



NDC ASPECTS

Planting the Seeds of Mitigation: Climate Governance Gaps and Options for the Land Use Sector (Deliverable 6.1a)

WP6 – Global Governance and International Cooperation

27/10/2022

Adrián Vidal, María José Sanz, Silvestre García de
Jalón, Dirk-Jan Van de Ven

BC3 Basque Centre For Climate Change

Version: 1



October 2022

www.ndc-aspects.eu

Adrián Vidal

BC3 Basque Centre For Climate Change

adrian.vidal@bc3research.org

<https://www.bc3research.org/>

María José Sanz

BC3 Basque Centre For Climate Change

mj.sanz@bc3research.org

<https://www.bc3research.org/>

Silvestre García de Jalón

BC3 Basque Centre For Climate Change

silvestre.garciadejalon@bc3research.org

<https://www.bc3research.org/>

Dirk-Jan Van de Ven

BC3 Basque Centre For Climate Change

dj.vandeven@bc3research.org

<https://www.bc3research.org/>

Disclaimer

The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the CINEA nor the European Commission is responsible for any use that may be made of the information contained therein.

Copyright Message

This report, if not confidential, is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0); a copy is available here: <https://creativecommons.org/licenses/by/4.0/>. You are free to share (copy and redistribute the material in any medium or format) and adapt (remix, transform, and build upon the material for any purpose, even commercially) under the following terms: (i) attribution (you must give appropriate credit, provide a link to the license, and indicate if changes were made; you may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use); (ii) no additional restrictions (you may not apply legal terms or technological measures that legally restrict others from doing anything the license permits).



Executive Summary

Land-based activities are increasingly acknowledged for their important ongoing and potential contributions to the Paris Agreement's mitigation target of reaching carbon neutrality in the second half of this century by reducing emissions and increasing removals from the sector, as well as by its capacity to produce biomass to substitute carbon-intensive products. Land use also plays an important role in short- and medium-term mitigation targets set out in countries' Nationally Determined Contributions (NDCs) and 2030 strategies and plans. At the same time, land is a critical resource for multiple developmental and environmental objectives, providing food, fodder, fibre, fuel, and a multitude of other goods and ecosystem services that are fundamental to human well-being. Due to its finite nature, land is subject to competition among these different uses and objectives, and mid to long term planning of land use and enhancing governance is therefore fundamental to ensure socially and environmentally sound arbitrages among them. As ecosystems (managed and unmanaged) are increasingly impacted by climate change, it is therefore needed that mitigation measures are compatible with adaptation measures. Overall, to achieve sustainability of the sector is also necessary the preservation of other ecosystem services and respect for local communities' rights, which requires a multiscale and fit-for-purpose governance structure. Despite some recent progress, governance structures and plans rarely address the multiple objectives listed above. For the purpose of the paper, the Intergovernmental Panel for Climate Change (IPCC) Agriculture, Forest and other Land Uses (AFOLU) sector approach will be used. This paper will assess the AFOLU governance instruments beyond the domestic scale to enhance ambition and implementation of NDCs by acting in the sector while integrating environmental and developmental objectives other than mitigation, and point out the barriers and possible solutions to the governance gaps that are identified.

Contents

1	Introduction	1
2	Assessment of existing sectoral governance landscape: gaps and potentials	3
2.1	Synthesis of main barriers and potentials to AFOLU mitigation.....	3
2.2	Potential of international cooperation to address barriers and potentials.....	6
2.3	Sectoral governance landscape: remaining gaps and underexploited potential.....	7
3	Options for enhancing global climate governance	25
3.1	Criteria for assessing institutional options	25
3.2	Options for overcoming identified gaps	26
3.2.1	Reforming one or more existing institutions.....	26
3.2.2	Creating a new institution.	28
4	Conclusion: pathways towards enhanced sectoral governance	30
5	References	31

1 Introduction

Acknowledging that land use activities are among the principal sources of anthropogenic carbon dioxide (CO₂) and other greenhouse gases (GHGs), the Agriculture, Forest and other Land Uses (AFOLU) sector, as defined by the Intergovernmental Panel for Climate Change (IPCC) in its 6th Assessment Report (AR6) encompassing managed ecosystems accounted for 13-21% of global total anthropogenic GHG emissions in the period 2010-2019 (IPCC, 2022). The emissions profile of AFOLU sector differs from other sectors, with a greater proportion of non-CO₂ gases (CH₄ and N₂O) and the predominance of biological processes. Regarding net AFOLU CO₂ emission fluxes, land use change is the main driver. The rate of deforestation, which accounts for 45% of total AFOLU emissions (IPCC, 2022), has generally declined over the last three decades (FAO and UNEP, 2020), while global tree cover and global forest growing stock levels are likely currently increasing, with substantial regional differences. Losses of carbon are generally being observed in tropical regions while gains concentrate in temperate and boreal regions (IPCC, 2022). AFOLU CH₄ emissions continue to increase, with their main source being enteric fermentation from ruminant animals. Similarly, AFOLU N₂O emissions are increasing, dominated by agriculture, particularly from manure application, nitrogen deposition, and fertiliser use (IPCC, 2022). At the same time, managed and natural terrestrial ecosystems act as a carbon sink, absorbing around one third of anthropogenic CO₂ emissions. The increasing interest in Carbon Dioxide Removals (CDR¹) is now inevitable to achieve the carbon neutrality by 2050, where large scale removals on the FOLU will play a critical role and encompass particular governance challenges (Mace et al 2018).

By the time of writing, 158 out of the 165 latest available Nationally Determined Contributions (NDCs), representing 192 Parties to the Paris Agreement², include mitigation actions in the AFOLU sector (UNFCCC, 2022a), which implies a significant expected contribution from land-use related activities in their national mitigation targets. Recent studies indicate that to achieve carbon neutrality by 2050, substantial carbon removals will be needed in the sector to compensate for unavoidable emissions (Roe et al., 2019; Griscom et al., 2017). However, there is evidence that the increase in temperature and CO₂ does not necessarily increase productivity as could be expected in mature forest (Dow et al. 2022, Jiang et al. 2020) and it is also expected that land sinks will become less effective over time, as the proportion of emissions taken up would decrease with increasing cumulative CO₂ emissions (IPCC, 2021), so it is important to caution about an excessive reliance on land sinks to slow down or avoid decarbonisation in other sectors or even within the AFOLU sector itself.

In order to successfully foster the sector's potential, in an increasingly interconnected world, land use governance -as the process by which natural and built resources of land are put to good use, including land policies, land administration functions, land regulation, and land information systems- remains a critical issue for international consideration. It will also play a critical role to enhance ambition of NDCs and effectively implement Agriculture and Land Use related climate action in the right space and time, in a coherent manner across scales (from local to global) and addressing leakage -broadly understood as unintended displacement of impacts caused by an environmental policy intervention-, which has become a major governance concern (Bastos-Lima et al., 2019). Several studies had addressed differ-

¹ Follows the definition provided in the IPCC SR 1.5°C: It includes existing and potential anthropogenic enhancement of biological or geochemical sinks and direct air capture and storage, but excludes natural CO₂ uptake not directly caused by human activities.

² The European Union and its 27 member States communicated one joint NDC in accordance with Article 4, paras. 16–18, of the Paris Agreement, which counts as one NDC representing 28 Parties.

ent aspects of the sector governance, although most of them focus on forests: global forest governance institutions and initiatives (Glück et al., 2010), key issues and actors (McDermott et al., 2010), main narratives and discourses (Arts et al., 2010), links between forest governance and sustainability (Davenport et al., 2010), policy design issues in multi-level settings (Howlett et al., 2010) and domestic influences and impacts (Bernstein et al., 2010). Nonetheless, AFOLU governance remains a complex environment where coordination between their institutions still poses a challenge (Keohane & Victor, 2011). Besides, forest governance, agricultural governance, and other land uses are not usually integrated into a common framework but sometimes even lay on competing institutions and interests.

This analysis was conducted by collecting data on relevant institutions and initiatives on their respective websites, reports, and grey literature, and supported with secondary literature review. It was supported with exchanges and consultations among researchers and stakeholders that allowed to build bridges between research and practitioners, setting more robust sectoral conversations and providing a more realistic space to explore the complementarities and contradictions of different perspectives. In this context, this assessment aims to be a contribution to support the enhancement of the ambition and implementation of NDCs integrating environmental and developmental objectives other than mitigation, while studying identifying the barriers and possible solutions to the governance gaps. Stronger focus is made on forests due to recent interest more advances under the UNFCCC and other processes.

First, we describe the key governance objectives in the sector and identify the challenges and barriers (economic, institutional, technological, ecological and socio-cultural) for mitigation and sectoral transformation. Second, we assess how six key functions of governance could potentially address the barriers previously identified and mobilise potential. Third, we map the current governance landscape in the sector and assess the extent to which existing institutions and initiatives are able to address climate change mitigation according to their correspondent governance functions, exploring remaining gaps and unexploited potentials. Last, we explore and discuss different options to bridge these governance gaps, including reforming existing institutions, or creating new ones to improve the coordination across existing institutional arrangements.

2 Assessment of existing sectoral governance landscape: gaps and potentials

Due to its characteristics, land use roles in mitigation and adaptation are closely connected, as mitigation options' success depends on the specific vulnerability of ecosystems. Thus, improved and coordinated governance at different scales of the sector remains a critical element to promote reducing emissions and enhancing carbon sinks, hand in hand with food security and increasing ecosystems resilience and conservation. Achieving the Paris Agreement goals with the contribution of the land sector will therefore require local engagement and the creation of an environment in each specific context that enables barriers to implementation to be overcome (Sanz, 2019), with overarching national and international frameworks that will steer and provide coherence across scales.

Regarding the different conceptions of the sector, the AFOLU sector encompasses three distinct sub-sectors with distinct climate global governance: Agriculture, including related land uses (croplands and grasslands), Forests and Other Land Uses (mainly peatlands and other wetlands). Forests and Agriculture are the main prominent areas where multiple international efforts are focused because of their economic and productive value and higher emissions, and they could benefit from performing more transparent and well-coordinated interventions.

2.1 Synthesis of main barriers and potentials to AFOLU mitigation

According to modelled pathways and latest sectoral literature review by IPCC, measures in forests provide the largest share of the cost-effective AFOLU mitigation potential between 2020 and 2050 (up to 100 USD tCO₂ eq-1) through avoiding deforestation, sustainable forest management and afforestation/reforestation, followed by livestock, croplands and grasslands management (soil carbon management, agroforestry, biochar application, improved rice cultivation, and livestock and nutrient management) and demand-side measures (shifting to sustainable healthy diets and reducing food loss and waste) (IPCC, 2022). Yet, large uncertainties and wide ranges on the potentials of the different options can be observed across the literature in both sectoral studies (bottom-up) and integrated modelling exercises (top-down) (Griscom et al. 2017; Roe et al 2019; Roe et al 2021).

Even though these response options and good practices for land management attending to previous objectives are not new, their implementation is facing several barriers or challenges linked to specific national and local circumstances that limit the technical potential identified at global level. Recent studies indicate that overcoming these barriers would require time, financing and capacity support while proposing case-specific approaches for mitigation measures (Bustamante et al., 2014). These identified barriers are related to technological, ecological, institutional, economic and socio-cultural aspects.

Social and cultural barriers: forest definitions vary greatly not only by country, but also across different communities according to their epistemic/ontological views. For example, the current FAO and UNFCCC forest definitions (based on numerical assessments of trees, like area, height and canopy cover) contrast heavily with indigenous forest understandings (González & Kröger, 2020). For decades, international forest policy have side-lined traditional and indigenous populations' ontologies of forests (that resist to framing them as resources) in favour of technical conceptualisations that focus on yields, carbon and measurable commodities (González & Kröger, 2020), being heavily influenced by industrial forestry lobbying (Boerema et al., 2017; Hall, 2013) and deeply ingrained in a colonialist, imperialist

and growth-oriented model of development (Perlin, 2005; Radkau, 2012). Also, concepts like “climate-smart agriculture,” “agroecology”, and “nature-based solutions” reflect different underlying narratives, so related initiatives may pursue different goals and interests (Hrabanski & Le Coq, 2022). Thus, these diverging -or even conflicting- views on agriculture, forests and nature’s role effectively hinder global governance by aiming at different objectives. Regarding AFOLU implementation efforts, lack of trained workers, access to extension services, lack of coordination in agricultural associations and access to education and environmental awareness are also prominent issues.

