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Climate Change and the Agriculture, Forestry and Land Use (AFOLU) Sectors in Sub-Saharan Africa

Executive Summary

The Paris Agreement adopted at COP21 recognizes "the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the impacts of climate change". Countries, through their Intended Nationally Determined Contributions (INDCs), have highlighted both the vulnerability of the Agriculture, Forestry and Land Use (AFOLU) sectors to climate change as well as the important role it plays both for adaptation and mitigation.

All countries in sub-Saharan Africa include an adaptation component within their INDC emphasizing the need to manage the climate risks. Agriculture is the foremost priority for adaptation, closely followed by Land Use, Land Use Change and Forestry (LULUCF). All countries have provided details on how this will be implemented, for example through highlighting key adaptation measures. Climate-Smart Agriculture (CSA) as an integrated approach is gaining momentum across the continent, and is often highlighted offering adaptation-mitigation co-benefits. All countries recognize the mitigation potential in the AFOLU sectors, but enhanced capacity building in data and monitoring is needed to develop appropriate MRV systems across all sectors. Substantial financial and technical support will be required to assist countries implement their adaptation and mitigation goals. Through south-south cooperation best practices and lessons learned can be shared amongst the countries to scale up innovative technologies as well as promote low-carbon development pathways.



Matters to be brought to the attention of the Regional Conference

To support the 2014 AU Malabo Declaration on Accelerated Agricultural Growth And Transformation for Shared Prosperity And Improved Livelihoods¹ on enhancing resilience in livelihoods & production systems to climate variability and shocks as well as the endorsed NEPAD programme to target 25 million farm households with CSA by 2025, there is a need for:

- Developing and improving the national, sub-regional and regional policy environment required for adequate adaptation and mitigation programmes (NAPs, NAMA, low-carbon development pathways);
- Enhanced capacity building (including awareness raising and education) and transfer of climate-smart technologies is needed through south-south, north-south and regional collaboration;
- Enhanced policy-research-practitioner interface to scale up existing or innovative technologies;
- Enhanced national coordination mechanisms to monitor, verify and evaluate adaptation and mitigation programmes;
- Adequate investment (domestic, international, private, public).

¹ Malabo Declaration http://au.int/en/sites/default/files/decisions/9661-assembly_au_dec_517_-_545_xxiii_e.pdf

I. Introduction

1. Key climate related drivers of impact include a general warming trend, extreme temperatures, areas with recurrent droughts, extreme precipitation and snow, damaging cyclones, sea level rise, ocean acidification and carbon dioxide fertilization. These trends may have varied effects on Agriculture, Forestry and Land Use (AFOLU).

2. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) has found, beyond reasonable doubt, that the Earth's Climate is warming² and that, with 95% certainty, human activity has been the dominant cause by increasing concentrations of Greenhouse Gases (GHG) in the atmosphere. The Fifth Assessment Report presented strong evidence that surface temperatures across Africa have already increased by 0.5-2°C over the past hundred years³. The projections towards 2085-2100 predict a temperature increase between 1.5 and 4.5 depending on the prevailing emissions scenario. Meteorological observations since 1950 suggests that climate change has changed the magnitude and frequency of extreme weather events in Africa, affecting the health, livelihoods and food security of people on the continent⁴. One third of the sub-Saharan countries have provided evidence within their Intended Nationally Determined Contributions (INDCs) highlighting the socio-economic costs caused by extreme climate disasters (see Box 1).

Box 1. Selected Cases of loss and damages and socio-economic impacts reported in the INDCs due to climate change.

Country	Socio-economic impact and loss/damages
Chad	Economic Vulnerability Index of 52.8
Comoros	\$ 836 million US by 2050 representing 130% of the GDP
Ivory Coast	0.5-2m coastal erosion costing \$4-6.75 million US, agricultural production losses: \$85.6 million US for rice production, \$ 202 million US cocoa production
Djibouti	Annual cost of \$ 5 billion US with 2°C scenario (excluding natural catastrophes)
Kenya	Economic losses from droughts and floods estimated at 3% of GDP
Malawi	Severe floods damage in 2015 estimated to be \$335 million US and recovery/reconstruction \$494 million US
Mauritius	Threat value of \$ 50 million US by 2050 in the tourism sector
Mozambique	Economic cost disasters between 1980-2003 \$1.74 billion US, between 2003-2050 estimated cost \$2-7 billion US, equivalent to annual loss between \$0.6-1.2 billion US
Namibia	Annual decrease of the GDP due to droughts and floods by 6.5% estimated.
Nigeria	Without adaptation, 2-11% of GDP lost by 2020, floods in 2012 caused \$16.9 billion US damage (% 1.4 GDP), agricultural productivity could decline by 10-25% by 2080 under BAU scenario, rice import could increase by 40%
Somalia	2010 droughts impacted 50% of populations and millions of unaccounted livestock
South Sudan	Flooding in 2014 resulted in deaths and displacement of over 40,000 people
Togo	5-10m coastal erosion/year threatening entire coastal zone, where more than 90% of country's industrial units are located

