interface

Overall, good progress was evident in terms of setting national baselines on global and national indicators for monitoring progress on LDN, with most countries setting clear baselines for the three global indicators (70 % with baseline for land cover, 55 % for land productivity dynamics, and 53 % for soil organic carbon). However, the TSP reports revealed that in most cases this assessment was based solely on global data provided by UNCCD, or a combination of national and global data. The broad reliance on global data and external technical assistance for setting national baselines may suggest that national monitoring capabilities for tracking progress on the LDN indicators as well as national data systems are quite limited. The survey results support this with respondents rating their national capacity (on average) to set baselines and track progress as ‘fair’.

An important finding from the survey was that ‘insufficient awareness of LDN and understanding of key concepts’ ranked as the top priority challenge moving forward with LDN implementation. The study result suggests that, while a robust scientific conceptual framework has been developed to support implementation of LDN, this is yet to be widely understood and applied at the national level. This finding aligns with other studies that show a lack of understanding of LDN amongst policy makers and planners prevents effective policy responses and allocation of resources (Chasek et al., 2019). Previous research also highlights that some of the major challenges to incorporating scientific knowledge into policy include low levels of scientific understanding by policy makers, limited openness of politicians to using this information, limited dissemination of research findings, and lack of incentives and institutional channels (Jones et al., 2009, 2008).

Overall, the results highlight that while baseline data to support decision making on LDN has advanced considerably, a priority moving forward will be the effective use of this data to inform and influence policy change and to drive national investment in achieving LDN. While establishing baselines and trends is an important initial step and good progress has been made in most countries, evidence-based assessments are also needed that analyse the costs, benefits and trade-offs of addressing land degradation, and mechanisms for introducing this evidence into the political, cultural and social debate. Although methods for undertaking such assessments are outlined in the LDN scientific conceptual framework, few operational implementations have occurred to date. Integrated national multi-disciplinary assessments addressing economic, social and environmental benefits and trade-offs associated

with LDN —co-designed with decision makers— would provide a means to understand the interconnections between environment and development issues in order to develop and implement informed, cost-effective and socially acceptable policies or practices. This requires strengthening not only the scientific and research capabilities within countries, but also improvements in the way that scientific information is constructed, integrated and communicated so that it can contribute more effectively and efficiently to policy formulation. In this context, lessons could be learned from recent experience in improving health policy outcomes associated with the production of evidence by means of participatory research models, which incorporate stakeholders into the design (mapping), evaluation (analysis), communication (visualisation and sharing) and implementation phases of research (Horton and Brown, 2018). Lessons could also be drawn from countries with greater progress on the science-policy interface enabler identified through the review of TSP reports. This included countries in the NM and LAC regional groupings (Fig. 2) such as Turkey, Italy, Guyana, Colombia and Bolivia.

4.5. Multiple benefits of achieving LDN for human well-being, sustainable livelihoods and the environment

Overall, synergies and multiple benefits associated with LDN were considered in most of the TSP reports reviewed, however these tended to focus on environmental linkages such as to the Rio Conventions on biodiversity and climate change. Fewer reports mentioned multiple benefits associated with socioeconomic or well-being outcomes. Some reports included more detailed analysis of multiple benefits in the form of a LDN leverage plan. Common recommendations for leveraging multiple benefits included mainstreaming of LDN targets into national sustainable development plans or relevant sectoral plans (primarily plans for combatting land degradation, biodiversity loss, or land-based mitigation or adaptation to climate change), incorporating LDN outcomes into existing programs funded through GEF or with climate finance, as well as greater engagement of central planning and finance ministries, land users and stakeholders.

These results align well with responses to the survey. Over 90 % of respondents either agreed or strongly agreed that they were expecting positive effects on human well-being and livelihoods as a result of SLM and LDN. Respondents ranked the three most important elements for ensuring that social co-benefits are maximised in LDN initiatives as the ‘full and effective participation from local communities and stakeholders’, ‘evaluation of environmental, economic and social trade-offs’, and the ‘identification of livelihood needs and prioritisation of livelihood outcomes in program design’. This aligns well with previous studies that concluded that effective project design and engagement of local communities are critical for identifying and addressing trade-offs and maximising multiple benefits (Bullock et al., 2011; Lamb et al., 2005; Stanturf et al., 2014; Budiharta et al., 2016).

5. Conclusions

This research finds that while the central role of an enabling environment for attaining LDN is acknowledged, knowledge on effective configurations, and the extent to which it materialises multiple benefits, is scarce. To develop such enabling environments, existing institutional arrangements need to be coherent and conducive to operationalising LDN and there needs to be a firm grounding of the neutrality concept in national policies, targets and budgets.

Our results show good progress in the institutional dimension of an enabling environment for LDN, yet high-level political buy-in that could accelerate the integration of LDN into national development planning and budgeting processes remains a gap. We conclude that greater efforts need to be made to raise awareness of LDN, educate core stakeholders in its concepts and enablers, and raise its political profile. The recent declaration of the UN Decade on Ecosystem Restoration

(2021–2030) provides an additional opportunity to raise the profile of land degradation challenges and LDN in the context of achieving the SDGs. This is also of relevance in the context of the ongoing COVID-19 pandemic which is derailing efforts to achieve the SDGs, with some experts calling for a great reset (Naidoo and Fisher, 2020). The focus of LDN interventions on maintaining and improving natural capital, building resilience and generating co-benefits that strengthen other forms of capital offer win-wins for the broader achievement of the SDGs.

Thorough assessment of the costing associated with LDN interventions, and sourcing finance remain important gaps. Further analysis could be undertaken of countries that have secured finance for LDN to date, and opportunities to replicate or scale-up this investment in other countries.

Information collected for this research evidence that national capacities for securing land tenure and governance arrangements likely represent an important capacity gap for national implementation of LDN, which undermines efforts for its attainment. Furthermore, our results show limited progress in adopting integrated land use planning for LDN interventions. Given that integrated land use planning and the adoption of a neutrality mechanism are considered fundamental to LDN achievement, it is apparent that this remains a priority implementation gap.

Overall countries have made good progress on setting baselines, though evidence points to a lack of national capabilities for key technical activities and assessments that support LDN implementation, which are needed to adequately assess trade-offs and multiple benefits of LDN for wellbeing and sustainable livelihoods, and to design projects and programs that maximise benefits and manage tensions or unintended consequences.

CRediT authorship contribution statement

Cameron Allen: Methodology, Investigation, Writing - original draft, Writing - review & editing. **Graciela Metternicht:** Conceptualization, Methodology, Writing - original draft. **Peter Verburg:** Conceptualization, Methodology, Writing - original draft. **Mariam Akhtar-Schuster:** Conceptualization, Methodology, Writing - original draft. **Marcelo Inacio da Cunha:** Conceptualization, Writing - original draft. **Marioldy Sanchez Santivañez:** Investigation, Writing - original draft.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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