Financial and economic barriers: include lack of access to loans and credit, high transaction costs or reduced income due to changes in livelihoods as a result of mitigation measures (Bustamante et al., 2014, Sanz et al., 2017). If finance mechanisms fail to cover at least transaction and monitoring costs of carbon sequestration projects (Milne, 2002, Pearson et al., 2013), they will hinder the full implementation of AFOLU mitigation (Phan et al., 2013, Bustamante et al., 2014). Access to insurance is key to smallholders, as it compensates for climate, weather and environmental losses, being an important risk management and adaptation tool, as well as a food security safety net. Despite that, the insured coverage represents less than 1% of global agricultural GDP value (Mahul & Stutley, 2010). Access to markets is also vital to farmers as it connects producers and consumers, boosts productivity, increases income and strengthens food security (OECD, 2007), stimulating the adoption of practices like agroforestry (Bruck & Kuusela, 2021). Opportunity costs need to be considered by any financing mechanism, especially in developing countries, as otherwise mitigation measures would be less attractive compared to returns from alternative land uses, -e.g., avoided deforestation vs agriculture- (Angelsen, 2008; Cattaneo et al., 2010; Böttcher et al., 2012). High levels of poverty -characterised not only by low income, but also by insufficient food availability in terms of quantity and/or quality, limited access to decision-making and social organisation, low levels of education and reduced access to land or technology (UNDP International Poverty Centre, 2006)- can also limit the possibilities for implementing AFOLU mitigation options, because of the different short-term priorities and lack of resources (Bustamante et al., 2014). The uneven share of benefits for the different mitigation options (e.g., payments for ecosystem services) could also act as a barrier if local communities see their livelihoods altered while not receiving any incentive due to informal land tenure.

Institutional and political barriers: land tenure, whether through formal law or informal arrangements, determine who can use which resources, for how long, and under what conditions (FAO, 2012). This has implications on all land management options as owners consider their soil’s future productive capacity when making current-year management decisions, while year-to-year tenant farmers are incentivised to prioritise current production at the expense of the future (Stevens, 2022). Improved governance (e.g. effective law enforcement, reduced corruption, integration of local communities in decision-making and greater transparency) is needed to promote sustainable land management and reduce unauthorised activities (FAO, 2012; Sanz et al., 2017). If that is not achieved, agri-business and other lobbying actors could undermine efforts to enhance ambition on mitigation. Such ambition is, of course, tied with political commitment, which can be lacking or feeble depending on the government changes. Land governance is often influenced by multiple agencies, operating at different levels, leading to fragmentation of interests, priorities and actions along horizontal (e.g., agriculture vs. environment ministries) and vertical (e.g., national vs. local government) lines (Chaturvedi et al., 2019). This governance misalignment, or “working at cross purposes”, leads to policy paralysis, incoherence or even conflict (Chaturvedi et al., 2019), undermining AFOLU mitigation efforts.

Technological barriers: land management practices depend on local conditions, which are defined by biophysical variables (see ecological barriers). Access to inputs (seeds and fertilisers) and access to

Climate governance gaps and options for the land use sector

adequate technology (machinery and tools), along with the existence of irrigation infrastructures can also heavily determine the viability or success of these practices. Thus, practices that are effective in one specific location may not necessarily be the best option or even feasible in other places (Sanz et al., 2017). Poor monitoring capacity and the lack of high-quality data on carbon emission baselines could hinder transparency, and difficult access to REDD+ incentives for reduced deforestation (Gibbs et al., 2007). Challenges for measuring, reporting and verifying CO₂ removals, related to issues of permanence and leakage.

Ecological barriers: biophysical factors like temperature, precipitation, soil quality, pH or slope constrain the application of different practices as well as the living conditions of different species of plants and animals according to suitable and optimal ranges, which limits the application of AFOLU mitigation measures. In addition, the availability of land and water for different uses needs to be balanced in order to ensure sustainability (Jackson et al., 2005). Furthermore, land degradation including soil erosion and desertification can further limit management options (del Barrio et al. 2021), often causing net CO₂ emissions through their indirect influence on soil organic carbon (Olsson et al., 2019). In addition, once a biological system reaches a state of “near” equilibrium it reduces its ability to remove carbon (Houghton et al., 2015), thus for biological sinks (e.g., AR, soil sequestration) there is a limit to how much carbon can be removed from the atmosphere. At present, storage limits and saturation are not a limiting factor, but would need to be considered when planning long-term CDR deployment.

Table 1. Synthesis of main barriers to mitigation in the AFOLU sector

Type of barriers	Barriers
Socio-cultural	<ul style="list-style-type: none"> Different epistemic/ontological views of forests and nature Underlying narratives behind initiatives pursue different goals Lack of skilled workers Access to extension services Lack of coordination in agricultural associations and networks Access to education Environmental awareness
Financial and Economic	<ul style="list-style-type: none"> Access to finance Access to markets Access to insurance Opportunity cost Poverty Uneven share of benefits
Institutional and Political	<ul style="list-style-type: none"> Land tenure Political instability Corruption and lack of trust on government Inability of states to enforce law Lack of political commitment and ambition Governance misalignment Lack of transparency Integration of local communities in decision-making Lobbying
Technological	<ul style="list-style-type: none"> Land management practices depend on local conditions Access to inputs (seeds and fertilisers) Access to adequate technology (tools and machinery) Existence of irrigation infrastructure Lack of high-quality data on carbon emission baselines Complexity of monitoring, reporting and verification
Ecological	<ul style="list-style-type: none"> Biophysical constraints (precipitation, soil pH, slope, etc.) Risk of non-permanence, leakage and saturation. Availability of land and water for different uses needs to be balanced Land degradation and desertification

2.2 Potential of international cooperation to address barriers and potentials

According to Oberthür et al. (2021), actual and potential contribution of existing sectoral institutional arrangements to advance climate action can be assessed according to five key governance functions: *providing guidance and signalling to actors, setting rules to facilitate collective action, enhancing transparency and accountability (including compliance), offering support to means of implementation (capacity building, technology and finance), and promoting knowledge diffusion and learning.*

In view of the proliferation of international institutions and initiatives in the AFOLU governance landscape, *the orchestration/coordination of existing institutions* could also be added to the listed governance functions. Orchestration is an indirect mode of governance that relies on incentives rather than mandatory controls (Abbott & Bernstein, 2015) in which an orchestrator works through like-minded intermediaries, steering their activities to govern targets in line towards a common goal (Abbott, 2018).

On Table 2 below, we assess how these six key functions of governance of international institutions could potentially address the barriers previously identified and mobilise potential on the sector.

Table 2. Assessment of the key functions of AFOLU governance of international institutions.

Governance function	Barrier	Potential role for international cooperation
Guidance & signal	Lack of political commitment and ambition	International governance could send guidance and signals on the need to enhance ambition in a more effective and concrete way (when, what and where), as well as on the importance of considering the increasing vulnerability of land systems due to climate change.
	Governance misalignment	Providing space for better alignment among the specific subsector governance initiatives.
Rules & standards	Lack of political commitment and ambition	International rules and standards are key to ensure comparability of efforts, and distribute the mobilised support according to specific country and stakeholders needs.
	Lack of transparency	Introducing environmental and social safeguards in rules and standards is critical to avoid trade-offs in other critical ecosystem services beyond carbon and ensure local communities and indigenous peoples' rights.
	Uneven share of benefits	Reaching international agreements on potential sanctions to ensure commitments compliance could be beneficial to stop delaying climate action both for the AFOLU sector as for the other sectors, e.g., compliance rules under the Paris Agreement if included in the NDCs. Nonetheless, these measures are often difficult to agree on and implement given their serious implications for the intergovernmental process and national sovereignty.
Transparency & accountability	Lack of transparency	Required for Measuring, Reporting and Verification (MRV) and moving towards the Enhanced Transparency Framework (ETF), holding Parties to account for the implementation of their NDCs. MRV is being one of the strongest points for international cooperation and governance initiatives in the AFOLU sector, in particular for forests, due to the UNFCCC Kyoto Protocol, the Warsaw Framework for REDD+, and the multiple initiatives that emerged on its margins.
	Lack of high-quality data on carbon emissions	For this end, improved estimation of carbon emissions and sequestration, along with monitoring could help increase transparency and understand and manage better the particularly high uncertainties as well as the non-permanence risk specific of large fractions of the sector.

Climate governance gaps and options for the land use sector

Governance function	Barrier	Potential role for international cooperation
<ul style="list-style-type: none"> › Means of implementation 	<ul style="list-style-type: none"> › Access to finance 	<ul style="list-style-type: none"> › Catalysing the mobilisation of finance for implementation according to the specific needs.
	<ul style="list-style-type: none"> › Uneven share of benefits 	<ul style="list-style-type: none"> › Providing space for identification of non-monetary incentives and engagement of the different stakeholders (e.g., public, business and civil society organizations) to facilitate Parties to act and enhance ambition.
	<ul style="list-style-type: none"> › Opportunity cost 	
<ul style="list-style-type: none"> › Knowledge & learning 	<ul style="list-style-type: none"> › Proliferation of potentially conflicting data 	<ul style="list-style-type: none"> › Enhancing developing countries technical and institutional capacity to meet the requirements under the Paris Agreement Enhanced Transparency Framework (ETF) with strengthened AFOLU components; and the information necessary to track progress against priority actions identified in their NDCs for the sector.
	<ul style="list-style-type: none"> › Lack of technical capacity 	
	<ul style="list-style-type: none"> › Access to education 	<ul style="list-style-type: none"> › Ensuring coordination among international capacity building initiatives.
	<ul style="list-style-type: none"> › Environmental awareness 	<ul style="list-style-type: none"> › Facilitating the sharing of scientifically based information and knowledge across different relevant communities.
	<ul style="list-style-type: none"> › Lack of trained workers 	
<ul style="list-style-type: none"> › Orchestration / coordination 	<ul style="list-style-type: none"> › Governance misalignment 	<ul style="list-style-type: none"> › Further coordination of existing institutions could increase synergy and reinforce the implementation of initiatives.
	<ul style="list-style-type: none"> › Misalignment of cooperation agendas 	<ul style="list-style-type: none"> › Providing space for bottom-up initiatives to translate global arrangements to local conditions, increasing the effectiveness in implementation by adjusting to the specific context and enhancing inclusiveness in decision-making.

2.3 Sectoral governance landscape: remaining gaps and underexploited potential

A broad range of actors is directly or indirectly involved in the global agriculture and land use governance, and a variety of conceptual frameworks may be used to understand their various roles (Arts et al., 2010). Traditionally, global governance has been addressed within a ‘state-centric’ framework, focusing on the actions of national governments as the entities empowered to make decisions within formal intergovernmental negotiations (Arts, 2006; McDermott et al., 2010).

Since the 1970s, however, a more pluralist view emerged since the progressive decline of the role of the state as the prime sovereign agent of international environmental governance (Arts et al., 2010; Weiss, 2013), enhancing public participation and increasing the diversity of actors shaping land use governance (Lemos & Agrawal 2006) by incorporating different stakeholder groups, such as local communities, indigenous peoples, land owners, farmers, companies and other actors (McDermott et al., 2010).

Given its complexity, and the lack of integration between agriculture and different land uses (e.g., forests, peatlands, other wetlands, etc.) plans and strategies, the existing AFOLU governance landscape is mapped (Figures 1 and 2), classifying institutions and initiatives depending of their nature (intergovernmental, public/state or private/non-state) and according to the sub-sector they focus in.

