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Krystal Crumpler, Alexandre Meybeck, Sandro Federici, Mirella Salvatore, Beau Damen, Giulia Gagliardi, Srijita Dasgupta, Mario Bloise, Julia Wolf and Martial Bernoux

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ACRONYMS AND ABBREVIATIONS

AFOLU	Agriculture, Forestry and Other Land Use
BAU	Business as usual
COP	Conference of the Parties
CTU	Clarity, transparency and understanding
ETF	Enhanced Transparency Framework
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GHG	Greenhouse gas
INDC	Intended nationally determined contribution
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Processes and Product Use
LULUCF	Land Use, Land Use Change and Forestry
MEA	Millennium Ecosystem Assessment
MPG	Modalities, Procedures and Guidelines
MRV	Measurement, reporting and verification
M&E	Monitoring and evaluation
NAP	National Adaptation Plan
NC	National Communication
NDC	Nationally determined contributions
NGHGI	National greenhouse gas inventory
PA	Paris Agreement
TACCC	Transparency, Accuracy, Consistency, Completeness and Comparability
TAP	Technology Action Plan
TEEB	Economics of Ecosystems and Biodiversity
TNA	Technical needs assessment
UNEP	UN Environment
UNFCCC	United Nations Framework Convention on Climate Change

CHEMICAL FORMULAE

CH₄

Methane

CO₂

Carbon dioxide

eq

equivalent

N₂O

Nitrous oxide

INTRODUCTION

At the twenty-first Conference of the Parties (COP) to the United Nations Framework on Climate Change (UNFCCC), the adoption of the Paris Agreement (PA) brought together developed and developing countries in a common cause to undertake ambitious efforts to combat climate change and adapt to its effects. The central aim of the PA is to strengthen the response to climate change by limiting the global temperature rise to well below 2 degrees Celsius (°C) above pre-industrial levels and to even strive for 1.5°C (Article 2). Parties also established a global goal on enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change (Article 2). Underpinning the PA are the Nationally Determined Contributions (NDCs),¹ or the efforts that each Party plans to pursue in order to reduce national greenhouse gas (GHG) emissions and, as appropriate, conserve and enhance sinks and reservoirs, and adapt to climate change. Articles 4.2 of the PA requires each Party to prepare, communicate and maintain NDCs over time.

The success of the PA rests upon the enhanced ambition of Parties to progressively revise and strengthen their NDCs over time. Article 4.3 embeds an “ambition mechanism” in the PA, under which each Party shall prepare successive NDCs every five years (starting in 2020) that represent a progression beyond their current NDC and reflects its highest possible ambition, in light of different national circumstances and capacities. The Global Stocktake, starting in 2023, is an essential part of the architecture of the PA, designed to take stock of the implementation of climate action and assess collective progress towards achieving the purpose and long-term goals of the PA (Article 14). The Global Stocktake represents the “engine” of the ambition mechanism, as the outcome shall inform, in a nationally determined manner, the next cycle of climate action and support, thus driving enhanced ambition over time.

The opportunity to bridge the emissions gap by 2030, however, is quickly closing. Commitments expressed in current NDCs imply global warming of about 3°C above pre-industrial levels by 2100. The UN Environment (UNEP) 2019 Emissions Gap Report shows that the current level of ambition in the NDCs needs to be roughly tripled for the 2°C scenario and increased around fivefold for the 1.5°C scenario (UNEP, 2019). While the Intergovernmental Panel on Climate Change (IPCC) suggests that it is still possible to limit the average global temperature rise to 1.5°C, it will require unprecedented action in six key areas: energy transition, climate finance and carbon pricing, industry transition, nature-based solutions, cities and local action and resilience (IPCC, 2018). Likewise, while the gap in adaptive capacity between lower-income and higher-income countries is closing, progress is generally too slow (UNEP, 2018). The UNEP 2018 Adaptation Gap Report finds that countries are increasingly addressing adaptation in laws and policies, but the enabling environments for adaptation to be efficient are still weak and there is a major adaptation finance gap that is estimated to be even wider in the future given the increasing needs.

The agriculture and land use sectors (crops, livestock, forestry, fisheries and aquaculture) – hereafter referred to as the AFOLU (Agriculture, Forestry and Other Land Use) sector for ease of reference – are uniquely placed to deliver on both mitigation and adaptation objectives in tandem. Smallholder farmers, pastoralists, fisherfolk, community foresters and actors along agri-food value chains depend on climate-sensitive activities for their sustenance and livelihoods and are considered amongst the most vulnerable groups to climate variability and change (IPCC, 2018). At the same time, reductions in emissions and the emission intensity of agricultural production, and enhancing carbon sequestration in biomass and soils, can significantly contribute to mitigating the 21 to 37 percent share of GHG emissions generated by the global food system each year (IPCC, 2019). Indeed, the sector features prominently amongst the adaptation and mitigation contributions set forth in the NDCs – up to 96 and 88 percent, respectively (FAO, 2016a).

¹ Parties were requested to submit intended NDCs (INDC) prior to COP21. Once a Party adopted the PA, the INDC was automatically converted into an NDC, unless replaced by a new NDC. For the sake of this document, the INDCs and NDCs are referred to collectively as NDCs.

PURPOSE

Understanding current NDC priorities and support needs is critical to upscaling climate action in 2020 and ensuring a progressive cycle of ambition over time. There is a need to unpack and assess national climate change mitigation and adaptation priorities at the sectoral and activity level, to understand the climate-related hazards and risks threatening ecosystems and the livelihood systems they sustain, and to identify the various barriers, capacity gaps and support needs impeding the dissemination of technologies and resources for the uptake of climate action on the ground. However, the heterogeneity of the NDCs in terms of scope, format and level of detail, consequent to their bottom-up, “nationally determined” nature, presents a number of methodological challenges for data aggregation and analysis. With the 2023 Global Stocktake around the corner, which calls for the assessment of collective progress towards the global temperature and adaptation goals of the PA, a common framework for aggregating NDC priorities and needs in a systematic manner is a necessary first step for assessing collective progress and facilitating the iterative process of NDC ambition raising.

This working paper identifies five core NDC pillars and sub-components specific to the AFOLU sector based on a global stocktaking of NDCs and alignment with the Enhanced Transparency Framework of the Paris Agreement. It can serve as a framework for formulating NDC priorities, planning processes and support needs in the AFOLU sector, as well as a comparative benchmark for highlighting gaps and entry-points for ambition raising in future NDC revisions. As such, it is directed at national policy makers sitting in ministries of environment, agriculture, finance and social planning involved in NDC planning and coordination. It is also directed at international and non-governmental organizations, development agencies and finance institutions so as to guide the provision of support towards closing the underlying finance, technology and capacity gaps impeding NDC implementation in the sector. To date, the framework has been adopted by FAO to conduct a series of regional-level analysis of the role of the AFOLU sector in the NDCs, including Eastern Africa (FAO, 2017b), Europe and Central Asia (FAO, 2019), Asia (FAO, 2020a) and the Pacific (FAO, 2020b), Latin America (FAO, 2020c) and the Caribbean (FAO, 2020d).

A common framework for unpacking the NDCs speaks to the importance of Art 4.8 of the PA, which provides that all Parties shall provide information necessary for “clarity, transparency and understanding” (CTU) when communicating their NDCs. The Modalities, Procedures and Guidelines (MPGs), adopted in 2018 at COP24 (Annex to decision 18/CMA.1), define a set of “rules” for the enhanced transparency of climate action and support. Under the ETF, Parties are expected (with flexibility) to provide a structured summary of information to report on NDC implementation and progress, including a national greenhouse gas inventory (NGHGI) report, information necessary to track progress on implementing and achieving their NDC, information on climate change impacts and adaptation and information on support provided or needed and received.

There are significant domestic and international benefits that can be realized from more transparent, specific, comprehensive, quantifiable and comparable NDCs, namely:

- ▶ Transparent communication is essential to building mutual trust and confidence and promoting effective implementation.
- ▶ Specific information about mitigation and adaptation objectives and targets can be more easily translated into actionable policies and plans with measurable outcomes;
- ▶ Comprehensive information on national circumstances, climate change impacts and support needs can promote greater understanding of what is fair and ambitious and provide the rationale for international support.
- ▶ Quantifiable and comparable information is required to realistically assess collective progress towards reaching the global temperature and adaptation goals of the PA and, thus, inform NDC review and revision cycles.

The paper is organized into two parts. The first part presents the NDC framework for the AFOLU sector. The second part presents a methodology for assessing entry-points for enhancing NDC ambition in future revision cycles by using the common framework as a benchmark against which the NDCs can be assessed. The conclusions grounds the utility of the framework within the context of the Enhanced Transparency Framework and Global Stocktake of the PA.

METHODS

The common NDC framework for the AFOLU sector presented here is based on a comprehensive screening of all 163 NDCs and 6 INDCs, representing 195 countries², submitted to the UNFCCC as of 1 June 2020. Each document was accessed in English, or in the original language when there was no English translation, and reviewed in full. The screening process served to identify common structural elements or information areas (“categories” and “sub-categories”) in the NDC specific to the AFOLU sector. A second screening processes was performed to catalog the NDC content by category (and sub-category) identified, using either binary coding, numerical values or plain text. Only those categories representing a relevant statistical share of the data collected (> 5 NDCs per category) were included in the final selection. The final set of categories were then aligned with standard international classifications or scientific literature. The data screening and categorization processes were undertaken by at least three independent reviewers to assure consistency and quality control. Supplementary information on GHG emissions and removals, climate change impacts and barriers to action and technology needs was collected from other national submissions (most recent as of 1 June 2020) to the UNFCCC, including National Communications (NCs), Biennial Update Reports (BURs) and technical needs assessments (TNAs) and categorized by means of the process described above. **Annex 1** contains the full list of categories and sub-categories that can be used to characterize the NDCs in the AFOLU sector.

It should be noted that the heterogeneous nature of the NDCs in terms of detail, format and content presents a challenge for data aggregation and ultimately the ability to make comparisons and draw concrete conclusions about them. The authors, therefore, stress that the utility of the common framework lies in the structured approach it allows for an initial stocktaking of information related to the AFOLU sector in the NDCs and the possibility to then identify entry points for enhancing the role of the sector in future NDC iterations.

² The European Union comprised 28 Member States at the time of the first NDC submission.