Climate governance gaps and options for the land use sector

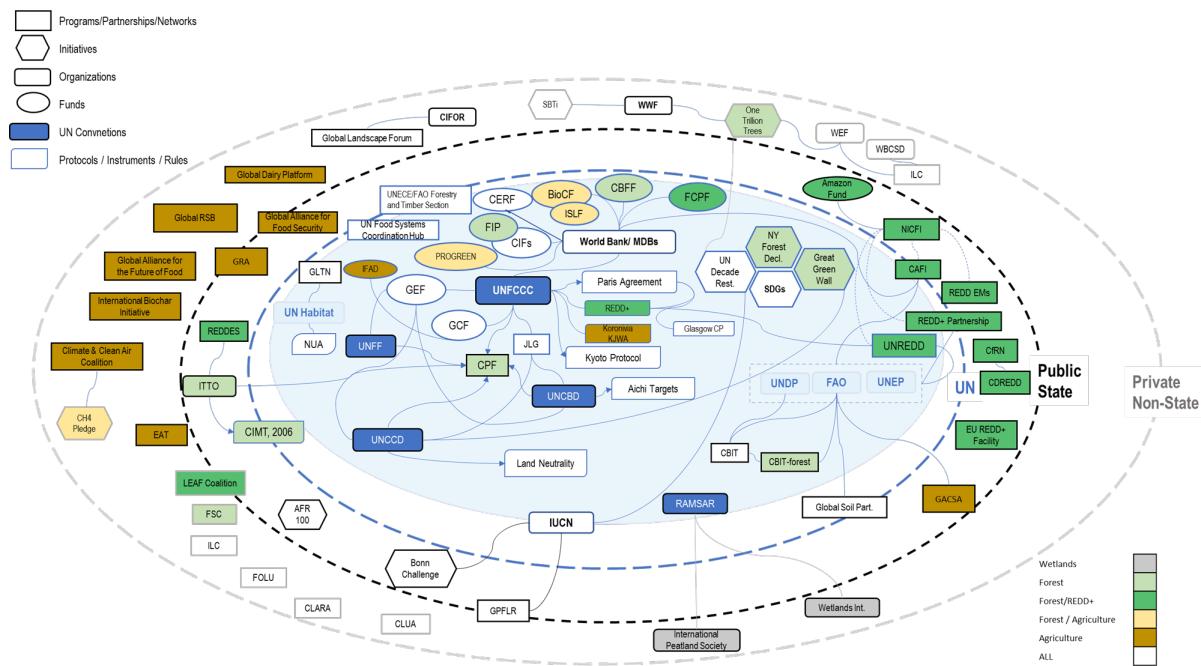


Figure 1: AFOLU global governance landscape. Acronyms can be found in Table 3 below. Blue shaded area represents the area of collaboration of UN Agencies. MRV partnerships and standards are not included

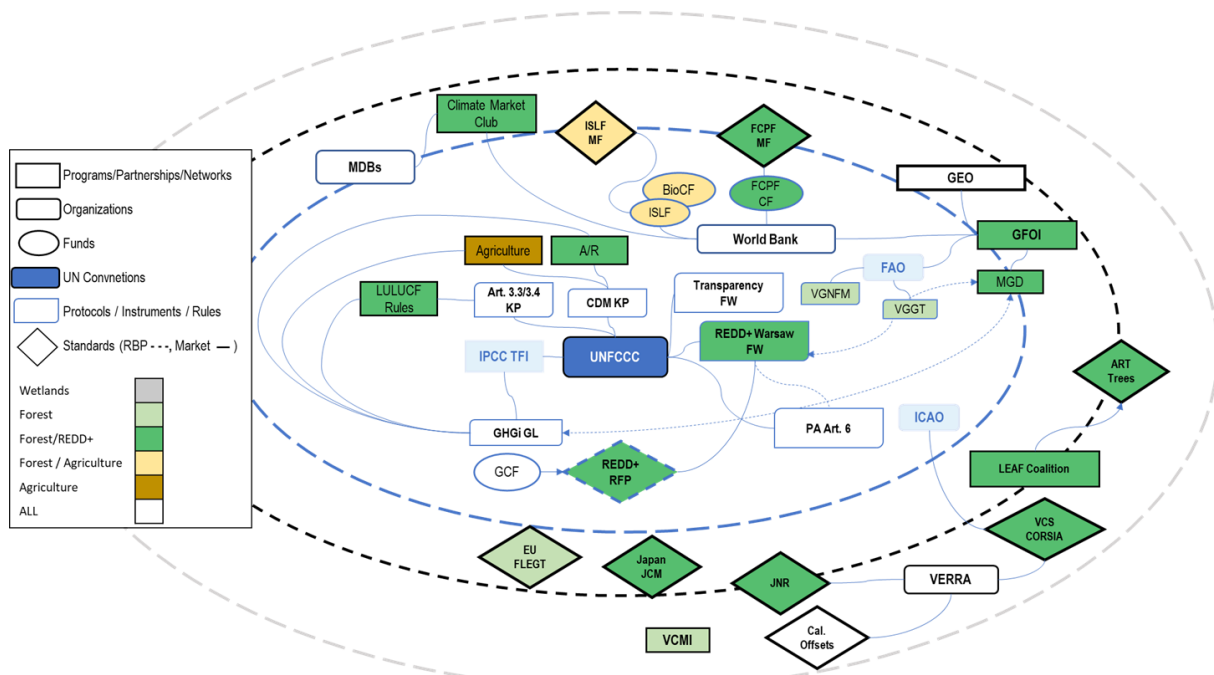


Figure 2. AFOLU MRV governance landscape.

Despite progress made in recent years, AFOLU climate governance is still playing a limited role in effectively engaging actors at different levels across the sector, which is not a surprise given the inter-linkages with food security and the intricate and complex inherited legacies for land management schemes across different countries (formal and traditional informal management rules).

On Table 3, we provide an initial assessment of the existing sectoral governance landscape (as described in Figures 1 and 2), focusing on the most relevant institutions and initiatives for climate change

Climate governance gaps and options for the land use sector

mitigation, according to experts and stakeholders, against the governance functions previously described (although many contribute to several governance functions, they are attributed to the function that seems to prevail for clarity).

Table 3. Assessment of AFOLU governance supply of international institutions.

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
UNFCCC Kyoto Protocol / REDD+ WF/ Paris Agreement and Glasgow Pact	The Kyoto Protocol signalled the importance of the Land Use, Land-Use Change and Forestry (LULUCF) sector in achieving its goals with Articles 3.4, 3.4, 6 and 12, including Afforestation and Reforestation (A/R) Clean Development Mechanism (CDM) projects.	•		•			
	The Cancun Agreements and the Warsaw Framework for REDD+ presented the framework to enhance action in forests of developing countries with the support of countries in a position to do so. The Decision booklet of REDD+ (UNFCCC, 2014), compiles key UNFCCC decisions relevant for REDD+.	•	•	•			
	The Paris Agreement signals for strong mitigation action, in conjunction with adaptation: Article 2.1b to foster adaptation and low GHGs emissions development, in a manner that does not threaten food production; Article 5.1 to conserve and enhance, as appropriate, sinks and reservoirs of GHGs, including forests; and Article 5.2 to formulate policy approaches and positive incentives for REDD+ activities. Regarding rules, Article 6 allows countries to voluntarily cooperate with each other to achieve emission reduction targets set out in their NDCs: Article 6.2 sets the basis for trading in GHG emission reductions or Internationally Transferred Mitigation Outcomes (ITMOs) across countries through bilateral or multilateral agreements, Art. 6.4 establishes a mechanism for trading GHG emission reductions analogous to the Clean Development Mechanism of the Kyoto Protocol, and Art. 6.8 recognizes non-market approaches to promote mitigation and adaptation. Regarding transparency, Article 13 establishes the ETF, designed to build trust that all Parties are contributing their share to the global mitigation effort, enhancing the current MRV reporting requirements under the Convention. It specifies how Parties must report on progress and provides procedures for the review of the submitted reports, feeding the information gathered into the Global Stocktake. Regarding relevant decisions to NDCs and the implementation of the PA (UNFCCC, 2022b), there are currently no requirements of a sectoral breakdown.	•	•	•			

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
	<p>The Glasgow Pact further emphasises “the importance of protecting, conserving and restoring nature and ecosystems, including forests and other terrestrial and marine ecosystems, to achieve the long-term global goal of the Convention by acting as sinks and reservoirs of greenhouse gases and protecting biodiversity, while ensuring social and environmental safeguards”.</p>	•					
<p>Other Río Conventions and other related arrangements, other UN Conventions and fora</p>	<p>The Convention on Biological Diversity (CBD), that is informed by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), provide policy relevant guidance on how to ensure the protection of biodiversity when designing and implementing climate change related actions. Aichi Biodiversity Targets, in particular 7, 10, 14 and 15, aim to manage agriculture and forest areas sustainably, and to protect and enhance ecosystem services contributing to mitigation and adaptation.</p> <p>The United Nations Convention to Combat Desertification (UNCCD) and its land neutrality targets, informed by Science-Policy Interface (SPI), signal the need to restore degraded ecosystems and therefore its carbon stocks.</p> <p>The UN Forest Forum (UNFF) is a subsidiary body that promotes “the management, conservation and sustainable development of all types of forests and to strengthen the long-term political commitment to this end” as per the UN Strategic Plan for Forests 2017-2030.</p> <p>The Joint Liaison Group (JLG) among UNCCD, CBD and UNFCCC; and the Collaborative Partnership on Forests (CPF) signal for the coordination of the conventions.</p> <p>Koronivia Joint Work on Agriculture (KJWA) signals the importance of agriculture to mitigate and adapt to climate change.</p> <p>Ramsar Convention for the protection of wetlands signals for the reduction of emissions by restoring and managing wetlands.</p>	•	•	•	•	•	•

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
UN	<p>The Sustainable Development Goals (SDGs) of the 2030 Agenda provide multilaterally agreed guidance on strategies and set several targets towards ensuring sustainable natural resources management and food production: SDG 2.3 by 2030 to double the agricultural productivity and incomes of small-scale food producers; SDG 2.4 by 2030 to ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, and that strengthen capacity for adaptation and disaster risk reduction; SDG 2.5a by 2020 to increase investment, including through enhanced international cooperation to enhance agricultural productive capacity in developing countries, in particular least developed countries; SDG 6.6 by 2020 to protect and restore water-related ecosystems; SDG 12.2: sets the target by 2030 to “achieve the sustainable management and efficient use of natural resources; SDG 12.8 by 2030 to ensure access to relevant information and awareness for sustainable development and lifestyles in harmony with nature; SDG 12.8 by 2020 to ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems; SDG 15.2 by 2020, to promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally; and SDG 15.9b by 2020 to mobilise significant resources to finance sustainable forest management. The global indicator framework for the SDGs comprises 231 unique indicators (as 12 indicators repeat under two or three different targets) in three tiers. Whilst these indicators provide the opportunity to track progress on these targets, inform policy and ensure accountability of all stakeholders, some of them lack specific thresholds for benchmarking. Nonetheless, the global indicator framework commitment is voluntary, as SDGs are not legally binding for the signatory member states and their implementation is not enforceable under international law</p> <p>The New Urban Agenda (NUA) developed by UN Habitat provides some multilaterally agreed commitments to integrate agriculture and forests into urban areas, encouraging connectivity between cities and their surroundings, peri-urban and rural areas. NUA 71 commits to “strengthening the sustainable management of resources, including land, water (oceans, seas and freshwater), energy, materials, forests and</p>	•	•	•	•	•	•

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
	<p>food”; while NUA 95 supports “urban agriculture and farming, as well as responsible, local and sustainable consumption and production”.</p> <p>The UN Decade of Ecosystems Restoration is a global effort aimed at restoring the planet and ensuring One Health for people and nature. The Decade unites the world behind a common goal: preventing, halting and reversing the degradation of ecosystems worldwide.</p> <p>The New York Declaration on forest (NYDF) was adopted as a political declaration calling for the end of natural forest loss and the restoration of 350 million hectares of degraded landscapes and forestlands by 2030. It was endorsed by nearly 200 governments, multinational companies, Indigenous Peoples, and civil society organisations.</p> <p>The Glasgow Leaders' Declaration on Forests and Land Use committed to halt and reverse forest loss and land degradation by 2030 while delivering sustainable development and promoting an inclusive rural transformation. It signals for forests and other terrestrial ecosystems conservation, along with incentivising sustainable agriculture.</p>	•					
International Union for Conservation of Nature (IUCN)	<p>The Bonn Challenge, launched by the Government of Germany and IUCN in 2011, aims to bring 150 million hectares of degraded and deforested landscapes into restoration by 2020 and 350 million hectares by 2030. It surpassed 210 million hectares for pledges by the time of writing.</p> <p>Leads the Global Partnership on Forest Land Restoration (GPFLR), a proactive global network that unites governments, organisations, academic/research institutes, communities and individuals that responds directly to the Bonn Challenge.</p>	•	•			•	•
Intergovernmental Panel for Climate Change Task Force on GHG Inventories (IPCC TFI)	<p>Provides guidelines on how to estimate emissions and removals of the AFOLU sector transparently, consistently, accurately and completely (2006 IPCC Guidelines for National Greenhouse Gas Inventories), which are mandatory for all countries under the PA ETF, along specific guidelines for the LULUCF sector supplementary reporting for the Kyoto Protocol and CDM A/R Projects. It updates guidelines with new information, as the 2019 Refinement of the 2006 Guidelines, AFOLU Volume, which is not mandatory yet but can be used voluntarily.</p>		•				
UN FAO	<p>The Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and</p>	•					

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
	<p>Forests (VGGT) provide standards to improve tenure governance through guidance and information on internationally accepted practices. Their application could be limited as they are only voluntary commitments.</p> <p>Voluntary Guidelines on National Forest Monitoring (VGNFM) aim to present a general framework to compile good practice principles, methodologies and tools for planning and implementing a multi-objective national forest inventory.</p>		•				
European Commission (EU-FLEGT-VPA)	<p>European Union Forest Law Enforcement, Governance and Trade Voluntary Partnership Agreement (EU-FLEGT VPA) aims to promote sustainable forest management and reduce illegal logging through supporting the implementation of VPAs.</p>		•				
Voluntary Carbon Markets (VCM) institutions and initiatives	<p>While the PA with its governing bodies has no jurisdiction over the VCM, it is not disconnected from the international climate regime as GHG emission reductions or removals achieved through VCM projects and programs are captured by national GHG inventories, and these activities can assist countries to meet their NDCs.</p> <p>The void left by the lack of concreteness of Art.6 of the PA favoured the emergence of different standards in the voluntary carbon market: Verified Carbon Standard, Gold Standard, Climate Action Reserve, American Carbon Registry, Climate Community & Biodiversity Standards, ART TREES, VERRA CORSIA standard, VERRA Jurisdictional and Nested REDD+ (JNR), VERRA California Offsetting Standard, Japan Joint Crediting Mechanisms (JCM), etc.</p> <p>The Voluntary Carbon Markets Integrity (VCMI) Initiative is a multi-stakeholder platform that intends to develop guidance on how carbon credits can be voluntarily used and claimed by businesses and others as part of their credible net zero decarbonization strategies.</p>		•				
International Civil Aviation Organisation (ICAO)	<p>The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), offers a harmonised way to reduce emissions from international aviation, minimising market distortion, while respecting the special circumstances and respective capabilities of ICAO Member States. It is relevant to AFOLU as it can be a source of finance for carbon removal projects.</p>		•				
Commodity Round tables	<p>Global Roundtable for Sustainable Beef (RSBs) is an international body for developing a global</p>		•				

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
	framework for definition of sustainability principles applicable and measurable worldwide and coordinating national round tables.						
The Architecture for REDD+ Transactions (ART) organization	The initiative aims to serve as a global quality benchmark for jurisdictional REDD+, providing the confidence needed in the integrity of emission reductions and removals from forest protection and restoration to unlock finance at scale for ambitious climate action and to incentivize governments to achieve those results. ART's standard for measurement, monitoring, reporting and verification, The REDD+ Environmental Excellence Standard, known as TREES, is based on a decade of learning and evolution of REDD+ and seeks to allow for TREES credits to be fungible with credits from other sectors.		•				
UNFCCC Secretariat	The UNFCCC Secretariat supports the intergovernmental process related to MRV under the Convention and the Kyoto Protocol, and the Enhanced Transparency Framework (ETF) under the PA designed to build trust that all Parties are contributing their share to the global mitigation effort, enhancing the current MRV reporting requirements under the Convention to report on progress and provides procedures for the review of the submitted reports, feeding the information gathered into the Global Stocktake. It also supports work on GHG inventories, REDD+ and LULUCF reporting, guidelines and common metrics. It also facilitates the transparency-related work of the Consultative Group of Experts (CGE) and maintains a transparency data hub for information management and analysis.			•			
Donors / multilateral funds / multilateral development banks (MDBs) / others	Development banks, either global (the World Bank) or regional (like the Inter-American Development Bank, the CAF – Development Bank of Latin America or the African Development Bank, inter alia), and multilateral funds like the Green Climate Fund (GCF), the Global Environment Facility (GEF), Bio Carbon Fund (including the initiative for Sustainable Forest Landscapes) or the Climate Investment Funds (CIF) finance thousands of AFOLU projects, being key to effectively implement mitigation actions. International. Regarding agriculture, the Fund for Agricultural Development (IFAD) is an international financial institution and a specialised agency of the United Nations that invests in projects in rural areas of developing countries to increase food security.				•		
	The MDB Working Group on Article 6, including the World Bank, the Asian Development Bank, African Development Bank, European Bank for				•		

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
	Reconstruction and Development, and the Inter-American Development Bank, has established a Climate Market Club with participation of 11 national governments. Its objective is to pilot institutional elements of Article 6.2 needed at the national level to decide which carbon credits could be sold, how they should be priced, and how a country can ensure its capacity to report on them.						
REDD Funds	Regarding REDD+, we can highlight these funds: REDD Early Movers (although they are bilateral arrangements per country), UN-REDD Programme (Phase 1 and 2), REDD+ Partnership, Forest Carbon Partnership Facility (FCPF) Carbon Fund, the Amazon Fund, the Congo Basin Forest Fund, the Central African Forest Initiative (CAFI), the BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISLF) and the Forest Investment Program (FIP) of World Bank.				•		
LEAF	The Lowering Emissions by Accelerating Forest finance (LEAF) Coalition is a public-private organisation whose goal is to halt deforestation by financing large scale tropical forest protection, having mobilised pledges for 1 USD billion in financing by 2021.				•		
CERF	Climate Emissions Reduction Facility (CERF) is a new flagship World Bank trust fund under the Climate Support Facility which was launched with an initial investment of \$52 million from the German Federal Ministry of Economic Cooperation and Development, the UK's Foreign, Commonwealth and Development Office, and the Austrian Federal Ministry of Finance. It is an umbrella fund for climate finance, will be the Bank's first trust fund providing operational liquidity at scale for low-carbon development projects. Over a 10-year period, the facility will disburse results-based climate finance, helping developing countries shape low-carbon development pathways and encouraging donors to increase funding to achieve scale.				•		
WBCSD	The Forest Solutions Group (FSG) of World Business Council for Sustainable Development (WBCSD), the global platform where leading businesses in the forest products sector build and share solutions to sustainable development, is developing the Forest Sector Net-Zero Roadmap.				•		
UNFCCC	As part of the PA, Parties to the UNFCCC agreed to establish a Capacity-building Initiative for Transparency (CBIT), with the aim of strengthening national institutions capacities; providing tools, training and assistance for meeting the					•	

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
	<p>Article 13 of the Agreement; and assisting in the improvement of transparency over time.</p> <p>The GHG Support Unit of the Transparency Division provides assistance in national GHG inventory management systems in developing countries and capacity building to national experts.</p> <p>UNFCCC also provides training for review experts for the technical review of GHG inventories and Biennial Technical Reports (BTRs) of Parties. However, this programme has a very limited reach since said experts must be nominated by their national focal point on behalf of their government to be included on the roster.</p> <p>The Technical Examination Process (TEP) assembled a series of expert meetings that produced policy outcomes compiling replicable and scalable good practices, approaches and technologies with significant mitigation potentials for a variety of sectors, including Land Use (with the subcategories of Agriculture, Forestry, Other and Policy support).</p>					<ul style="list-style-type: none"> • • • 	
UN Agencies and programmes	<p>The UN REDD Program, is the flagship UN knowledge and advisory partnership on forests and climate to reduce forest emissions and enhance forest carbon stocks.</p> <p>The FCPF Readiness Fund supports the capacity building of the global partnership of governments, businesses, civil society, and Indigenous Peoples focused on REDD+.</p> <p>FAO's CBIT-AFOLU programme provides several tools to support institutional arrangements and data, MRV on mitigation, Monitoring and Evaluation (M&E) on adaptation and AFOLU NDCs tracking on implementation.</p> <p>FAO's CBIT-Forest initiative provides capacity building to developing countries to collect, analyse and share forest data to meet the transparency requirements of the PA.</p> <p>The CBIT Global Coordination Platform keeps track of national CBIT projects and addresses any lack of national transparency capacities and coordination needs.</p> <hr/> <p>The Global Land Tool Network (GLTN) is dynamic and multisectoral alliance of international partners facilitated by UN Habitat committed to increasing access to land and tenure security for all that develop, disseminate and implement pro-poor and gender-responsive Land Tools.</p>					<ul style="list-style-type: none"> • • • • • 	

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
UN Food Systems Coordination Hub	In 2021, UN Secretary-General convened a Food Systems Summit as part of the Decade of Action to achieve the Sustainable Development Goals (SDGs) by 2030.						
ITTO	International Tropical Timber Organisation (ITTO) REDDES program to strengthen the capacity of ITTO developing member countries and their stakeholders to reduce deforestation and forest degradation, enhance environmental services and help improve forest dependant livelihoods through sustainable management of tropical forests, and forest restoration					•	
CfRN	Capacity Development for REDD+ (CD REDD) I and II, a partnership led by the Coalition for Rainforest Nations (CfRN) and supported by GIZ as part of the German International Climate Initiative, aims to build capacity in developing countries on REDD+ monitoring and National GHG Inventory for the AFOLU sector. It hosts the REDD.plus platform that offers countries and corporations the ability to purchase Paris Agreement-compliant carbon credits from the entire inventory of a country's national rainforests and achieve carbon neutral or reduction goals.			•	•	•	
GRA	The Global Research Alliance on Agricultural GHGs (GRA) aims to deepen and broaden mitigation research efforts across the agricultural sub-sectors of paddy rice, cropping, and livestock, and to coordinate cross-cutting activities across these areas, including promoting synergies between adaptation and mitigation efforts.					•	
CIFOR	The Global Landscape Forum (GLF) led by CIFOR, is a knowledge-led platform on sustainable and inclusive landscapes.					•	
Food and Land-Use Coalition (FOLU)	The Food and Land Use Coalition (FOLU) is a community of organisations and individuals committed to the urgent need to transform the way we produce and consume food and use our land for people, nature and climate. It builds on the work of the Food, Agriculture, Biodiversity, Land Use and Energy (FABLE) Consortium teams which operate in more than 20 countries.					•	
EAT	Science-based global platform for food system transformation. EAT partners with a range of foundations, academic institutions, organizations and companies.					•	
Global Alliance for Food Security	In May 2022 the G7 Development Ministers agreed to launch a Global Alliance for Food Security as a way to combat the hunger crisis that is threatening the world. With support of the				•		•