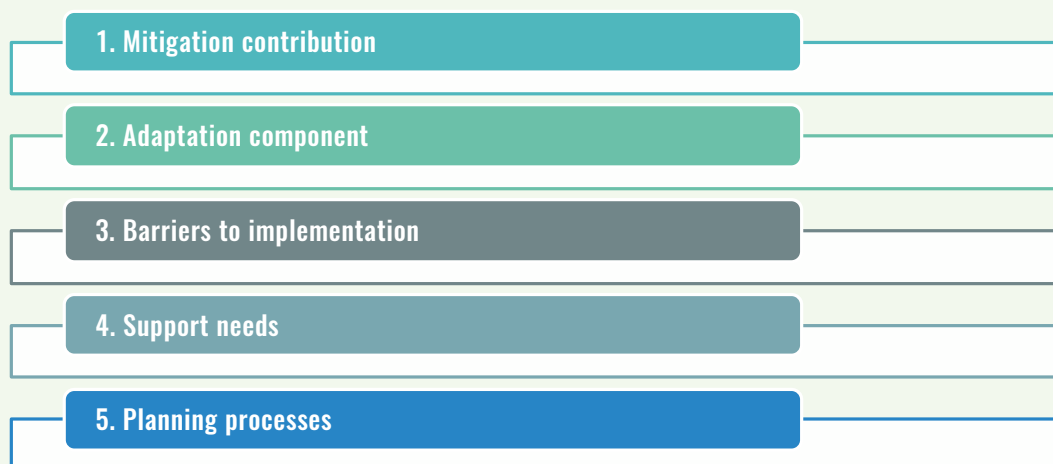
PART 1

FRAMEWORK

This section presents a common framework for transforming the NDCs in the AFOLU sector into a set of sub-components so as to facilitate aggregation and analysis. The NDC framework is organized around five main pillars (**Figure 1**): the mitigation contribution; adaptation component; barriers to implementation; support needs; and planning processes For the purpose of this document, the AFOLU sector encompasses all assets (natural, economic, social and human) and activities (production, aggregation, processing, distribution and consumption) related to crops, livestock, forestry and fisheries and aquaculture systems, and the outputs of those systems, including environmental and socio-economic outcomes (e.g. food security and nutrition) at the individual, community, national and global level.

FIGURE 1.

FIVE MAIN PILLARS OF THE COMMON NDC FRAMEWORK FOR THE AFOLU SECTOR



PILLAR 1: MITIGATION CONTRIBUTION

Article 4.2 of the PA requires Parties to communicate their domestic mitigation efforts in contribution to the collective temperature goal. Mitigation refers to a human intervention that aims to reduce emission sources or conserve and enhance sinks (IPCC, 2014a). For the purpose of this framework, mitigation in the AFOLU sector refers to the GHG source and sink categories defined by the 2006 IPCC Guidelines for NGHGI for the AFOLU sector, excluding Settlements and Other Land categories (IPCC, 2006).

Based on a global stocktaking of the NDCs, and in line with the new transparency requirements of the ETF, the **mitigation contributions** in the NDCs generally contain the following information categories (**Figure 2**):

- ▶ scope of contribution (i.e. economy-wide, multi-sectoral or uni-sectoral);
- ▶ timeframes and/or period(s) for implementation;
- ▶ type of contribution (i.e. GHG target or Action-only);
- ▶ type of GHG target (i.e. absolute or intensity reduction)
- ▶ reference level or baseline (i.e. base year, business as usual (BAU) or trajectory);
- ▶ target year(s) of GHG target (i.e. single or multi-year)
- ▶ coverage of GHG gases (i.e. CO₂, CH₄, N₂O);
- ▶ long-term mitigation goal;
- ▶ assumptions and methodological approaches;
- ▶ description of adaptation and sustainable development co-benefits of mitigation; and
- ▶ information on measurement, reporting and verification (MRV).

FIGURE 2.

MAIN INFORMATION CATEGORIES CONTAINED IN THE “MITIGATION CONTRIBUTION” IN THE NDCs

Scope	Timeframe	Type of contribution	Type of GHG target	Target reference level	Coverage of GHG gases	Long-term mitigation goal	Assumptions and methodological approaches	Description of co-benefits of mitigation	Information on MRV system
Energy	Single period	GHG target	Absolute	Base year	CO ₂	Included	Included	Adaptation	In place
IPPU				BAU	CH ₄				
AFOLU	Multi-period	Action-only	Intensity	Trajectory	N ₂ O	Not-included	Not-included	Sustainable dev.	Improvement needed
Waste									

The **scope** is defined as the overall sectoral coverage of the mitigation contribution, which may span one or more of the four sectors defined by the 2006 IPCC Guidelines for NGHGs: Energy, Industrial Processes and Product Use (IPPU), AFOLU and Waste.

The overall **timeframe** may be expressed as a single period with a start and end date (e.g. 2020–2030), or multiple periods of implementation (e.g. 2020–2025 and 2025–2030).

A mitigation **contribution** may take the form of either a **GHG target**, or a set of actions (“Action-only”). A GHG target may be expressed as either an “absolute” reduction – a reduction or percent change in net emissions compared to a reference level – or as a reduction in emission “intensity” – a reduction or percent change in net emissions per unit of gross domestic product (GDP) or per capita compared to a reference level. The **reference level**, or baseline/counterfactual scenario against which the GHG target is set, may be “static” in nature, such as an emission level in a given “base year” or in a “BAU” scenario. Alternatively, the baseline/counterfactual scenario may be “dynamic” in nature, such as an emission “trajectory”. The **target year** may be set in relation to a “single” year (e.g. 2030) or “multi-years” (e.g. 2020, 2025 and 2030).

Alternative to a GHG target, the mitigation contribution may be expressed as a set of actions, “**Action-only**”. Each action may be associated with a quantified or non-quantified expected outcome where quantified outcomes are expressed in units of GHG emissions reduced/avoided or removals enhanced (e.g. 20 Mt CO₂eq reduced per year from energy efficiency improvements), or in non-GHG units (e.g. 200 hectares of land restored by 2030). A non-quantified outcome, on the other hand, is descriptive in nature (e.g. widespread reforestation).

In addition, an NDC may contain a **long-term mitigation goal** indicative of its contribution towards collectively achieving the temperature goal under Article 2 of the Convention. In order to facilitate CTU, the mitigation contribution shall also be supplemented by **information on assumptions and methodological approaches**, including those for estimating emissions and removals, such as IPCC methodology applied, and those for accounting NDC progress, including about the use of an offset mechanism when appropriate.

At the sectoral level, the **AFOLU-specific mitigation contributions** in the NDC generally contain the following information categories (**Figure 3**):

- ▶ degree of sectoral integration (i.e. included in or additional to economy-wide/multi-sectoral contribution);
- ▶ scope of sectoral contribution (i.e. agriculture and/or Land Use, Land Use Change and Forestry (LULUCF) sector);
- ▶ timeframes and/or period(s) for implementation;
- ▶ type of sectoral contribution (i.e. sector-wide GHG or non-GHG target, and/or policies and measures);
- ▶ type of GHG target (i.e. absolute or intensity reduction)
- ▶ reference level or baseline (i.e. base year, BAU or trajectory);
- ▶ target year(s) of GHG target (i.e. single or multi-year);
- ▶ type of non-GHG target (i.e. quantified or non-quantified outcome)
- ▶ coverage of GHG gases (i.e. CO₂, CH₄, N₂O); and
- ▶ description of adaptation and sustainable development co-benefits of mitigation in AFOLU.

FIGURE 3.

MAIN INFORMATION CATEGORIES IN THE “MITIGATION CONTRIBUTION IN THE AFOLU SECTOR” IN THE NDCs

Degree of integration	Scope	Timeframe	Type of contribution	Type of GHG target	Target reference level	Target year(s)	Coverage of GHG gases	Type of non-GHG target	Co-benefits of mitigation
Included in economy-wide* contribution	Agriculture	Single period	GHG target	Absolute	Base year	Single	CO ₂	Quantified outcome	Adaptation
Additional to economy-wide* contribution	LULUCF	Multi-period	Non-GHG target	Intensity	BAU	Multi-year	CH ₄	Non-quantified outcome	Sustainable development
			Policies and measures		Trajectory		N ₂ O		

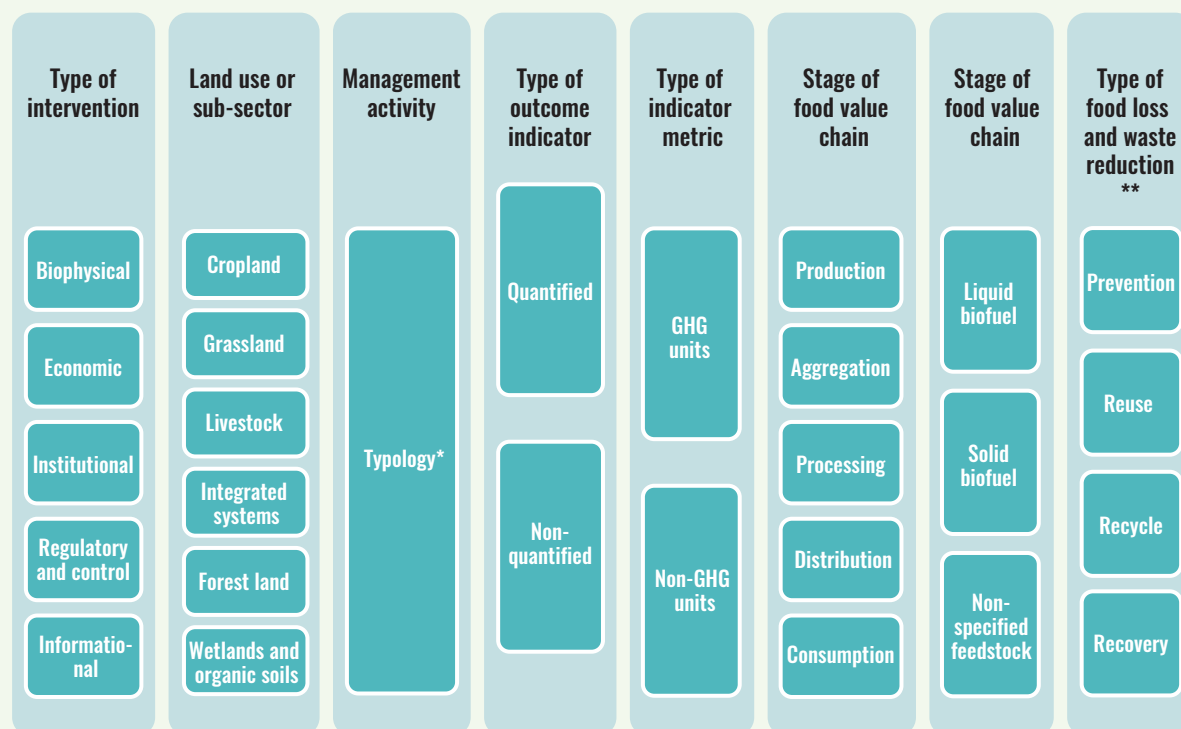
*Or multi-sectoral.

The mitigation contribution in the AFOLU sector may be articulated in the form of a GHG target or non-GHG target, and/or policies and measures. Policies and measures provide clarity and specificity on the means to achieving an economy-wide and/or sector-specific mitigation contribution. Based on a stocktaking of the NDCs, and in line with the new transparency requirements of the ETF, the **AFOLU-specific mitigation policies and measures** in the NDC generally contain the following information categories (Figure 4):

- ▶ type of intervention;
- ▶ type of land use category or agricultural sub-sector;
- ▶ type of management activity;
- ▶ type of outcome indicator (i.e. quantified or non-quantified);
- ▶ type of indicator metric (i.e. GHG or non-GHG unit of measurement);
- ▶ stage of food value chain;
- ▶ type of bioenergy production (if applicable); and
- ▶ type of food loss or waste reduction (if applicable).

FIGURE 4.