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
	World Bank and is currently recruit other partners for the alliance in order to deliver a swift, effective and sustainable joint response to the food crisis triggered by Russia's war of aggression.						
EU-EC	EU REDD+ Facility hosted by the European Forest Institute and established in 2010, works with partners in tropical forest countries in Africa, Asia and South America, developing innovative solutions and approaches to improve land-use governance.					•	
CGIAR	The Consultative Group on International Agricultural Research (CGIAR) Research Program on Climate Change, Agriculture and Food Security (CCAFS).					•	
WEF/WBCSD	The Natural Climate Solutions (NCS) Alliance is a multi-stakeholder group composed of the World Economic Forum (WEF) and the World Business Council for Sustainable Development (WBCSD) committed to delivering Natural Climate Solutions (NCS) with integrity, at scale. The NCS Alliance convenes public and private stakeholders to identify opportunities and barriers to investment into carbon credits in new and existing markets in order to scale up financing for natural climate solutions. It also serves as a forum for knowledge sharing and technical capacity building to ensure natural climate solutions reach their full potential in abating climate change.					•	
CCAC	The Climate and Clean Air Coalition is a voluntary partnership of governments, intergovernmental organizations, businesses, scientific institutions and civil society organizations committed to protecting the climate and improving air quality through actions to reduce short-lived climate pollutants. It Supports the Global Methane Pledge launched at COP27 to take voluntary actions to contribute to a collective effort to reduce global methane emissions at least 30 percent from 2020 levels by 2030, which could eliminate over 0.2°C warming by 2050 (100 countries on board, representing nearly 50% of global anthropogenic methane emissions and over two thirds of global GDP). Annual ministerial level meetings to review progress following the launch of the Global Methane Pledge in November 2021 are to be convened.						
Collaborative Partnership on Forests (CPF)	Supports the work of UNFF and its member countries, promoting the implementation of the UN Forest Instrument and the United Nations Strategic Plan for Forests as well as the contribution of forests and trees to the 2030 Agenda					•	•

Climate governance gaps and options for the land use sector

Institution	Governance supply	Guidance & Signal	Rules & standards	Transparency & accountability	Means of implementation	Knowledge & learning	Orchestration / coordination
	for Sustainable Development and other major forest-related agreements. Enhances coherence, cooperation as well as policy and programme coordination at all levels, including through joint programming and the submission of coordinated proposals to members' governing bodies, consistent with their mandates.						
Global Earth Observation group (GEO)	Promoted the Global Forest Observations Initiative (GFOI), an informal partnership to coordinate international support to developing countries on forest monitoring and GHGs accounting for the purposes of REDD+ and related forums.					•	•
The International Land Coalition (ILC)	The International Land Coalition (ILC) is an informal international network of networks to realise land governance for and with people at the country level, responding to the needs and protecting the rights of those who live on and from the land.					•	•
International Peatland Society (IPS)	IPS is a network of peat and peatland experts for sharing knowledge.					•	
Wetlands International (WI)	WI is a global not-for-profit organisation dedicated to the conservation and restoration of wetlands.					•	

Assessing the information summarised in Table 3 above, several gaps that still need further attention were identified in relation to the different functions of governance indicated in Table 2.

Guidance and signalling.

Global institutions and initiatives point out the critical role that the sector needs to play to achieve the Paris Agreement, in particular to achieve carbon neutrality by 2050. There is an increasing number of institutions and initiatives that signal the importance of ensuring balance among carbon services (mitigation through emissions and removals) and other services, such as food production/security, biodiversity conservation, desertification reduction, and water and soil conservation; leading to a very intricate and complex landscape of instruments.

The three Rio Conventions (UNCCD, CBD and UNFCCC), UNFF and Ramsar recognise that land management and ecosystem protection is fundamental to achieve their respective goals and acknowledge the overlaps. However, in spite of the existence of coordination mechanisms such as the Collaborative Partnership on Forests (CPF) or the Joint Liaison Group (JLG), they still show very weak alignment and a lack of a more comprehensive and holistic approach to land. Even UN Habitat is providing signals through its New Urban Agenda (NUA) on the importance of integrating forests and agriculture in urban areas. One opportunity to enhance orchestration of institutions and initiatives could be in the context of the achievement of the SDGs as the overarching framework, and their role to support specific SDGs, such as SDG 2, 6, 12 and 15.

UNFCCC introduced specific signals for elements of the sector by the special treatment of the LULUCF sector in the Kyoto Protocol (Art. 3.3 and 3.4), and the specific mention of REDD+ in the Cancun Agreements and the Paris Agreement (Art. 5). Ongoing negotiations under the UNFCCC also signal out the importance of Agriculture through the Koronivia Joint Work, where Parties address both mitigation and adaptation, showing the importance of integrated solutions. This continued at COP26, with the Glasgow Pact recognizing linkages between climate change and biodiversity loss, and the critical role of protecting, conserving and restoring nature and ecosystems in delivering benefits for climate adaptation and mitigation, while ensuring social and environmental safeguards.

Strong signals from business are relatively recent and point to narrow mitigation approaches, such as the “One Trillion Trees” initiative or the “Methane Pledge” adopted at COP 26 in Glasgow, which includes biological CH₄. Many of them strongly focus on carbon market offsets, including the reactivation of the Voluntary Carbon Markets through jurisdictional approaches or new private-public partnerships with ad hoc standards (like LEAF). However, they still address the sector in a fragmented and inconsistent manner, which makes it difficult to ensure they will effectively contribute to increase global ambition.

Rules & Standards.

LULUCF is the only sector for which the UNFCCC provided specific rules and modalities, such as the rules for the Articles 3.3. and 3.4 of the Kyoto Protocol or the Warsaw Framework for REDD+. Identified gaps relate mainly to reporting rules and standard methodologies for estimating emissions and removals and tracking them over time. Although, guidance for estimation and reporting of GHG emissions and removals of national governments is provided by the UNFCCC and the IPCC Task Force on GHG Inventories, multiple sets of guidance for jurisdictional level or for non-government initiatives are proliferating in the context of non-state market driven governance systems (such as voluntary markets or commodity round tables) that do not necessarily align with them, which makes difficult the tracking, aggregation and comparability of efforts towards common goals for the sector at national and international level.

There is an underexploited potential in Article 6 of the PA as the expected benefits of cooperation in achieving the NDCs under it are large, with potential cost reductions over independent implementation of countries’ NDCs through improved economic efficiency totalling about 250 USD billion per year in 2030 (IETA, 2019). If countries would invest these cost savings in enhanced ambition, then Article 6 could facilitate additional mitigation of around 5 GtCO₂ per year in 2030 (IETA, 2019). Recent studies also pointed out the key role of AFOLU in the carbon markets, with agriculture being a source of demand and FOLU a source of supply of carbon credits (Oberghassel et al., 2021).

Nonetheless, despite the progress made in COP26 in relation to the rules of Article 6, including carbon markets, some uncertainties remain unsolved in the view of several stakeholders. For example, varying interpretations have emerged regarding the role of REDD+, with some stating it’s clearly eligible under Article 6, others affirming it’s been excluded, and others noting it is not clear (CfRN, 2022; Todd and Guimaraes, 2022). In particular, rainforest nations raised concerns that voluntary carbon project proponents had compromised the REDD+ mechanism, as previous Clean Development Mechanism (CDM) projects under the Kyoto Protocol made it into Article 6.4, while national emissions reductions accomplished by rainforest nations countries did not (CfRN, 2022). Moreover, while currently the REDD+ MRV process and technical analysis of the results are reviewed under the PA transparency framework, new REDD+ results generated under Article 5 will now have to undergo additional review under Article 6.2, posing an additional burden for countries (CfRN, 2022).

As mitigation policies in the land-use sector may have significant impacts on the environment and core rights such as land tenure and local livelihoods, addressing these issues is one of the biggest remaining gaps in AFOLU governance. REDD+ is the only mechanism in the UNFCCC that integrates significant social, environmental and governance safeguards that go beyond a risk-based approach, and rather requires a rights-based approach to ensure the equity, sustainability and permanence of its implementation.

However, land tenure, as it falls under national jurisdictions, exhibits large differences across various countries, with a large sum of unresolved territorial management issues. As a result, the variation in the underlying land tenure systems determine the effectiveness and uneven applicability of global governance mechanisms (Dieterle, 2022). Since global rules and norms can make up to some extent for missing capacities and faulty governance structures at the national level (Deininger et al., 2011; Von Braun & Meinzen-Dick, 2009), certain international guidelines could then act as ‘soft laws’ that address this issue (Dieterle, 2022), like the Voluntary Guidelines for the Responsible Governance of the Tenure of Land Fisheries, and Forests (VGGT) by FAO, endorsed by the UN Committee on World Food Security.

Nonetheless, the effectiveness of these international guidelines is conditioned as the adherence to global governance norms by states and investors is shaped by whether and how the land rights in question are already legally recognised and protected by the state and the presence of ‘outside pressure’ from the international donor community and/or domestic or international civil society (Dieterle, 2022). So far, international guidelines are reinforced on land tenure regimes where land rights are recognised ‘de jure’ (documented and enforceable in a court of law) and limited where it exists legal ambiguity around those rights (Dieterle, 2022), generally reproducing national land ownership patterns and inequalities. Therefore, we conclude that this gap can be better addressed at national level but may also benefit from some global space for learning from different national experiences.

Transparency & Accountability.

Current gaps in transparency are closely linked to deficits in rules and standards for MRV and the proliferation of non-comparable or inconsistent estimations. The proliferation of reporting and accounting frameworks and standards add confusion and pose an extra burden for the countries, making it more difficult to access sufficient financial resources to support action. In general, standards are often used in the FOLU sector in the context of offsets for accounting, given the risk aversion of donors and buyers to carbon credits that often have high uncertain estimates behind, could be double counted and increasing risk of reversals.

In the case of forests in developing countries, different governance schemes -multilateral and public/private- emerged (e.g., the Warsaw Framework for REDD+, GCF Terms of Reference for REDD+ result-based payments, FCPF methodological framework, ART TREES standard, Verra standards, etc.) to address the robustness of the forest carbon credits for a range that varies from result base payments to carbon markets. The lack of coordination and harmonisation across the increasing number of MRV and accounting standards not necessarily aligned with the PA rules and modalities represent a challenge for the effectiveness of the pledged financial flows at global level due to a lack of trust in transparency.

As stated previously, the updated Article 6.4. will allow millions of certified emission reductions (CERs) produced between 2013 and 2020 under the CDM of the Kyoto Protocol to stay alive (not in vain, they are often referred to as “zombie credits”). Converting CERs into ITMOs could be problematic, given

that these credits are often of poor quality, lack environmental integrity, and some of the projects they financed would have happened anyway without any further financial support, which increases the concerns for their non-additionality.

Regarding double counting, some also raise the issue that voluntary credits purchased by private companies do not require to have corresponding adjustments through the Article 6 system, that could translate in largely unregulated private schemes still allowing double counting (Carbon Market Watch, 2021), that is, when the same reduction is counted towards achievement of two separate goals (e.g., one country's NDC and an international corporation offset). This could cause buyers to lose confidence on those projects, posing the question of why would they want double-counted credits when properly adjusted credits will be available.

Also, in the implementation of carbon removal projects by increasing above-ground biomass there exists a risk of reversal through future disturbances like wildfires, diseases or pests, that could jeopardise the persistence of the vegetation mass (IPCC, 2022). Therefore, the associated carbon credits could not represent real emissions reduction if the projects are not adequately implemented, monitored and maintained.

Means of Implementation.

Insufficient funds are mobilised so far, with an average of 0.7 USD billion per year estimated to have been spent on AFOLU mitigation through 2018 (IPCC, 2022). Progress has been made in recent years as mitigation finance in AFOLU reached 8.1 USD billion on average in 2019-2020, with at least 3.4 USD billion that helped to finance forestry projects and 2.3 USD billion went to agriculture (more than half directed towards sustainable crops, agroforestry and livestock) according to available data (Climate Policy Initiative, 2021). Regarding the financing sources, 40% of total Multilateral Climate Funds flows went towards AFOLU projects in 2019-2020, with the Green Climate Fund (GCF) providing almost half of the total finance from multilateral climate funds, followed by the Global Environment Facility (GEF) with 27% of the total (Climate Policy Initiative, 2021).