MAIN INFORMATION CATEGORIES TO DEFINE THE “MITIGATION POLICIES AND MEASURES IN THE AFOLU SECTOR” IN THE NDCs

* Refer to **Table 1** of **Annex 1** for full list.

** If applicable.

Each mitigation policy or measure may be characterized by the following **intervention types**: biophysical (such as on-farm practices); economic (such as taxes, subsidies or other market-based policies); regulatory and control (such as land use planning and protected areas); informational (such as research and awareness raising) and institutional approaches (such as policy mainstreaming and coordination) (IPCC, 2014a).

Each policy or measure may also be associated with one of six land use categories (IPCC, 2014a), or one of four **agricultural sub-sectors** (FAO, undated). Each policy or measure may be associated with one of 33 types of land use/agricultural **management activities** (IPCC, 2014a). The expected outcome from the implementation of that activity may be associated with a quantified or non-quantified **outcome indicator**. If quantified, the **indicator metric** used to define the expected outcome may be expressed in a GHG or non-GHG unit of measurement, i.e. GHG emissions reduced/avoided or removals enhanced (e.g. 50 kt CO₂ eq avoided per dairy cattle), or a non-GHG unit of measurement (e.g. 10 ha of abandoned land converted to agroforestry each year). Alternatively, if the expected outcome is not quantified, it is descriptive/qualitative in nature (e.g. substitution of chemical with organic fertilizer). Each policy or measure may also be associated with one of five **stages of the food value chain** from production to consumption, where production includes pre-harvest/slaughter and harvest/slaughter (HLPE, 2014).

If applicable, each policy or measure may be associated with one of six types of **bioenergy production** and use (IPCC, 2014a). For instance, if a country promotes the distribution of more efficient wood cookstoves, the policy is firstly categorized as a mitigation action in the AFOLU sector under “reducing forest degradation and sustainable forest management” and then tagged as “use of energy-efficient fuelwood cookstoves” under bioenergy from forests.

If applicable, each policy or measure may be associated with one of four types of **food loss and waste reduction**, where food losses occur during production, post-harvest and processing operations, and food waste occurs at marketing and consumer levels (HLPE, 2014).

Table 1 illustrates examples of AFOLU-specific mitigation contributions found in the NDCs of selected countries.

TABLE 1.

COUNTRY EXAMPLES OF NDC MITIGATION CONTRIBUTIONS IN THE AFOLU SECTOR

TYPE OF MITIGATION CONTRIBUTION		AFOLU-SPECIFIC EXAMPLE
SECTOR-WIDE GHG EMISSION REDUCTION TARGET		
EMISSION REDUCTION COMPARED AGAINST BASE YEAR LEVEL		THE TARGET FOR LULUCF REMOVALS IS SET AS APPROXIMATELY 37 MILLION TONS OF CO ₂ CORRESPONDING TO 2.6 PERCENT REDUCTION OF TOTAL GHG EMISSIONS COMPARED TO 2005 (JAPAN)
EMISSION REDUCTION COMPARED AGAINST BAU SCENARIO		31.1 PERCENT REDUCTION IN AGRICULTURAL EMISSIONS COMPARED TO 2030 BAU INCLUDING 25.3 PERCENT OF CONDITIONAL CONTRIBUTION AND 5.8 PERCENT OF UNCONDITIONAL CONTRIBUTION (BENIN)
SECTOR-WIDE NON-GHG TARGET		
MITIGATION TARGET EXPRESSED IN NON-GHG UNITS		INCREASE THE [SHARE] OF TOTAL GAZETTE FOREST RESERVES TO 55 PERCENT OF TOTAL [FOREST] LAND AREA, COMPARED TO THE CURRENT LEVELS OF 41 PERCENT (BRUNEI DARUSSALAM)
MITIGATION POLICY OR MEASURE		
QUANTIFIED OUTCOME		REDUCING CHEMICAL FERTILIZERS BY 20 PERCENT THROUGH CONSERVATION AND CLIMATE SMART AGRICULTURAL PRACTICES, [INCLUDING] THE USE OF ORGANIC MANURE AND COMPOSTS (NAMIBIA)
NON-QUANTIFIED OUTCOME		IMPROVE THE QUALITY OF PASTURE, IN PARTICULAR OF CATTLE WITH LEGUMINOUS PLANT (HAITI)

PILLAR 2: ADAPTATION COMPONENT

Article 7.10 of the PA states that each Party should, as appropriate, submit and update periodically an adaptation communication, which may include its priorities, implementation and support needs, plans and actions, without creating any additional burden for developing country Parties. Adaptation to climate change refers to the process of adjustment to actual or expected climate and its effects in order to moderate harm or to benefit from opportunities associated with such changes (IPCC, 2019). For the purpose of this framework, adaptation in the AFOLU sector signifies modifying agricultural production and socio-economic institutional systems in response to and in preparation for actual or expected climate variability and change and their impacts, to moderate harmful effects and exploit beneficial opportunities. Resilience can be described as the capacity of systems, communities, households or individuals to prevent, moderate or cope with risk, and recover from shocks. Adaptive capacity encompasses two dimensions: the capacity to manage or moderate climate risks (including extreme climatic events), and the capacity to gradually respond to longer-term climate changes (FAO, 2017c). A key way to moderate, reduce and/or avoid climate-related impacts is to reduce a system's underlying vulnerabilities, strengthen its adaptive capacity and increase its resilience (FAO, 2016b).

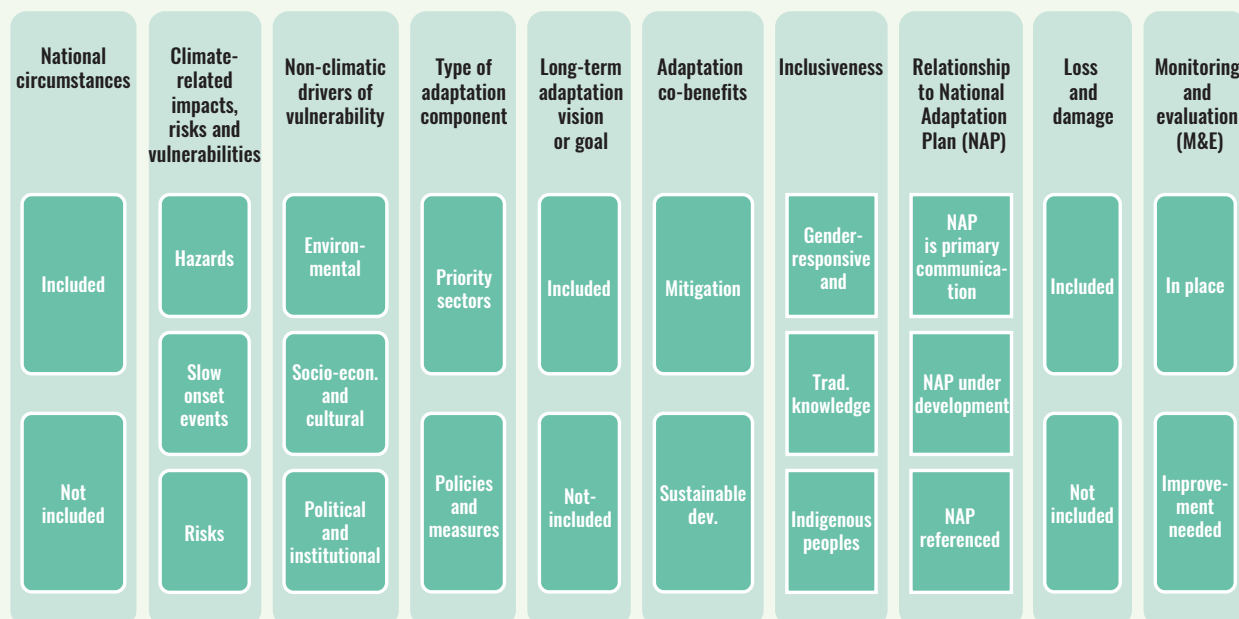
Based on a global stocktaking of the NDCs, and in line with the new transparency requirements under the ETF (UNFCCC, 2018), **adaptation components** in the NDCs generally contain the following information categories (**Figure 5**):

- ▶ national circumstances, institutional arrangements and legal frameworks;
- ▶ climate-related impacts, risks and vulnerabilities;
- ▶ non-climatic drivers of vulnerability;
- ▶ adaptation priority sectors and cross-sectoral priorities;
- ▶ adaptation policies and measures;
- ▶ long-term adaptation vision and/or goal;
- ▶ description of the mitigation and sustainable development co-benefits of adaptation;
- ▶ inclusiveness of adaptation (i.e. gender-responsive, use of traditional and indigenous peoples' knowledge);

- description of relationship to adaptation communication and process, such as National Adaptation Plan (NAP);
- information on loss and damage related to climate change impacts; and
- information on monitoring and evaluation (M&E) of adaptation actions and processes.

FIGURE 5.

MAIN INFORMATION CATEGORIES CONTAINED IN THE “ADAPTATION COMPONENT” IN THE NDCs



*Or multi-sectoral

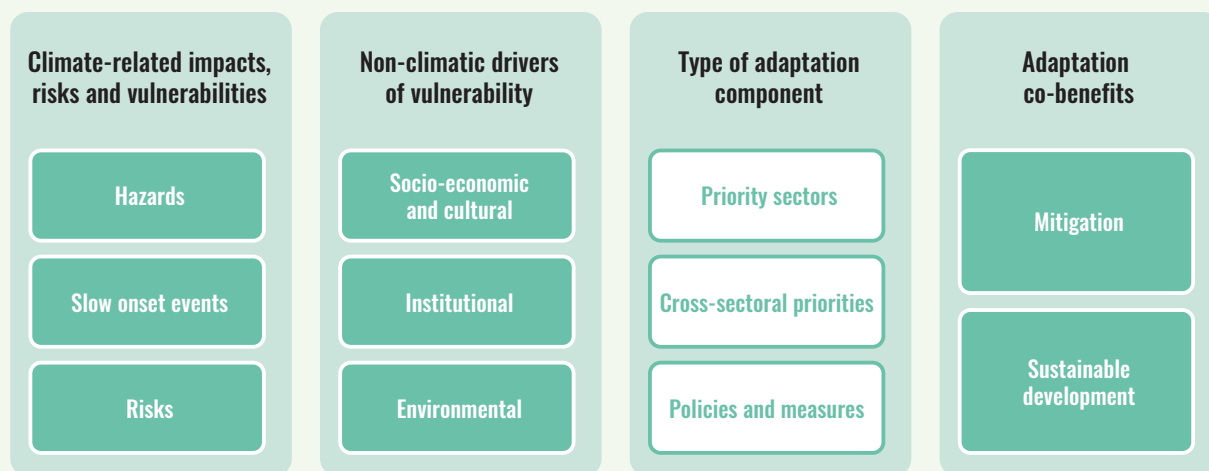
For the sake of this framework, “climate-related impacts” refer broadly to the effects of extreme weather and climate events and of climate change on the lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure, due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. A “climate-related risk” is a function of the complex interactions between climate-related hazards and the vulnerability, exposure and adaptive capacity of human and natural systems (IPCC, 2014a; UN Environment, 2019).