Nonetheless, this is well short of the more than 400 USD billion per year that are estimated to be necessary to deliver the 5-6 Gt CO₂ per year by 2050 of forest related carbon sequestration and emissions reduction, as assessed with sectoral models, to achieve the up to 30% of global mitigation effort envisaged in deep mitigation scenarios (IPCC, 2022). In any case, if companies and donors demand a significant volume of emissions reductions and removals over longer periods of time, there will need to be serious commitment and investment into generating those emissions reductions and removals that result from actual delivery on the ground, focusing on the areas where the risk of emissions is higher and removals won't happen due to natural processes (Aguilar, Funk & Sanz, 2021).

A gradual redirection of existing agriculture and forestry subsidies would greatly advance mitigation. Effective policy interventions and national (investment) plans as part of NDCs, specific to local circumstances and needs, are urgently needed to accelerate the deployment of AFOLU mitigation options. These interventions are effective when they include funding schemes and long-term consistent support for implementation with governments taking the initiative together with private funders and non-state actors (IPCC, 2022).

Risk of reversal, uncertainty of estimates and trade-offs of emissions reductions and removals still remain as important issues, in particular for market approaches. PA contemplates in Art. 6.8 the possibility of non-market approaches, which emerged from the position of countries that were against the

commoditization of nature or nature services to people as an opposition to REDD+, but its development and application are uncertain yet.

Knowledge & learning.

There exists a large proliferation of platforms, networks and programs devoted to knowledge sharing on different aspects. MRV knowledge generation and new non-permanent sharing programs were extensively promoted in the context of REDD+ capacity building, such as UNREDD, CDREDD, GFOI (MGD and Capacity Building components), etc.

Despite new tools and models offering unprecedented monitoring opportunities, striking differences remain in estimations of anthropogenic land-use CO₂ fluxes between the national greenhouse gas inventories (NGHGs) used to assess compliance with the Paris Agreement, and the Global Carbon Budget and IPCC assessment reports, both based on global bookkeeping models (BMs) (Grassi et al., 2022). Top-down global studies so far tend to overestimate the AFOLU global mitigation potential, especially in the case of forests (Griscom et al., 2017; Bastin et al., 2019; Roe et al. 2019), partially due to incomplete representation of the competition of land by different options and lack of consideration of barriers, which could reinforce narratives that picture land systems as the solution to the climate crisis alone, unburdening other sectors of their own decarbonisation. Additional guidance could be transmitted on the limitations of global assessments, addressing global drivers and the barriers to deploy the biophysical potentials, ensuring consistent and more realistic mitigation potential for the sector at global level by different communities, providing a clearer signal on feasibility, cost-effectiveness and the associated risks for the different options.

Orchestration/coordination.

Duplicity of efforts and disconnection across different initiatives remain an increasing challenge for the sector. Few orchestration/coordination initiatives emerged along the years. For example, the Collaborative Partnership on Forests (CPF) seeks to orchestrate the UN and other organisations to support forest related agreements and the UN Forest Forum by enhancing cooperation, but so far it has had limited success in addressing emerging adaptation and mitigation needs from the UNFCCC. And, the REDD+ Partnership that emerged as a platform to coordinate REDD+ efforts across donors, REDD+ Countries and supporting institutions (i.e. FCPF, UNREDD, bilateral efforts) had a short life and limited success.

Generally speaking, we appreciate a lack of more systemic approaches to governance of the AFOLU sector as a whole, as formal structures are often disconnected and conflicting between subsectors and governance levels. Further complementarity in finance mechanisms could also catalyse implementation and increase the efficiency in resources allocation. Also, many different initiatives lack coordination in achieving their often-overlapping goals, and there exists a general undersupply of bottom-up initiatives. Although it will be difficult to promote such coordination across the whole AFOLU sector, efforts should be made to enhance coordination at least the sub-sectors, or at least critical areas such as forests, agriculture soils and livestock.

To sum up, we conclude that despite the complex landscape of institutions, the global governance potential of the sector has been underexploited to date, with the main governance gaps summarised in Table 4 below.

Table 4. Main AFOLU gaps across governance functions.

Climate governance gaps and options for the land use sector

Governance Function	Gap
<i>Guidance & Signal</i>	Signal for realistic mitigation potential of the sector and trade-offs.
<i>Rules & Standards</i>	Monitoring, Reporting and Verification standards misalignment. Remaining uncertainties in Articles 6.2 and 6.4 of PA. Environmental and social principles and safeguards. Land tenure.
<i>Transparency & Accountability</i>	Concerns over uncertainties, additionality, double counting, risk of reversals and environmental impacts.
<i>Means of implementation</i>	Insufficient funds mobilised so far. Non-monetary incentives not considered.
<i>Knowledge & learning</i>	Limitations of global assessments.
<i>Orchestration/coordination</i>	Duplicity of efforts and disconnection across different initiatives.

3 Options for enhancing global climate governance

Following the previous assessment, we identify and assess different types of options aiming to close the remaining identified governance gaps: reforming one or more existing institutions, creating a new institution, mainly for orchestration/coordination of existing institutional sub-complexes. While gaps have been identified, overlaps among existing institutions and initiatives are also prominent and often lead to inefficiencies and extra burdens for countries that have to deal with different avenues for capacity building and financial flows provision. Below recommendations and options relating to the gaps are introduced.

3.1 Criteria for assessing institutional options

In order to evaluate these options, the assessment criteria for institutional options are based on membership, institutional strength, legitimacy and feasibility.

Membership: describes the critical mass the institution possesses for addressing the governance gap, including state governments but also non-governmental and transnational actors. Membership requirements may vary, as sometimes a relatively limited membership may suffice depending on the issue or starting with a limited membership may be sufficient if incentives for membership are strong enough, so that initial members stay on board and others may join over time.

Institutional strength/capacity: concerns the capacity, competence and expertise of the institution with respect to addressing the most central identified gaps or potentials for effective implementation; potential for broader effects beyond the institution itself (such as influence on other institutions), cost efficiency – indicators (non-exclusive): financial and personnel resources, powers of decision-making and implementation (including for promoting/enforcing compliance), etc.

Legitimacy: is the authority of the institution as perceived by actors, considering fairness and distributional outcomes, especially in a North-South context with asymmetric power relations (Dannecker, 2022). Trade-offs in land systems are linked to issues of distributive justice, as impacts on land that occur over multiple human generational timescales may constrain benefits to future generations or their opportunities (Meyfroidt et al., 2022). Thus, governance processes that do not acknowledge intergenerational justice are likely to be considered unjust by some actors (Meyfroidt et al., 2022). Legitimacy of an institution could be divided in two components: input legitimacy, which refers to the acceptance that arises from the due process followed in decision-making, and output legitimacy, which stems from the outputs produced and their effectiveness or efficiency in addressing the problem at hand (Boedeltje & Cornips, 2004).

Feasibility: assess if there exist sufficient incentives for all main actors or stakeholder groups whose cooperation may be required and if there are any prominent leaders/entrepreneurs/champions of institutional reform or the creation of new institutions. For reforming existing institutions, it also refers to compatibility with the established objectives of the institution and the prospect for agreement on

institutional reform/institutional rigidity or lock-ins (such a consensus requirements), considering statutory or constitutional rules as well as past experiences. Regarding the creation of a new institution, it refers to how it could be linked to and complement or arise from existing institutions and the existence of any particular forums or venues that may possibly initiate its creation. Also, if there are possible paths towards fully functional institutions (i.e., starting with a smaller core group that would grow over time).

3.2 Options for overcoming identified gaps

While gaps have been identified, overlaps among existing institutions and initiatives are also prominent and often lead to inefficiencies and extra burdens for countries that have to deal with different avenues for capacity building and financial flows provision. Below recommendations and options relating to the gaps are introduced.

In this very sense, for the sake of simplifying the governance arrangements and as several gaps identified are very interlinked, the options proposed aim to address one of more than one them. For example, gaps in transparency are very interlinked to rules and standards, and gaps in means in implementation are also very related to orchestration/coordination.

As discussed, gaps in transparency are strongly interlinked to rules and standards, as better clarity and advances on Article 6 rules, carbon standards and safeguards could lower concerns over uncertainties, additionality, double counting, risk of reversals and environmental impacts. Similarly, gaps in means of implementation and orchestration/coordination, such as insufficient funds mobilised so far, lack of non-monetary incentives, and the duplicity of efforts and disconnection across different initiatives could be addressed together to ensure complementarity in providing support to the different needs (from capacity building and readiness to necessary investments to catalyse transformations), as it requires strong coordination among and across donors and recipients.

3.2.1 Reforming one or more existing institutions.

Regarding **Rules & Standards and Transparency & Accountability**, the **gaps addressed** would be:

- Monitoring, Reporting and Verification standards misalignment.
- Remaining uncertainties in Articles 6.2 and 6.4 of PA.
- Environmental and social principles and safeguards.
- Concerns over uncertainties, additionality, double counting, risk of reversals and environmental impacts.

Adopting consistent standards across existing institutions for MRV aligned with the rules and modalities adopted by the UNFCCC would enhance transparency, avoiding unnecessary burdens to developing countries and double accounting risks. Developing countries are pointing to the need for consistency and avoid overburdening on MRV issues, including in relation to the role of markets and their MRV needs in achieving PA targets. In this regard, some governments have recently established moratoria on the sale of voluntary carbon credits issued by domestic nature-based projects at national level (Papua New Guinea, Indonesia, Honduras and India, as of the time of writing) or subnational level (China's Fujian province), to avoid unnecessary MRV burdens as they are figuring out the best strategy towards their NDCs, concerned that they will not be able to meet their own targets. These phenomena

Climate governance gaps and options for the land use sector

reflect the increasing breach among actors. The role of the UNFCCC to enable the promotion of coherent responses is essential.

The UNFCCC/PA has potential to address these key governance gaps by better exploring its capacities to convey governments and other actors through the different elements of the PA and UNFCCC architecture:

Membership:

- Near-universal (198 parties).

Institutional strength:

- Possesses legal competence across all governance functions at global level.
- Long-standing and strong secretariat with long history on MRV issues under the Kyoto Protocol and the Cancun Agreements reporting and reviewing emissions and reductions from the AFOLU sector (GHG Inventories of Annex I, Biennial Update Reports, Biennial Reports, Warsaw Framework for REDD+ process).
- Supreme decision-making/governing body (the COP).

Legitimacy:

- Possesses a high level of legitimacy, since it is responsible for all the MRV process under the Enhance Transparency Framework, and it included specific references to the FOLU sector under the PA. It will host all processes related to enhancing ambition of governments through the NDCs and the ETF. As well as conveys the Global Stocktake as a collective forum where not only governments will provide inputs and inform of its progress on the sector mitigation.

Feasibility:

- Advancing climate action on AFOLU aligns with the objectives of the UNFCCC/PA.
- Capacity to enable space for sharing and discussing MRV issues, for example under the Subsidiary Body for Scientific and Technological Advice (SBSTA).
- However, it needs to consider the consensus rule as the possible measures could confront interests. Despite the different interests of developing countries, given their potentials for mitigation and the climate change impacts risk for the sector, could lead a discussion on how to create space for addressing the gaps indicated above in a more open and coordinated manner aside from the formal negotiations.

Regarding **Means of implementation**, the **gap addressed** would be:

- **Insufficient funds mobilised so far.**

Increasing the capacity of MDBs and existing funds, including the GCF, to attract private finance could upscale AFOLU mitigation finance:

MDBs/Multilateral Funds:

Membership:

- Member nations from developed and developing countries.
- Often limited, depending on the region, except for the case of GCF and other global funds.

Institutional strength:

- Specifically provide resources to fund projects to support social, environmental and economic sustainability and development
- Important role in climate finance, specifically for implementation of mitigation measures.

Legitimacy:

- Strong, as it leaves far less scope for individual donor countries to pursue their own interests.