In the case of the AFOLU sector, the information contained in the **sector-specific adaptation component** of an NDC can generally be characterized by the following categories:

- Climate-related impacts, risks and vulnerabilities in ecosystems and social systems;
- Non-climatic drivers of vulnerability;
- Adaptation priority sectors and cross-sectoral priorities in ecosystems and social systems;
- Adaptation policies and measures in ecosystems and social systems; and
- Mitigation and sustainable development co-benefits of adaptation.

At the sectoral level, the **AFOLU sector-specific adaptation component** in the NDCs generally contains the following information categories (Figure 6):

- climate-related impacts, risks and vulnerabilities in ecosystems and social systems;
- non-climatic drivers of vulnerability;
- adaptation priority sectors and cross-sectoral priorities in ecosystems and social systems;
- adaptation policies and measures in ecosystems and social systems; and
- mitigation and sustainable development co-benefits of adaptation.

FIGURE 6.**MAIN INFORMATION CATEGORIES IN THE “ADAPTATION COMPONENT IN THE AFOLU SECTOR” IN THE NDCs**

Observed and/or projected **climate-related impacts, risks and vulnerabilities in ecosystems** reported can generally be characterized by the following information categories (refer to **Table 2** of **Annex 1** for full list of categories and sub-categories):

- ▶ type of meteorological variable;
- ▶ type of climate-related hazard;
- ▶ type of climate-related slow onset event;
- ▶ type of biome;
- ▶ type of natural resource;
- ▶ type of ecosystem;
- ▶ type of ecosystem service group; and
- ▶ type of ecosystem service impact.

For the purpose of this framework, “climate-related impacts” refer broadly to the effects of extreme weather and climate events and of climate change on the lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure, due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. A “climate-related risk” is a function of the complex interactions between climate-related hazards and the vulnerability, exposure and adaptive capacity of human and natural systems (IPCC, 2014b; UN Environment, 2019).

Each observed and/or projected change in **meteorological variables**, namely variations in mean annual precipitation and surface air temperature and the frequency and intensity of climate extremes, can be categorized by type (IPCC, 2014b). Each observed and/or projected **climate-related hazard**, or hydro-meteorological, climatological and biological process or phenomenon that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources, can be characterized by type (EM-DAT, undated; IPCC, 2014b). Each observed and/or projected **climate-related slow onset event**, or chemical and physical change in terrestrial ecosystems and freshwater resources and marine and coastal ecosystems, may be characterized by type (EM-DAT, undated; IPCC, 2014b).

Each of these observed and/or projected climate-driven impacts in ecosystems can further be qualified by type of **biome, ecosystem, natural resource** and **ecosystem service** impact category (IPCC, 2014b; UNEP, 2010).

Observed and/or projected **climate-related impacts, risks and vulnerabilities in social systems** can also be characterized by one of three dimensions (i.e. socio-economics and well-being, knowledge and capacity and institutions and governance) and one of eight **climate-related risk** categories (FAO, 2017a; IPCC, 2014b). **Table 2 of Annex 1** contains the full set of categories and sub-categories that can be used to qualify the types of observed and/or projected climate-related impacts, risks and vulnerabilities in social systems reported.

Non-climatic drivers of vulnerability, or the intersecting social, economic, cultural, political and institutional variables, or stressors, that can affect individual adaptive capacity to respond, as well as the level of exposure to climate change, creating new or exacerbating existing vulnerabilities to climate change (IPCC, 2014b), can be characterized by one of three types of non-climatic dimensions and one of nine non-climatic vulnerability driver categories (FAO, 2013, 2017a; IPCC, 2014b). **Table 3 of Annex 1** contains the full set of categories and sub-categories that can be used to qualify the types of non-climatic dimensions and drivers of vulnerability reported.

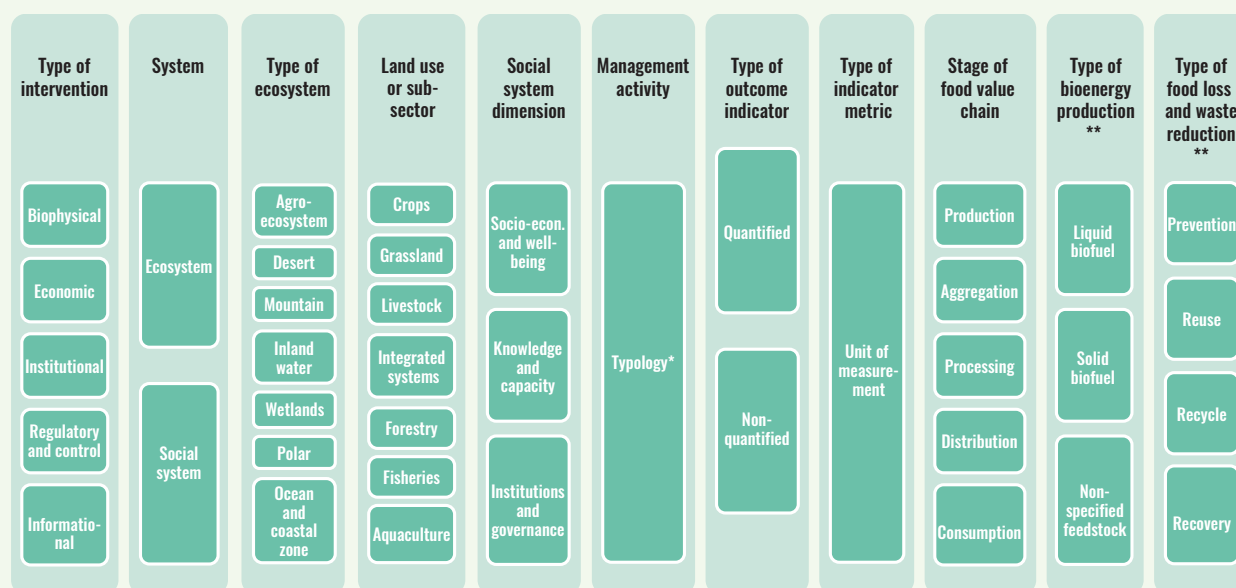
Priority sectors for adaptation in ecosystems and social systems, or the thematic areas of intervention prioritized for adaptation, often based on a vulnerability assessment, can be characterized by one or more of six agricultural sub-sectors, or one or more of 14 cross-cutting priority areas (FAO, undated). **Table 4 of Annex 1** contains the full set of categories and sub-categories that can be used to qualify the types of adaptation priority sectors and cross-sectoral priorities for adaptation in ecosystems and social systems included in the NDCs.

Adaptation policies and measures in ecosystems can generally be characterized by the following information categories (**Figure 7**):

- ▶ type of intervention;
- ▶ type of ecosystem;
- ▶ type of agriculture sub-sector or land use category (if applicable);
- ▶ type of ecosystem, land use or agricultural management option;
- ▶ type of outcome indicator (i.e. quantified or non-quantified);
- ▶ type of indicator metric (i.e. unit of measurement);
- ▶ stage of food value chain (if applicable);
- ▶ type of bioenergy production (if applicable); and
- ▶ type of food loss and waste reduction (if applicable).

FIGURE 7.

MAIN INFORMATION CATEGORIES TO CHARACTERIZE THE “ADAPTATION POLICIES AND MEASURES IN THE AFOLU SECTOR” IN THE NDCs



* Refer to Tables 5–6 of Annex 1 for the full list. ** If applicable.

Each adaptation policy or measure in ecosystems may be characterized by the type of **intervention**, or the primary approach of implementation, including biophysical; economic; regulatory and control; informational; and institutional approaches (IPCC, 2014a).

Each adaptation policy or measure in ecosystems can be associated with one of eight **ecosystem** categories (UNEP, 2010; WRI, 2005). In the case of agro-ecosystems, a policy or measure may be associated with one of seven **agricultural sub-sectors** (FAO, undated) and/or one of six **land use categories** (IPCC, 2014a). Each policy or measure in ecosystems can be characterized by one of 61 ecosystem and natural resource **management options** (EM-DAT, undated; IPCC, 2014b). The expected outcome from the implementation of that management option may be associated with a quantified or non-quantified **outcome indicator**. If quantified, the **indicator metric** used to define the expected outcome may be categorized by the unit of measurement (e.g. 25 percent of rice farmers adopt drought-resistant varieties, 200 ha of grassland restored). Alternatively, if the expected outcome is not quantified, it is descriptive/qualitative in nature (e.g. forest biodiversity enhanced).

If applicable, each adaptation policy or measure may also be associated with one of five types of **bioenergy production** (IPCC, 2014a).

If applicable, each adaptation policy or measure may be associated with one of five **stages of the food value chain**, where production includes pre-harvest/slaughter and harvest/slaughter (HLPE, 2014).

If applicable, each adaptation policy or measure may be associated with one of four types of **food loss and waste reduction** measures, where food losses occur during production, post-harvest and processing operations, and food waste occurs at marketing and consumer levels (HLPE, 2014).

Adaptation policies and measures in social systems can generally be characterized by the following information categories (Figure 7):

- ▶ type of intervention;
- ▶ social dimension;
- ▶ type of management option;
- ▶ type of outcome indicator (i.e. quantified or non-quantified); and
- ▶ type of indicator metric (i.e. unit of measurement).

Each policy or measure in social systems may be characterized with one of three **social dimensions** (i.e. socio-economics and well-being, knowledge and capacity, and institutions and governance) (IPCC, 2014b) and one of 34 **management options** (FAO, 2013, 2017a; IPCC, 2014b). The expected outcome from the implementation of that management option may be associated with a quantified or non-quantified **outcome indicator**. If quantified, the **indicator metric** used to define the expected outcome may be categorized by the unit of measurement (e.g. 20 percent of households have access to clean water, 5 percent reduction in rural poverty by 2030). Alternatively, if the expected outcome is not quantified, it is descriptive/qualitative in nature (e.g. early-warning systems set up to prevent agricultural loss and damage).

Table 2 illustrates examples of AFOLU-specific adaptation components found in the NDCs of selected countries.