Feasibility:

- Major MDBs and multilateral funds have made a clear commitment to Paris-alignment finance, but lack private engagement due to their architecture.
- Source of funding limited up to large extent by public governmental donors.

However, there is no clear mechanism identified yet to further private co-financing or private mobilisation (either by direct or indirect mobilisation).

Overall, improving the balance among different actors' representation in existing governance structures is also identified as a common feature across several existing international institutions and initiatives. One option could be increasing the ratio of developing countries in the committee boards or integrating private sector stakeholders (although they may need to have observer status), like transnational companies, local communities and indigenous peoples. This action could help to better incorporate these actor's interests into global governance. Despite that, some may argue that schemes like REDD+ cannot be reformed to avoid deforestation while respecting local communities' rights as long as they attempt to commodify forest carbon (Hein, 2019). Nonetheless, reforms on REDD+ existing institutions and initiatives by broadening and balancing the participation and decision-making power of relevant groups (developing-non-developing countries, government-civil society, public-private) could address criticism in issues such as carbon colonialism and the non-respect of communities' rights.

3.2.2 Creating a new institution.

Building new international governance structures proved to be difficult and sometimes inefficient due to the lack of capacity from top-down institutions to properly address the on-the-ground barriers and challenges that are very specific to the sector and context-driven. In the current context, creating new institutions to address the current gaps could add further complexity to the existing governance landscape, already tangled in a vast number of actors, arrangements and initiatives, in particular if they duplicate roles of existing institutions. Furthermore, to spend additional resources to form, organise and insert any hypothetical new institution could prove to be counterproductive in a financially and time-constrained context. Instead, to work with the existing arrangements to create better conditions for cooperation might be more cost-effective.

However, to coordinate efforts requires the creation of some kind of platforms, even if no permanent structures are set. So, the new institutions should concentrate on orchestration of the existing ones, helping to resolve their overlapping functions and conflicting guidance, and promoting synergies on MRV and finance.

Regarding Means of implementation and Orchestration/coordination, the **gaps addressed** would be:

Climate governance gaps and options for the land use sector

- **Insufficient funds mobilised so far.**
- **Non-monetary incentives not considered.**
- **Duplicity of efforts and disconnection across different initiatives.**

Further coordination among the different governance structures providing finance is identified by many stakeholders across the sector, in order to guarantee enough resources for implementation at national and subnational level to achieve mitigation goals. To this end, could be very useful to understand and learn pros and cons from efforts like the REDD+ Partnership did for forests (looking to improve coordination among different REDD+ initiatives through annual meetings to identify synergies, gaps and avoid overlaps) to a sector-wide scope, seeking to coordinate the delivery of mitigation financing, from capacity building to implementation and results-based payment. This could also partially improve the available funds for mitigation by increasing the efficiency in resources allocation.

Regarding Signalling and Knowledge & learning, the **gaps addressed** would be:

- Signal for realistic mitigation potential of the sector and trade-offs.
- Limitations of global assessments.

A platform (as some sort of joint working group) could be created to serve as an in-depth technical dialogue across modellers and GHG inventories communities, providing a space to develop a common understanding of the concepts and interlinkages between the sub-sectors. This could prevent governance misalignments and share a realistic assessment of the technical and socio-economic potential that constitutes the basis for further action across initiatives. Although the IPCC partially provides this space, it is still fragmented (between the Task Force on National GHG Inventories, and Working Groups I, II and III) and the sector requires more in-depth work in signalling the potentials and providing broad guidance to inform implementation.

The UNFCCC/PA could potentially provide the forum for the creation of this new platform:

Membership:

- Near-universal (198 parties).

Institutional strength:

- Possesses legal competence across all governance functions.
- Large, long-standing and strong secretariat.
- Supreme decision-making/governing body (the COP).

Legitimacy:

- Possesses a high level of legitimacy.

Feasibility:

- Advancing climate action on AFOLU aligns with the objectives of the UNFCCC/PA.
- The COP may possibly demand such exercise.

4 Conclusion: pathways towards enhanced sectoral governance

To sum up, the specificity and context-dependency of the biophysical and socio-cultural factors along the different institutional and political arrangements at national level often challenge standardised top-down approaches promoted by international initiatives at global level. Furthermore, to support sectoral transformations solely by providing capacity building and financial resources without a good understanding of the national and sub-national institutional and socio-cultural context could often exacerbate governance conflicts at lower scales (local, subnational and national) in the AFOLU sector.

While FOLU sectoral climate action is advancing, several barriers hinder the implementation of mitigation measures. These identified barriers are related to technological, ecological, institutional, economic and socio-cultural aspects. To which can be added the potentially increasingly high vulnerability of the AFOLU sector to climate change impacts when considering its role in mitigation pathways. The existing sectoral governance landscape addresses these barriers through several governance functions like providing guidance and signalling to actors, setting rules to facilitate collective action, enhancing transparency and accountability (including compliance), offering support to means of implementation (capacity building, technology and finance), and promoting knowledge diffusion and learning.

However, several gaps remain, especially regarding transparency and rules and standards, the complexities that AFOLU presents when considering the role of Article 6 of PA, and the proliferation of disconnected initiatives. The key gaps identified are the need for signalling a realistic mitigation potential of the sector and trade-offs, current Monitoring, Reporting and Verification (MRV) standards misalignment; the remaining uncertainties surrounding Articles 6.2 and 6.4 of PA, environmental and social principles and safeguards, land tenure, concerns over uncertainties, additionality, double counting, risk of reversals and environmental impacts of the mitigation projects; the insufficiency of the funds mobilised so far, the lack of non-monetary incentives, the limitations of global assessments, and the duplicity of efforts and disconnection across different initiatives across the sectoral governance landscape.

Nonetheless, some options remain open to close existing gaps in the sector governance. The adoption of consistent standards across existing institutions for MRV aligned with the rules and modalities adopted by the UNFCCC could greatly enhance transparency, comparability of efforts and therefore, climate action. Broadening and balancing the participation and decision-making power of relevant groups (developing-non-developing countries, government-civil society, public-private) into existing structures could help to incorporate these actor's interests into global governance. The creation of a sector-wide partnership (learning from previous efforts like the REDD+ Partnership) could enhance complementarity in finance mechanisms and increase the efficiency in resource allocation towards mitigation. A platform (as some sort of joint work group) could be created to serve as an in-depth technical dialogue across modellers and GHG inventories communities, signalling for a realistic mitigation potential of the sector and trade-offs and cautioning about the limitation of global assessments.

However, no solution will work if the underlying risk aversion from donors and buyers and the short-term nature of targets and goals remain. Especially, given the complexity of the biological processes involved and the drivers of emissions and removals in the sector, which can result in large uncertainties in emissions and removals, non-additionality, reversals and double counting. Gaining more understanding of this complexity and finding affordable "science based" ways to minimise the risks will be critical to inform the necessary climate investment decisions.

5 References

- Abbott, K. W. & Bernstein, S. (2015). The high-level political forum on sustainable development: orchestration by default and design. *Global Policy*, 6 (3), 222–233.
- Abbott, K. W. (2018). Orchestration. *Strategic Ordering in Polycentric Governance*. Cambridge: Cambridge University Press. *Governing Climate Change: Polycentricity in Action?* pp. 19–36. doi:10.1017/9781108284646.
- Aguilar-Amuchastegui, N., Funk, J., & Sanz, M.J. (2021). Forest carbon credits: Separating the “good” from the merely “good enough”. World Wide Fund for Nature (WWF). https://wwf.panda.org/wwf_news/?1415966/Forest-Carbon-Credits-Separating-the-good-from-the-merely-good-enough.
- Angelsen, A. (2008). *Moving Ahead with REDD: Issues Options and Implications*. CIFOR, Bogor Barat, Indonesia.
- Arts, B., Appelstrand, M., Kleinschmit, D., Püzl, H., Visseren-Hamakers, I., Eba’a Atyi, R., Enters, T., McGinley, K., & Yasmi, Y. (2010). Discourses, Actors and Instruments in International Forest Governance. *Embracing Complexity: Meeting the Challenges of International Forest Governance*, pp. 57–74. IUFRO World Series 28, Vienna.
- Bastin, J. F., Finegold, Y., Garcia, C., Mollicone, D., Rezende, M., Routh, D., Zohner, C. M., & Crowther, T. W. (2019). The global tree restoration potential. *Science* 365, 76–79. doi:10.1126/science.aax0848 Medline.
- Bastos-Lima, M.G., Persson, U.M., & Meyfroidt, P. (2019). Leakage and boosting effects in environmental governance: A framework for analysis. *Environmental Research Letters*. 14. 10.1088/1748-9326/ab4551.
- Bernstein, S., Cashore, B., Eba’a Atyi, R., Maryudi, A., McGinley, K., Cadman, T., Gulbrandsen, L., Goehler, D., Hogg, K., Humphreys, D., Kant, S., Kozak, R., Levin, K., McDermott, C., Purdon, M., Scher, I., Stone, M., Tacconi, L., & Yasmi, Y., (2010). Examination of the influences of global forest governance arrangements at the domestic level. In: Rayner, J., Buck, A., Katila, P. (Eds.), *Embracing Complexity: Meeting the Challenges of International Forest Governance*, pp. 111–136. IUFRO World Series 28, Vienna.
- Boedeltje, M. & Cornips, J. (2004). Input and output legitimacy in interactive governance. *Public Performance & Management Review*.
- Boerema, A., Rebelo, A.J., Bodi, M.B., Esler, K.J., & Meire, P. (2017). Are ecosystem services adequately quantified? *J. Appl. Ecol.* <https://doi.org/10.1111/1365-2664.12696>.
- Böttcher, H., Verkerk, P.J., Gusti, M., Havlík, P., & Grassi, G. (2012). Projection of the future EU forest CO₂ sink as affected by recent bioenergy policies using two advanced forest management models. *GCB Bioenergy*, 4, 773–783.
- Bruck, S.R., & Kuusela, O-P. (2021). How health and market access associate with agroforestry adoption decisions: evidence from Tabora, Tanzania. *Agroforest Syst* 95, 1073–1086. <https://doi.org/10.1007/s10457-021-00629-3>
- Bustamante, M., Robledo, C., Harper, R., Mbow, C., Ravindranath, N., Sperling, F., Haberl, H., Pinto, A., & Smith, P. (2014). Co-benefits, trade-offs, barriers and policies for greenhouse gas mitigation in the Agriculture, Forestry and Other Land Use (AFOLU) sector. *Global Change Biology*, 20 (10). pp. 3270–3290. <https://doi.org/10.1111/gcb.12591>
- Cattaneo, A., Lubowski, R., Busch, J., Creed, A., Strassburg, B., Boltz, F., & Ashton, R. (2010). On international equity in reducing emissions from deforestation. *Environmental Science & Policy*, 13, 742–753.
- Carbon Market Watch. (2021). FAQ: Deciphering Article 6 of the Paris Agreement. Available at: <https://carbonmarketwatch.org/2021/12/10/faq-deciphering-article-6-of-the-paris-agreement/#article-6-intro>
- Chaturvedi, R., Hanson, C.A., Ding, H., & Seymour, F. (2019). Public-Sector Measures to Conserve and Restore Forests: Overcoming Economic and Political Economy Barriers.
- Climate Policy Initiative. (2021). *Global Landscape of Climate Finance 2021*.
- Coalition for Rainforest Nations (CfRN). (2022). What does the Paris Agreement’s Article 6 mean for rainforests? Available at: <https://www.rainforestcoalition.org/policy-news/what-does-the-paris-agreements-article-6-mean-for-rainforests/>
- Dannecker, P. (2022). Collaboration in a ‘North–South’ Context: The Role of Power Relations and the Various Context-Based Conditions. *Eur J Dev Res.* <https://doi.org/10.1057/s41287-022-00550-0>