TABLE 2.**COUNTRY EXAMPLES OF NDC ADAPTATION COMPONENTS IN SELECTED COUNTRIES**

ADAPTATION COMPONENT	AFOLU-SECTOR EXAMPLE
CLIMATE-RELATED IMPACTS, RISKS AND VULNERABILITIES	
CLIMATE-RELATED HAZARDS IN ECOSYSTEMS	FREQUENCY AND EXTENSION OF DROUGHT HAS INCREASED SIGNIFICANTLY SINCE 1960 (CUBA)
CLIMATE-RELATED SLOW ONSET EVENTS IN ECOSYSTEMS	THE NUMBER OF GLACIER LAKES HAS INCREASED BY 11 PERCENT AND GLACIERS RECEDE ON AN AVERAGE BY 38 KM ² PER YEAR (NEPAL)
CLIMATE-RELATED IMPACTS ON ECOSYSTEM SERVICES	OCEAN ACIDIFICATION MAY REDUCE THE ABILITY OF MANY MARINE SPECIES TO FORM CALCAREOUS SKELETONS, THUS DISRUPTING FOOD WEBS AND HABITAT STRUCTURE (FIJI)
CLIMATE-RELATED RISKS IN SOCIAL SYSTEMS	LOSSES ARE BOUND TO HAVE A GREATER IMPACT ON VULNERABLE GROUPS LIKE WOMEN, CHILDREN AND PEOPLE IN EXTREME POVERTY (COSTA RICA)
NON-CLIMATIC DRIVERS OF VULNERABILITY	
ENVIRONMENTAL	ARCHIPELAGIC COUNTRY WITH EXTENSIVE LOW-LYING AND SMALL ISLAND AREAS (INDONESIA)
SOCIO-ECONOMIC	AGRICULTURE PLAYS AN IMPORTANT ROLE IN THE ECONOMY AND 48 PERCENT OF THE POPULATION LIVES IN RURAL AREAS. AGRICULTURE EMPLOYS 38 PERCENT OF THE COUNTRY'S POPULATION (AZERBAIJAN)
POLITICAL AND INSTITUTIONAL	DECADES OF WAR AND SOCIAL UNREST (AFGHANISTAN)
ADAPTATION POLICIES AND MEASURES	
POLICIES AND MEASURES IN ECOSYSTEMS	CROP PRODUCTION OF PULSES WILL COVER 25 PERCENT OF TOTAL CULTIVABLE LAND (ERITREA)
POLICIES AND MEASURES IN SOCIAL SYSTEMS	PROVIDE EARLY WARNING/METEOROLOGICAL FORECASTS AND RELATED INFORMATION FOR CROPS AND LIVESTOCK (NIGERIA)

PILLAR 3: BARRIERS TO IMPLEMENTATION

Under the call for enhanced transparency of action and support in the PA (Article 13), Parties are now required to report information necessary to track progress made in implementing and achieving their NDC, including barriers to addressing the social and economic consequences of mitigation, barriers, gaps and challenges to the implementation of adaptation and barriers to attracting international support. The rationale is that with greater understanding of the underpinning challenges to achieving the temperature and adaptation goals of the PA, the outcomes of the Global Stocktake in 2023 will promote enhanced action and support until the long-term goals of the PA are met.

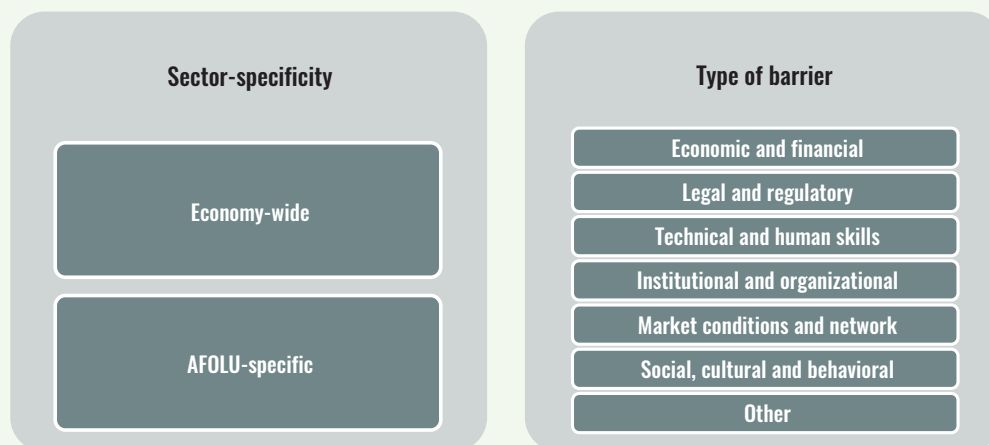
TNAs provide critical information on the types of constraints impeding the uptake of climate change adaptation and mitigation at scale (UN Environment and UNEP DTU Partnership, 2018). A review of current barriers to implementation in the AFOLU sector can inform actionable NDC support programmes and implementation roadmaps to ensure that underlying technical, economic, institutional and regulatory barriers are addressed. Based on a global stocktaking of TNAs, each **barrier to implementation of**

climate action in the AFOLU sector expressed may be characterized by the following information categories (Figure 8):

- sector specificity; and
- barrier type.

FIGURE 8.

MAIN INFORMATION CATEGORIES TO DEFINE “BARRIERS TO IMPLEMENTATION” OF CLIMATE ACTION IN THE AFOLU SECTOR



PILLAR 4: SUPPORT NEEDS

Article 9, 10 and 11 of the PA recognize the importance of the provision of support towards developing country Parties, particularly countries with the least capacity and those that are particularly vulnerable to the adverse effects of climate change. Under the new transparency requirements of the ETF, Parties are required to report information on financial, technology transfer and capacity building support needed and received or provided, by sector or sub-sector.

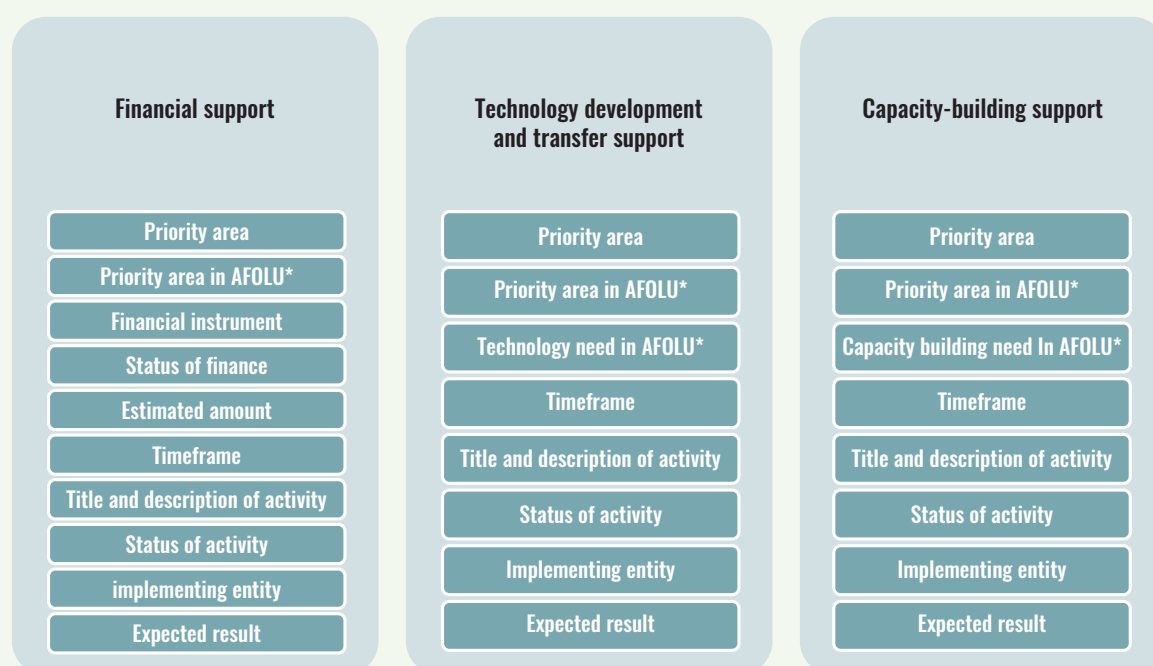
To accelerate the rapid transformational changes needed towards low-emission development and climate resilience, scaling up support in the AFOLU sector in the form of enhanced finance, technology development and transfer and capacity building is a prerequisite. Information on the potential, ability and scale of climate technologies and capacities required for the uptake of climate action in a country is a fundamental starting point for designing technology action plans and capacity-building programmes. Along with NDCs, other national planning tools and processes, including TNAs, NCS, NAPs and other relevant policies, represent an important resource for understanding the types of support needs in a country, which are often differentiated by sector (UN Environment and UNEP DTU Partnership, 2018; UNFCCC, undated). Based on a global stocktaking of support needs for climate action, and in line with the new transparency requirements of the ETF, each type of **support need for climate action in the AFOLU sector** expressed can be characterized by the following information categories (Figure 9):

- Type of support need (i.e. financial, technology transfer and/or capacity-building);
 - **Financial support:**
 - priority area for support (i.e. adaptation, mitigation or cross-cutting);
 - priority area (i.e. sub-sector) for support in the AFOLU sector;
 - type of financial instrument;
 - status of finance (i.e. committed, received or needed);
 - estimated amount (converted into USD);
 - timeframe;

- title of activity, project or programme;
 - description of activity, project or programme;
 - implementing entity;
 - status of activity, project or programme (i.e. planned, ongoing or completed); and
 - expected use, impact or result.
- **Technology development and transfer support:**
- priority area for support (i.e. adaptation, mitigation or cross-cutting);
 - priority area (i.e. sub-sector) for support in the AFOLU sector;
 - type of priority technology need in AFOLU sector;
 - timeframe;
 - title of activity, project or programme;
 - description of activity, project or programme;
 - implementing entity;
 - status of activity, project or programme (i.e. planned, ongoing or completed); and
 - expected use, impact or result.
- **Capacity-building support:**
- priority area for support (i.e. adaptation, mitigation or cross-cutting);
 - priority area (i.e. sub-sector) for support in the AFOLU sector;
 - type of priority capacity building need in AFOLU sector;
 - timeframe;
 - title of activity, project or programme;
 - description of activity, project or programme;
 - implementing entity;
 - status of activity, project or programme (i.e. planned, ongoing or completed); and
 - expected use, impact or result.

FIGURE 9.

MAIN INFORMATION CATEGORIES TO DEFINE “SUPPORT NEEDS FOR CLIMATE ACTION” IN THE AFOLU SECTOR



*Refer to Table 8 of Annex 1 for the full list of sub-categories.

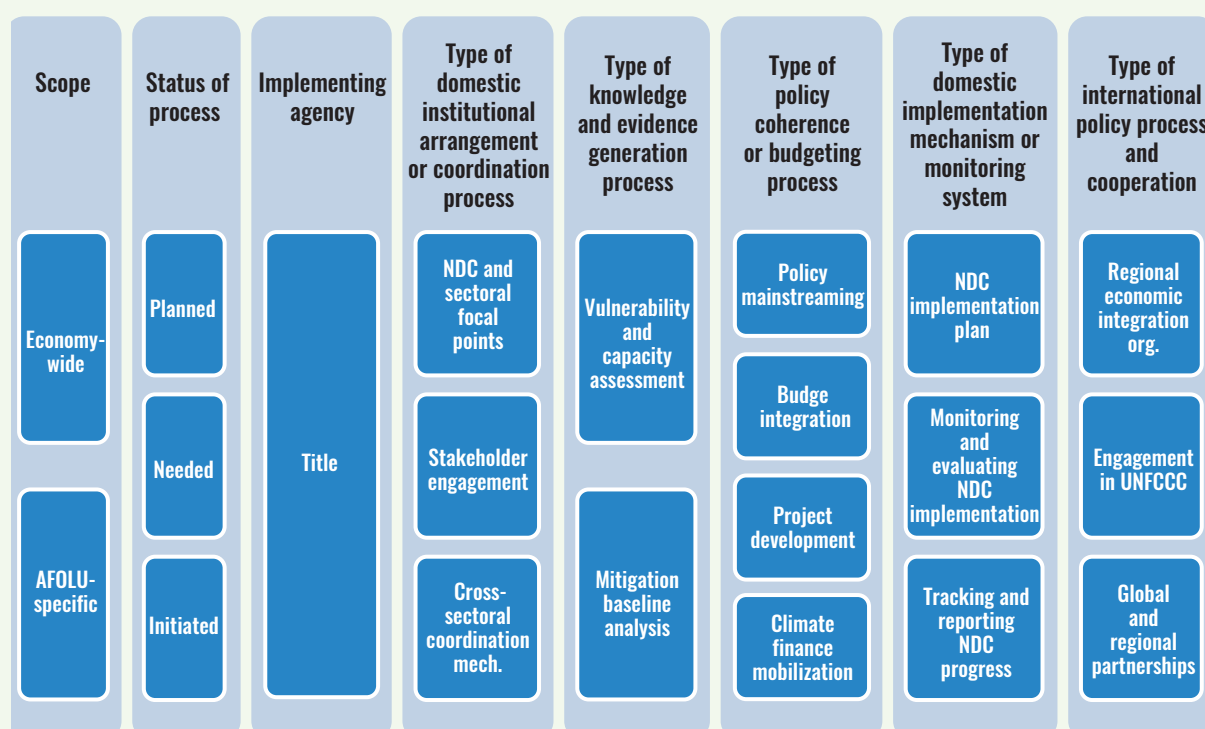
PILLAR 5: PLANNING PROCESSES

Under COP24 decision 4/CMA.1 ([Annex 1](#)) on information to facilitate CTU, Parties are expected to provide a description of the various planning processes underlying the preparation of NDCs, as well as the processes, either planned or already established, to accompany NDC implementation and track its progress. Such institutional arrangements provide the enabling environment for an iterative planning process that presents an opportunity to ensure that climate action is smart, forward-looking, and inclusive. Based on a global stocktaking of NDCs, and in line with the principles of CTU, each **planning process for NDC formulation, implementation and tracking** may be defined by one of the following information categories ([Figure 10](#)):

- ▶ scope (i.e. economy-wide or sector-specific);
- ▶ status of process (i.e. planned, needed, or initiated)
- ▶ implementing agency;
- ▶ type of planning process:
 - ▶ domestic institutional arrangements and coordination mechanisms;
 - ▶ knowledge and evidence generation;
 - ▶ policy coherence and budgeting processes;
 - ▶ domestic implementation mechanisms and monitoring systems; and
 - ▶ international policy processes and cooperation.

FIGURE 10.

MAIN INFORMATION CATEGORIES TO DEFINE “NDC PLANNING PROCESSES”



Refer to [Table 9](#) of [Annex 1](#) for the full list of information categories and sub-categories.

PART 2

ENHANCEMENT INDEX

Using the Common NDC Framework for the AFOLU sector developed as a benchmark against which NDCs can be compared, this section presents a methodology for identifying entry-points for enhancing NDCs in future review and revision cycles around five main pillars: mitigation, adaptation, barriers to implementation, support needs and planning processes. For the purpose of this paper, the term “enhancement” refers to increasing the level of information provided in relation to the five NDC pillars identified, including the articulation of sector-specific priorities.

In order to score the level of ambition contained in an NDC, an “NDC-AFOLU Enhancement Index” was developed that follows the five-pillared structure of the Common NDC-AFOLU Framework. Each of the NDC Pillars were assigned equal weights and each of the information categories and sub-categories (“indicators”) per pillar were weighted between 0 and 1. [Figure 11](#) illustrates the five pillars and 32 indicators of the NDC-AFOLU Enhancement Index.

FIGURE 11.

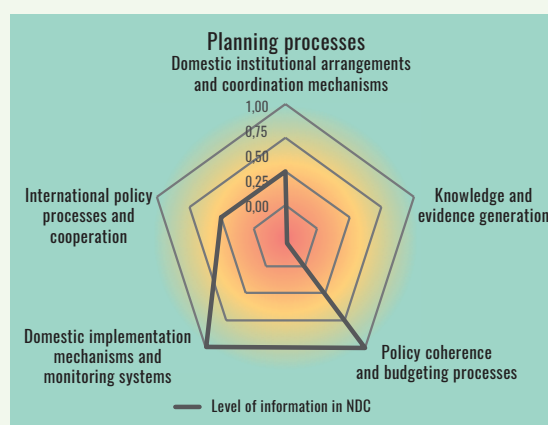
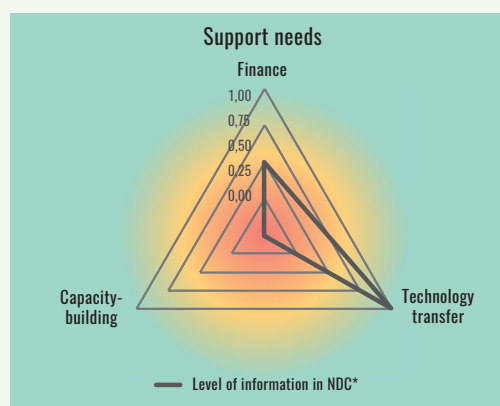
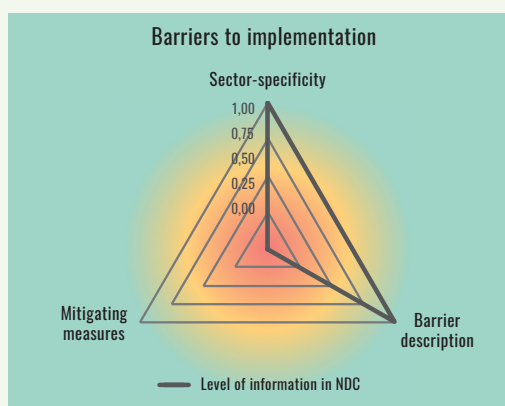
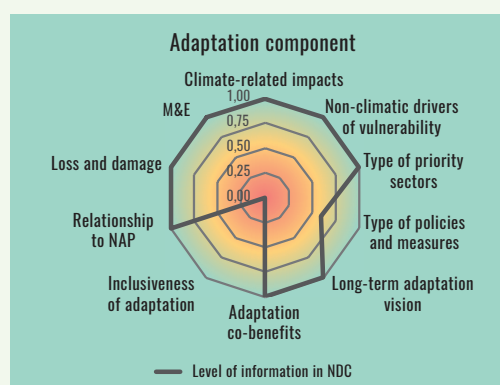
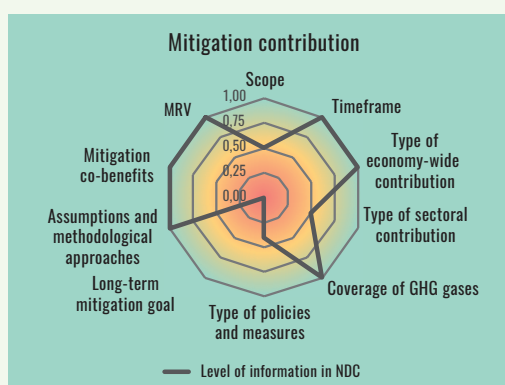
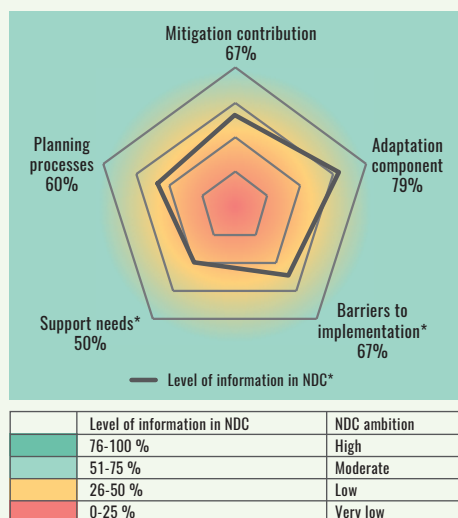
NDC-AFOLU ENHANCEMENT INDEX, BY PILLAR AND WEIGHTED INDICATOR

PILLAR	PILLAR WEIGHT	INDICATOR	WEIGHT
MITIGATION	1	SCOPE	1/14
		TIMEFRAME	1/14
		TYPE OF ECONOMY-WIDE CONTRIBUTION	1/14
		TYPE OF SECTORAL CONTRIBUTION	3/14
		COVERAGE OF GHG GASES	1/14
		TYPE OF MITIGATION POLICIES AND MEASURES	3/14
		LONG-TERM MITIGATION GOAL	1/14
		ASSUMPTIONS AND METHODOLOGICAL APPROACHES	1/14
		MITIGATION CO-BENEFITS	1/14
		MRV	1/14

ADAPTATION	1	NATIONAL CIRCUMSTANCES	1/16
		CLIMATE-RELATED IMPACTS, RISKS AND VULNERABILITIES	1/16
		NON-CLIMATIC DRIVERS OF VULNERABILITY	1/16
		TYPE OF ADAPTATION PRIORITY SECTORS	1/16
		TYPE OF ADAPTATION POLICIES AND MEASURES	6/16
		LONG-TERM ADAPTATION VISION AND/OR GOAL	1/16
		ADAPTATION CO-BENEFITS	1/16
		INCLUSIVENESS OF ADAPTATION	1/16
		RELATIONSHIP TO NAP	1/16
		LOSS AND DAMAGE	1/16
		M&E	1/16
BARRIERS TO IMPLEMENTATION	1	SECTOR-SPECIFICITY	1/3
		BARRIER DESCRIPTION	1/3
		MITIGATING MEASURES	1/3
SUPPORT NEEDS	1	FINANCE	1/3
		TECHNOLOGY TRANSFER	1/3
		CAPACITY-BUILDING	1/3
PLANNING PROCESSES	1	DOMESTIC INSTITUTIONAL ARRANGEMENTS AND COORDINATION MECHANISMS	1/4
		KNOWLEDGE AND EVIDENCE GENERATION	1/4
		POLICY COHERENCE AND BUDGETING PROCESSES	1/4
		DOMESTIC IMPLEMENTATION MECHANISMS AND MONITORING SYSTEMS	1/4
		INTERNATIONAL POLICY PROCESSES AND COOPERATION	1/4

To assess the current “ambition level,” a given NDC should be screened against each of the 32 indicators and scored by relevant parameter (refer to [Annex 2](#) for each indicator parameter). Each score should be aggregated to assess the overall level of information provided in the NDC, or “NDC ambition”, per NDC Pillar. **Figure 12** illustrates an example country application of the NDC-AFOLU Enhancement Index with an average ambition level of 64 percent (moderate) across all five NDC Pillars. The example results are presented in a radar chart, per NDC Pillar, with ambition levels scored from highest (1) to lowest (0).

The results of the NDC-AFOLU Enhancement Index can highlight current “gaps” or entry-points for enhancing ambition across each of the five NDC Pillars and articulating sectoral priorities in future NDC submissions. The information categories and sub-categories presented in the common NDC-AFOLU Framework can serve as guidance in this enhancement process.