- Davenport, D., Bulkan, J., Hajjar, R., Hardcastle, P., Assembe-Mvondo, S., Eba`a Atyi, R., Humphreys, D., & Maryudi, A. (2010). Forests and sustainability. In: Rayner, J., Buck, A., Katila, P. (Eds.), *Embracing Complexity: Meeting the Challenges of International Forest Governance*, pp. 75–92. IUFRO World Series 28, Vienna.
- Deiningner, K., Byerlee, D., Lindsay, J., Norton, A., Selod, H., & Stickler, M. (2011). *Rising global interest in farmland. Can it yield sustainable and equitable benefits?* Washington, DC: The World Bank.
- del Barrio, G., Sanjuán, M. E., Martínez-Valderrama, J., Ruiz, A., & Puigdefábregas, J. (2021). Land degradation means a loss of management options. *J. Arid Environ.* 189, 104502. <https://doi.org/10.1016/j.jaridenv.2021.104502>
- Dieterle, C. (2022). Global Governance Meets Local Land Tenure: International Codes of Conduct for Responsible Land Investments in Uganda, *The Journal of Development Studies*, 58:3, 582-598, DOI: 10.1080/00220388.2021.1983165
- Dow, C., Kim, A.Y., D'Orangeville, L. et al. (2022). Warm springs alter timing but not total growth of temperate deciduous trees. *Nature* 608, 552–557. <https://doi.org/10.1038/s41586-022-05092-3>
- FAO. (2012). *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries, Forests*.
- FAO & UNEP. (2020). *The State of the World's Forests 2020. Forests, biodiversity and people*. Rome.
- Gibbs, H., Brown, S., Niles, J., & Foley, J. (2007). Monitoring and estimating tropical forest carbon stocks: Making REDD a reality. *Environmental Research Letters*. 2. 045023. 10.1088/1748-9326/2/4/045023.
- Glück, P., Angelsen, A., Appelstrand, M., Assembe Mvondo, S., Auld, G., Hognl, K., Humphreys, D., & Wildburger, C. (2010). Core components of the international forest regime complex. In: Rayner, J., Buck, A., Katila, P. (Eds.), *Embracing Complexity: Meeting the Challenges of International Forest Governance. A Global Assessment Report*, pp. 37–55. IUFRO World Series 28, Vienna.
- González, N.C., & Kröger, M. (2020). The potential of Amazon indigenous agroforestry practices and ontologies for rethinking global forest governance. *For. Policy Econ.* 118, 102257 <https://doi.org/10.1016/j.forpol.2020.102257>.
- Grassi, G., Schwingshackl, C., Gasser, T., Houghton, R. A., Sitch, S., Canadell, J. G., Cescatti, A., Ciais, P., Federici, S., Friedlingstein, P., Kurz, W. A., Sanz Sanchez, M. J., Abad Viñas, R., Alkama, R., Ceccherini, G., Kato, E., Kennedy, D., Knauer, J., Korusuo, A., McGrath, M. J., Nabel, J., Poulter, B., Rossi, S., Walker, A. P., Yuan, W., Yue, X., & Pongratz, J. (2022). Mapping land-use fluxes for 2001–2020 from global models to national inventories, *Earth Syst. Sci. Data Discuss.* [preprint], <https://doi.org/10.5194/essd-2022-245>, in review, 2022.
- Griscom, B.W., Adams, J., Ellis, P.W., Houghton, R.A., Lomax, G., Miteva, D.A., Schlesinger, W.H., Shoch, D., Siikamaki, J.V., Smith, P., et al. (2017). Natural climate solutions. *Proceedings of the National Academy of Sciences of the United States of America* 114(44):11645-11650. doi:10.1073/pnas.1710465114.
- Hall, R. (2013). *REDD+ and the Underlying Causes of Deforestation and Forest Degradation*. Global Forest Coalition.
- Hein, J. (2019). Political Ecology of REDD+ in Indonesia: Agrarian Conflicts and Forest Carbon. 10.4324/9781351066020.
- Hrabanski, M., & Le Coq, J. F. (2022). Climatisation of agricultural issues in the international agenda through three competing epistemic communities: Climate-smart agriculture, agroecology, and nature-based solutions. *Environmental Science and Policy* 127, 311–320. <https://doi.org/10.1016/j.envsci.2021.10.022>.
- Howlett, M., Rayner, J., Goehler, D., Heidbreder, E., Perron-Welch, F., Rukundo, O., Verkoijen, P., Wildburger, C., 2010. Overcoming the challenges to integration: embracing complexity in forest policy design through multi-level governance. In: Rayner, J., Buck, A., Katila, P. (Eds.), *Embracing Complexity: Meeting the Challenges of International Forest Governance*. IUFRO World Series, Vol. 28, pp. 93–110. Vienna.
- Keohane, R.O., & Victor, D.G. (2011). The regime complex for climate change. *Perspect. Politics* 9 (1), 7–23. <https://doi.org/10.1017/S1537592710004068>.
- IETA. (2019). *The Economic Potential of Article 6 of the Paris Agreement and Implementation Challenges*, IETA, University of Maryland and CPLC.
- IPCC. (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L.Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2391 pp. doi:10.1017/9781009157896.

- IPCC. (2022): Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926
- Jackson, R.B., Jobbágy, E.G., Avissar, R. et al. (2005). Trading water for carbon with biological carbon sequestration. *Science*, 310, 1944.
- Jiang, M., Medlyn, B.E., Drake, J.E., Duursma, R.A., Anderson, I.C., Barton, C.V.M., Boer, M.M., Carrillo, Y., Castañeda-Gómez, L., Collins, L., Crous, K.Y., De Kauwe, M.G., dos Santos, B.M., Emmerson, K.M., Facey, S.L., Gherlenda, A.N., Gimeno, T.E., Hasegawa, S., Johnson, S.N., Kännaste, A., Macdonald, C.A., Mahmud, K., Moore, B.D., Nazaries, L., Neilson, E.H.J., Nielsen, U.N., Niinemets, Ü., Noh, N.J., Ochoa-Hueso, R., Pathare, V.S., Pendall, E., Pihlblad, J., Piñeiro, J., Powell, J.R., Power, S.A., Reich, P.B., Renchon, A.A., Riegler, M., Rinnan, R., Rymer, P.D., Salomón, R.L., Singh, B.K., Smith, B., Tjoelker, M.G., Walker, J.K.M., Wujeska-Klaue, A., Yang, J., Zaehle, S. & Ellsworth, D.S. (2020). The fate of carbon in a mature forest under carbon dioxide enrichment. *Nature*. 580. (7802) 227-231-231. DOI (10.1038/s41586-020-2128-9).
- Lemos, M. C., & Agrawal, A. (2006). Environmental Governance. *Annual Review of Environment and Resources* 31(November): 297–325.
- Mace, M.J., Fyson, C.L., Schaeffer, M., Hare, W.L. (2018). Governing large-scale carbon dioxide removal: are we ready? Carnegie Climate Geoengineering Governance Initiative (C2G2), November 2018, New York, US.
- Mahul, O., & Stutley, C.J. (2010). Government Support to Agricultural Insurance: Challenges and Options for Developing Countries. World Bank, Washington DC.
- McDermott, C.L., Humphreys, D., Wildburger, C., Wood, P., Marfo, E., Pacheco, P., & Yasmi, Y. (2010). Mapping the core actors and issues defining international forest governance. IUFRO World Series Volume 28 (Ed.). *Embracing Complexity: Meeting the Challenges of International Forest Governance*, pp. 19–36.
- Meyfroidt, P, et al. (2022). Ten facts about land systems for sustainability. *Proceedings of the National Academy of Sciences* 119. <https://doi.org/10.1073/pnas.2109217118>.
- Milne, M. (2002). Transaction costs of forest carbon projects. CIFOR. Bogor, Indonesia.
- Obergassel, W., Hermwille, L., Jüde, F., Samadi, S., & Röhnelt, A. (2021). Carbon Markets in a <2 °C World: What Role May International Carbon Trading Play in, up to and beyond 2050? (Carbon Mechanisms Research Policy Paper No. 03/2021). Wuppertal Institute for Climate, Environment and Energy.
- OECD. (2007), "Increasing Productivity and Improving Market Access", in *Promoting Pro-Poor Growth: Policy Guidance for Donors*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264024786-16-en>.
- Olsson, L., H. Barbosa, S. Bhadwal, A. Cowie, K. Delusca, D. Flores-Renteria, K. Hermans, E. Jobbágy, W. Kurz, D. Li, D.J. Sonwa, L. Stringer, (2019): Land Degradation. In: *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems* [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.
- Pearson, T., Brown, S., Sohngen, B., Henman, J., & Ohrel, S. (2013). Transaction costs for carbon sequestration projects in the tropical forest sector. *Mitigation and Adaptation Strategies for Global Change*. 19. 10.1007/s11027-013-9469-8.
- Perlin, J. (2005). *A Forest Journey: The Story of Wood and Civilization*. The Countryman Press, New York, USA.
- Phan, T-H. Brouwer, R., & Davidson, M. (2013). The economic costs of avoided deforestation in the developing world: A meta-analysis. *Journal of Forest Economics*. 20. 10.1016/j.jfe.2013.06.004.
- Radkau, J. (2012). *Wood: A History*. Polity, Cambridge, UK.
- Roe, S., Streck, C., Obersteiner, M. et al. (2019). Contribution of the land sector to a 1.5 °C world. *Nat. Clim. Chang*. 9, 817–828. <https://doi.org/10.1038/s41558-019-0591-9>.
- Roe, S., Streck, C., Beach, R. et al. (2021). Land-based measure to mitigate climate change: Potential and feasibility by country. *Global Change Biology*, 27: 6025-6058. DOI: 10.1111/gcb.15873.

Climate governance gaps and options for the land use sector

- Sanz, M. J., de Vente, J., Chotte, J.-L., Bernoux, M., Kust, G., Ruiz, I., Almagro, M., Alloza, J.-A., Vallejo, R., Castillo, V., Hebel, A., & Akhtar-Schuster, M. (2017). Sustainable Land Management contribution to successful land-based climate change adaptation and mitigation. A Report of the Science-Policy Interface. United Nations Convention to Combat Desertification (UNCCD), Bonn, Germany.
- Sanz, M. J. (2019). Will Land-Use Mitigation Contribute as Expected to Achievement of Paris Agreement Goals? Available at: <https://www.wri.org/climate/expert-perspective/will-land-use-mitigation-contribute-expected-achievement-paris-agreement>.
- Smith, P. & Bustamante, M. (2014). "Agriculture, Forestry and Other Land Use (AFOLU)" in Mitigation of Climate Change: Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge: Cambridge University Press, 2014).
- Stevens, A.W. (2022). The economics of land tenure and soil health. *Soil Security* 6, 100047.
- Todd, K. & Guimaraes, L. (2022). Article 6: What does it mean for REDD+? UN-REDD Programme. Available at: <https://www.un-redd.org/post/article-6-what-does-it-mean-redd>
- UNDP International Poverty Centre. (2006). What is Poverty? Concept and Measures. United Nations Development Programme, Brasilia, Brazil.
- UNFCCC. (2014). Decision booklet on REDD+. Available at: https://unfccc.int/files/land_use_and_climate_change/redd/application/pdf/compilation_redd_decision_booklet_v1.1.pdf
- UNFCCC. (2022a). NDC Registry. Available at: <https://www4.unfccc.int/sites/NDCStaging/Pages/All.aspx>.
- UNFCCC. (2022b). Nationally Determined Contributions. Relevant decisions. Available at: <https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs/nationally-determined-contributions-ndcs>
- Von Braun, J., & Meinzen-Dick, R. (2009). 'Land Grabbing' by foreign investors in developing countries: Risks and opportunities (IFPRI Policy Brief No 13). Washington, DC: International Food Policy Research Institute.
- Weiss, T. G., Seyle, C., & Coolidge, K. (2013). The Rise of Non-State Actors in Global Governance: Opportunities and Limitations. One Earth Future Foundation. <http://dx.doi.org/10.18289/OEF.2013.003>.

PARTICIPANTS



NDC ASPECTS project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement No 1011003866



NDC ASPECTS

www.ndc-aspects.eu

@ndcaspects



@ndcaspects