FIGURE 12.
EXAMPLE NDC-AFOLU ENHANCEMENT INDEX RESULTS, PER NDC PILLAR


CONCLUSION

The heterogeneity of NDCs in terms of scope, format and level of detail presents a methodological challenge for data aggregation and analysis. This paper attempts to address that challenge by presenting a common framework for unpacking the NDCs into five main pillars and sub-areas specific to the AFOLU sector that are aligned with the principle of CTU and the transparency requirements for reporting on NDC implementation and progress under the ETF. The underlying assumption is that greater understanding of NDC priorities, barriers, gaps, and needs can inform the 2023 Global Stocktake of collective progress to date on achieving the purpose and long-term goals of the PA and, consequently, inform NDC ambition raising and guide the flow of support towards developing countries to fill existing finance, technology and capacity gaps.

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ANNEXES

ANNEX 1: NDC-AFOLU COMMON FRAMEWORK CATEGORIES AND SUB-CATEGORIES

TABLE 1.

QUALIFICATION OF MITIGATION POLICIES OR MEASURES IN THE AFOLU SECTOR

CATEGORY AND SUB-CATEGORY	SOURCE
Stage of food value chain Production Aggregation Processing Distribution Consumption Full value chain	HLPE (2014)
Type of intervention Biophysical Economic Regulatory and control Institutional Informational	Adapted from IPCC (2014b) (IPCC, 2014a)
Type of land use categories and agriculture sub-sectors All land Agricultural land Cropland Grassland Forest Land Wetlands and organic soils Livestock Integrated systems Bioenergy from agriculture Bioenergy from forests	Adapted from IPCC (2014b) and FAO (undated)
Type of land use and agriculture management activity	Adapted from Herr, Pidgeon and Laffoley (2012), IPCC (2014b) and FAO expert consultation
Cropland, grassland or agricultural land	
General crop management Plant management Rice management Nutrient management Tillage/residues management Herd management Land restoration and rehabilitation Fire management Set aside Irrigation and drainage Sustainable water use and management Sustainable agriculture practice/approach	
Forest land	
Reducing deforestation and forest conservation Reducing degradation and sustainable forest management Fire management Afforestation/Reforestation	

Wetlands and Organic soils	
Wetlands conservation Aquaculture management Rewetting of organic soils drained for agriculture	
Livestock	
General livestock management Animal feeding Animal breeding and husbandry Manure management	
Integrated systems	
Agroforestry Other mixed production systems	
All land	
Sustainable land use and management	
Bioenergy	
General bioenergy production Liquid biofuel production Solid biofuel production Use of energy-efficient fuelwood cookstoves	
Other	
Fisheries management Blue carbon conservation Other	
Type of bioenergy production and use Liquid biofuel production Solid biofuel production Use of energy-efficient cookstoves Non specified biomass feedstock production	Adapted from IPCC (2014b)
Type of food loss and waste reduction Prevention Reuse Recycle Recovery	Adapted from HLPE (2014)

TABLE 2.

QUALIFICATION OF OBSERVED AND/OR PROJECTED CLIMATE-RELATED IMPACTS, RISKS AND VULNERABILITIES IN ECOSYSTEMS AND SOCIAL SYSTEMS

CATEGORY AND SUB-CATEGORY	SOURCE
Type of meteorological variable Changes in annual mean precipitation and/or frequency and intensity of extremes Changes in mean surface air temperature and/or frequency and intensity of extremes	Adapted from IPCC (2014a)
Type of climate-related hazard Extreme heat Drought Flood Storm Landslides Wildfire Invasion by pests and non-native species in agriculture	Adapted from IPCC (2014a) and EM-DAT (undated)

Type of climate-related slow onset event All land Agricultural land Cropland Grassland Forest Land Wetlands and organic soils Livestock Integrated systems Bioenergy from agriculture Bioenergy from forests	Adapted from IPCC (2014a) and EM-DAT (undated)
Terrestrial ecosystems and freshwater resources Snow and ice melting Eutrophication Salinization and saltwater intrusion Desertification Soil erosion Water stress	
Marine and coastal ecosystems Sea-level rise Ocean acidification Sea surface temperature rise Coastal erosion	
Type of biome Terrestrial Freshwater Marine All biomes	
Type of natural resource Land and soil Water Energy Genetic resources All natural resources	Adapted from UNEP (2010) and WRI (2005)
Type of ecosystem Agro-ecosystem Desert Mountain Inland water Wetlands Polar Ocean and coastal zone All ecosystems	Adapted from UNEP (2010) and WRI (2005)
Type of ecosystem service group Provisioning Regulating Supporting General ecosystem services Biodiversity	Adapted from UNEP (2010) and WRI (2005)
Type of ecosystem service Terrestrial Freshwater Marine All biomes	Adapted from UNEP (2010) and WRI (2005)
Provisioning General food, fibre, fuel and raw materials provision Crops provision Livestock provision Fisheries provision Aquaculture provision Forestry (NTFPs and wood) provision Biofuel provision Fibre provision Fresh water provision Genetic resources provision	

Regulating	
Moderation of extreme events Pollination Biological control Erosion control Water purification Water flow regulation Local climate and air quality control	
Supporting	
Primary production Carbon sequestration and storage Nutrient cycling and soil formation Water cycling Maintenance of genetic diversity and abundance Habitats for species	
Type of climate-related risk in social systems Loss of productive infrastructure and assets Adverse health Food insecurity and malnutrition Rural livelihoods and income losses Gender inequality Civil conflict and war Migration and displacement Poverty and inequality	Adapted from FAO (2017a) and IPCC (2014b)

TABLE 3.**QUALIFICATION OF NON-CLIMATIC DIMENSIONS AND DRIVERS OF VULNERABILITY**

CATEGORY AND SUB-CATEGORY	SOURCE
Type of non-climatic dimension Environmental Socio-economic and cultural Political and institutional	Adapted from IPCC (2014a) and FAO (2014)
Type of non-climatic vulnerability driver	
Environmental	
Geography and topography Natural hazards	
Socio-economic and cultural	
Economic and livelihood dependence on agriculture and natural resources Population growth and demographics Poverty and low development Natural resource competition Limited knowledge and capacity	
Political and institutional	
Civil conflict and war Weak institutions and governance	

TABLE 4.**QUALIFICATION OF ADAPTATION PRIORITY SECTORS AND CROSS-SECTORAL PRIORITIES FOR ADAPTATION IN ECOSYSTEMS AND SOCIAL SYSTEMS**

CATEGORY AND SUB-CATEGORY	SOURCE
Type of priority sector(s) All sub-sectors Crops Livestock Fisheries and Aquaculture Bioenergy Integrated systems Forestry	FAO (undated)

Type of cross-sectoral priorities	FAO (undated)
Ecosystems	
Ecosystems and natural resources Water Land and soil Oceans and coastal zones Biodiversity Agri-food chain	
Social systems	
Food security and nutrition Disaster risk reduction and management Health Resilient infrastructure Gender Local communities and indigenous peoples Poverty and inequality reduction Human rights	

TABLE 5.**QUALIFICATION OF ADAPTATION POLICIES AND MEASURES IN ECOSYSTEMS**

CATEGORY AND SUB-CATEGORY	SOURCE
Type of intervention Biophysical Economic Regulatory and control Institutional Informational	Adapted from IPCC (2014b)
Type of ecosystem All ecosystems Agro-ecosystem Desert Mountain Inland water Wetlands Polar Ocean and coastal zone	Adapted from UNEP (2010) and WRI (2005)
Type of agro-ecosystem All sub-sectors Crops Livestock Integrated systems Forestry Aquaculture Fisheries	Adapted from IPCC (2014b) and FAO (undated)
Type of land use category All land Agricultural land Cropland Grassland Forest Land Wetlands	Adapted from IPCC (2014b)
Type of ecosystem and natural resource management option	Adapted from FAO (2014), IPCC (2014a) and (FAO, 2017a)
Crops	
General crop management Pest and disease management Plant genetic resources conservation and diversification Plant cycle adjustment Nutrient and on-farm soil management Fire management on cropland	

Livestock and grassland	
General livestock management Animal genetic resources conservation and diversification Animal feeding Animal husbandry Herd management Manure management Pasture management Fire management on grassland	
Integrated systems	
Agroforestry Other mixed production systems	
Forestry and land/soil resources	
Reducing deforestation and forest conservation Reducing degradation and sustainable forest management Afforestation/Reforestation Promotion of urban and peri-urban forestry Fire management on forest land Land restoration and rehabilitation Integrated landscape management Wetlands conservation Rewetting of peatlands drained for agriculture Coastal zone management Mangrove conservation and replanting	
Fisheries and aquaculture	
General fisheries and aquaculture management Aquatic genetic resources conservation and diversification Fisheries technologies Aquaculture management	
Water resources	
Water availability and access Water storage and harvesting Irrigation and drainage Sustainable water use and management Water quality and pollution management Desalinization Water-use efficiency and reuse Water-related ecosystem protection and restoration Integrated watershed management Flood management	
Ecosystems and genetic resources	
Biodiversity protection, conservation and restoration Pest and disease management Genetic resource diversification and conservation Ecosystem management, conservation and restoration Payment for Ecosystem Services	
Energy resources	
Bioenergy production Bioenergy use Energy use in agriculture	
Agri-food chain	
Input provision Food loss reduction Food waste reduction Value addition and diversification Certification schemes Shift of consumption patterns Market access	
Cross-cutting	
Sustainable agriculture practices/approach Sustainable intensification Agricultural expansion Climate-Smart Agriculture (CSA) Conservation Agriculture Agroecology Ecosystem-based adaptation Community-based adaptation	

Type of bioenergy production and use measure Liquid biofuel production Biogas production Solid biofuel production Woodfuel and charcoal production Use of energy-efficient fuelwood cookstoves	Adapted from IPCC (2014b)
Stage of food value chain Production Aggregation Processing Distribution Consumption Full value chain	HLPE (2014)
Type of food loss and waste reduction measure Prevention Reuse Recycle Recovery	Adapted from HLPE (2014)

TABLE 6.

QUALIFICATION OF ADAPTATION POLICIES AND MEASURES IN SOCIAL SYSTEMS

CATEGORY AND SUB-CATEGORY	SOURCE
Type of intervention Biophysical Economic Regulatory and control Institutional Informational	Adapted from IPCC (2014b)
Type of social dimension Socio-economics and well-being Knowledge and capacity Institutions and governance	Adapted from IPCC (2014a)
Type of management option Socio-economics and well-being Health information and services Disease management and prevention Food security and nutrition Indigenous peoples Gender equality and women empowerment Displacement and migration of vulnerable people Resilience and adaptive capacity building Resilient infrastructure Productive assets Decent rural employment On and off-farm livelihood diversification Farmer cooperatives and networks Credit and insurance services Social protection Poverty reduction Knowledge and capacity Traditional knowledge Research & Development Extension services for climate action Awareness raising and education Risk and vulnerability assessment Environmental assessment and monitoring Climate information services Early warning systems	Adapted from FAO (2017), IPCC (2014a) and FAO (2014)

Institutions and governance	
Disaster risk reduction and management	
Institutional capacity building for climate change planning	
Law and regulation	
Land tenure reform	
Water governance	
Pricing and fiscal mechanisms	
Investment in agriculture	
Transparency & Accountability	
Policy mainstreaming and coherence	
Participatory governance	
Conflict resolution	
Finance mobilization	

TABLE 7.**QUALIFICATION OF BARRIERS TO NDC IMPLEMENTATION IN THE AFOLU SECTOR**

CATEGORY AND SUB-CATEGORY	SOURCE
Type of barrier to implementation	UN Environment and UNEP DTU Partnership (2018)
Economic and financial	
Legal and regulatory	
Technical and human skills	
Information and awareness	
Institutional and organizational	
Market conditions and network	
Social, cultural and behavioral	
Other	

TABLE 8.**QUALIFICATION OF SUPPORT NEEDS FOR NDC IMPLEMENTATION IN THE AFOLU SECTOR**

CATEGORY AND SUB-CATEGORY	SOURCE
Type of support need	Art. 9, 10 and 11 of decision 1/CP.21 (UNFCCC, 2015)
Capacity-building	
Technology transfer	
Finance	
Priority area for support	FAO elaboration of TNA data
Adaptation	
Mitigation	
Cross-cutting	
TPriority area for support in AFOLU sector	
Agriculture	
Crops	
Livestock	
Integrated systems	
Forestry	
Fisheries and aquaculture	
Ocean and coastal zones	
Energy	
Land and soil	
Water	
Ecosystems and biodiversity	
Socio-economics and well-being	
Knowledge and capacity	
Institutions and governance	
Transparency	

Priority capacity need in the AFOLU sector	UNFCCC (undated)
Individual	
Changing attitudes and behaviors Sharing knowledge and skill development Participation, knowledge exchange and ownership	
Organizational	
Organizational performance and capabilities Organizational adaptive capacity Institutional and sectoral cooperation	
Systemic	FAO elaboration of TNA data
Framework for institutional-individual interaction Enabling environment (e.g. economic and regulatory policy)	
Priority technology need in AFOLU sector	
Natural resource management On-farm practices Genetic resource diversification and conservation Post-production processing and storage Energy efficiency and renewables Resilient infrastructure Climate information services and risk assessment Disaster risk reduction and management Financial and credit services Capacity building, education and awareness services Research and development Policy coherence and regulation Partnership and cooperation M&E MRV	

TABLE 9.

QUALIFICATION OF PLANNING PROCESSES FOR NDC FORMULATION, IMPLEMENTATION AND MONITORING AND AFOLU-SPECIFIC EXAMPLES

CATEGORY AND SUB-CATEGORY	
DOMESTIC INSTITUTIONAL ARRANGEMENTS AND COORDINATION MECHANISMS	AFOLU-SPECIFIC EXAMPLE
NDC and sectoral focal points	Focal points in Ministries of Environment, Agriculture, Forestry, Fisheries and Aquaculture, Social Planning
Stakeholder engagement and gender-responsiveness	Inclusion of state and non-state actors (e.g. civil society, community and women organizations, local communities and indigenous people) in NDC decision-making processes
Cross-sectoral coordination mechanisms for NDC processes	Horizontal coordination across line Ministries, Environment, Agriculture, Forestry, Fisheries and Aquaculture, Finance, Social Planning and vertical coordination at national, sub-national and local/community level
Cross-sectoral coordination mechanisms between NDC and other key policy processes	Nationally Appropriate Mitigation Actions (NAMA), NAP, SDGs, Sendai Framework for Disaster Risk Reduction, UN Convention to Combat Desertification (UNCCD) and Convention on Biological Diversity (CBD)
KNOWLEDGE AND EVIDENCE GENERATION	AFOLU-SPECIFIC EXAMPLE
Vulnerability and capacity analysis	Climate risk information assessment and vulnerability analysis in AFOLU sector
Mitigation baseline analysis	Local emission factor development, Tier II and Tier III GHGI management and ex-ante GHG emission estimation in AFOLU sector
Sharing good practices, experiences and lessons learned for enhanced NDCs	Lessons learned on NDC planning, implementation and monitoring in AFOLU sector

POLICY COHERENCE AND BUDGETING PROCESSES	AFOLU-SPECIFIC EXAMPLE
Policy option prioritization	Impact assessment, cost benefit and multi-criteria analysis, including consideration of the economic and social outcomes of NDC implementation
Policy mainstreaming and budget integration	Integration of AFOLU-relevant NDC priorities into national development strategy and sectoral plans, including natural resource, agriculture, rural development, social protection plans, programmes, projects, policies and budgets
Project development and climate finance mobilization	Project development and finance mobilization towards AFOLU, including Green Climate Fund (GCF) and Global Environmental Facility (GEF)
DOMESTIC IMPLEMENTATION MECHANISMS AND MONITORING SYSTEMS	AFOLU-SPECIFIC EXAMPLE
NDC implementation plan	NDC implementation plan with timeframe, milestones and roles and responsibilities specific to AFOLU sector
Institutional arrangements for monitoring and evaluating NDC implementation	Institutional arrangements for monitoring NDC implementation progress in AFOLU sector
Institutional arrangements for tracking and reporting mitigation and adaptation progress	National MRV and M&E systems with AFOLU-specific indicators and reporting processes
INTERNATIONAL POLICY PROCESSES AND COOPERATION	AFOLU-SPECIFIC EXAMPLE
Participation in regional economic integration organizations to act jointly in contribution to goals of PA	Association of Southeast Asian Nations (ASEAN), African Group of Negotiators Expert Support (AGNES)
Engagement in UNFCCC processes	Koronivia Joint Work on Agriculture (KJWA), Gender Action Plan (GAP)
Engagement in global and regional partnerships related to goals of PA	NDC Partnership, Marrakech Partnership for Global Climate Action, Global Alliance for Climate-Smart Agriculture (GACSA), Partnership on Transparency in the PA (PAPTA)

ANNEX 2: NDC-AFOLU ENHANCEMENT INDEX SCORING PARAMETERS

PILLAR	INDICATOR	LEVEL OF INFORMATION
MITIGATION CONTRIBUTION	SCOPE	AGRICULTURE (AG) AND LULUCF
		AG OR LULUCF
		NEITHER
	TIMEFRAME	SPECIFIED
		NOT-SPECIFIED
	TYPE OF ECONOMY-WIDE CONTRIBUTION	GHG TARGET
		ACTION ONLY
		NO CONTRIBUTION
	TYPE OF SECTORAL CONTRIBUTION	GHG TARGETS (AG AND LULUCF)
		GHG AND NON-GHG TARGET (AG AND LULUCF)
		GHG TARGET (AG OR LULUCF)
		NON-GHG TARGET (LULUCF)
		NOT INCLUDED
	COVERAGE OF GHG GASES	SPECIFIED
		NOT SPECIFIED

MITIGATION CONTRIBUTION	TYPE OF MITIGATION POLICIES AND MEASURES	QUANTIFIED (AG AND LULUCF)
		QUANTIFIED AND NON-QUANTIFIED (AG AND LULUCF)
		NON QUANTIFIED (AG AND LULUCF)
		QUANTIFIED (AG OR LULUCF)
		NOT QUANTIFIED (AG OR LULUCF)
		NOT INCLUDED
	TYPE OF POLICIES AND MEASURES	INCLUDED
		NOT INCLUDED
	ASSUMPTIONS AND METHODOLOGICAL APPROACHES	INCLUDED
		NOT INCLUDED
	MITIGATION CO-BENEFITS	INCLUDED
		NOT INCLUDED
ADAPTATION COMPONENT	MRV	INCLUDED
		NOT INCLUDED
	NATIONAL CIRCUMSTANCES	INCLUDED
		NOT INCLUDED
	CLIMATE-RELATED IMPACTS, RISKS AND VULNERABILITIES	ECOSYSTEM AND SOCIAL SYSTEM SPECIFIC
		ECOSYSTEM OR SOCIAL SYSTEM SPECIFIC
		NOT INCLUDED
	NON-CLIMATIC DRIVERS OF VULNERABILITY	INCLUDED
		NOT INCLUDED
	TYPE OF ADAPTATION PRIORITY SECTORS	PRIORITY SECTORS AND CROSS-SECTORAL PRIORITIES
		PRIORITY SECTORS OR CROSS-SECTORAL PRIORITIES
		NOT INCLUDED
	TYPE OF ADAPTATION POLICIES AND MEASURES	QUANTIFIED (ECOSYSTEMS AND SOCIAL SYSTEMS)
		QUANTIFIED AND NON-QUANTIFIED (ECOSYSTEMS AND SOCIAL SYSTEMS)
		NON-QUANTIFIED (ECOSYSTEMS AND SOCIAL SYSTEMS)
		QUANTIFIED (ECOSYSTEMS OR SOCIAL SYSTEMS)
		NON-QUANTIFIED (ECOSYSTEMS OR SOCIAL SYSTEMS)
		NOT INCLUDED
	LONG-TERM ADAPTATION VISION AND/OR GOAL	INCLUDED
		NOT INCLUDED
	ADAPTATION CO-BENEFITS	INCLUDED
		NOT INCLUDED
	INCLUSIVENESS OF ADAPTATION	INCLUDED
		NOT INCLUDED
	RELATIONSHIP TO NAP	INCLUDED
		NOT INCLUDED
	LOSS AND DAMAGE	INCLUDED
		NOT INCLUDED
	M&E	INCLUDED
		NOT INCLUDED

BARRIERS	SECTOR-SPECIFICITY	SECTOR SPECIFIC
		ECONOMY-WIDE
		NOT INCLUDED
	BARRIER DESCRIPTION	INCLUDED
		NOT INCLUDED
	MITIGATING MEASURES	INCLUDED
		NOT INCLUDED
SUPPORT NEEDS	FINANCE	SECTOR SPECIFIC AND QUANTIFIED
		ECONOMY-WIDE AND QUANTIFIED
		NOT QUANTIFIED
	TECHNOLOGY TRANSFER	SECTOR SPECIFIC
		NOT SECTOR SPECIFIC
		NOT INCLUDED
	CAPACITY-BUILDING	SECTOR SPECIFIC
		NOT SECTOR SPECIFIC
		NOT INCLUDED
PLANNING PROCESSES	DOMESTIC INSTITUTIONAL ARRANGEMENTS AND COORDINATION MECHANISMS	SECTOR SPECIFIC
		NOT SECTOR SPECIFIC
		NOT INCLUDED
	KNOWLEDGE AND EVIDENCE GENERATION	SECTOR SPECIFIC
		NOT SECTOR SPECIFIC
		NOT INCLUDED
	POLICY COHERENCE AND BUDGETING PROCESSES	SECTOR SPECIFIC
		NOT SECTOR SPECIFIC
		NOT INCLUDED
	DOMESTIC IMPLEMENTATION MECHANISMS AND MONITORING SYSTEMS	SECTOR SPECIFIC
		NOT SECTOR SPECIFIC
		NOT INCLUDED
	INTERNATIONAL POLICY PROCESSES AND COOPERATION	SECTOR SPECIFIC
		NOT SECTOR SPECIFIC
		NOT INCLUDED

This working paper identifies five core pillars of nationally determined contributions (NDCs) and sub-components specific to the agriculture and land use sectors, based on a global stocktaking of NDCs and alignment with the Enhanced Transparency Framework of the

Paris Agreement. It can serve as a framework for formulating NDC priorities, planning processes and support needs in the agriculture and land use sectors, as well as a comparative benchmark for highlighting gaps and entry-points for ambition raising in future NDC revisions.

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