² IPCC (2013). Climate Change 2013: The Physical Science Basis. Headline Statements from Summary for Policymakers.

³ IPCC (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Chapter 22. Africa (p.7).

⁴ IPCC (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Chapter 18, Detection and Attribution of Observed Impacts.

Uganda	4.4% of national budget in 2007; costs of impacts of CC (without adaptation measures) are estimated between 270-332 bn USD over 2010-2050 in agriculture, water, infrastructure, and energy sectors
Zambia	GDP losses: 4.3-5.4 bn USD (mid-term), of which in agriculture: 2.2-3 bn USD

3. Ambitious global mitigation of greenhouse gas emissions is needed in order to limit the magnitude of long-term climate change and reduce the risks associated with it. In response, UNFCCC member states have decided during COP21 in Paris to limit warming to at least 2°C above pre-industrial levels and to pursue efforts to limit temperature increase to 1.5°C above pre-industrial levels. IPCC recognizes that Africa (particularly sub-Saharan Africa (SSA), excluding South Africa) has low levels of emissions and that over time these emissions will increase moderately to meet pressing development needs⁵. The Fifth Assessment Report also highlighted the need in Africa in particular to adapt through enhanced risk management. The co-benefits of integrated climate change adaptation, mitigation and development are important and promote socio-economic development, the creation of jobs, environment protection and the improvement of health. Thus, most SSA countries have embarked on a resilient low-carbon development pathway.

II. Overview of AFOLU in the INDCs

4. As of 4 December 2015, all 47 countries of SSA⁶ submitted their INDCs to the UNFCCC⁷ highlighting their commitment to the global goal of 2°C. All countries include an adaptation component within their INDC emphasizing the need to manage the climate risks. All countries include the Agriculture, Forestry and Land Use (AFOLU) in their INDCs, while 98% noting a role for agriculture in adaptation and 73% in mitigation.

AFOLU adaptation measures in the INDCs

5. Agriculture is the foremost priority for adaptation, closely followed by Land Use, Land Use Change and Forestry (LULUCF). All countries have provided details on how this will be implemented, for example through highlighting key adaptation measures. Some countries have followed the approach of the National Adaptation Programme of Action and provided a list of specific long-term projects. Key adaptation measures recorded are shown below in table 1.

⁵ IPCC (2014). Climate Change 2014: Impacts, Adaptation, and Vulnerability. Chapter 22, Africa (Section 4.4)

⁶ FAO (2015). <http://www.fao.org/3/a-i4635e.pdf>

⁷ UNFCCC INDC portal https://unfccc.int/focus/indc_portal/items/8766.php

Table 1. Number of countries citing particular adaptation measures in the AFOLU sectors

Main Agricultural adaptation measures	Number of countries	Main LULUCF adaptation measures	Number of countries
Water Resource Management	38	Ecosystem-based approach/biodiversity	25
Early warning systems	31	Integrated Coastal Zone Management	18
Irrigation	24	Sustainable Forest Management	11
Information Systems/data/modelling	19	Restoration of degraded lands	10
Agroforestry	19	Land use planning	8
Improved varieties/breeds	17	Land Management	8
Awareness raising/education	16	Fire Management	7
Climate-Smart Agriculture	16		
Livestock management	13		
Financial mechanisms (e.g. crop insurance)	12		
Agricultural diversification	11		
Soil Management	11		
Fisheries management	9		
Resilient agriculture	8		
Post-harvest storage/processing	7		
Aquaculture management	6		
Efficient Agricultural Intensification	6		
Mainstreaming of CC into plans/policies	6		
Gender-sensitive adaptation	6		
Vulnerability Assessment	5		
Adaptive research capacity	5		
Adequate use of Indigenous knowledge	5		
Agro-ecology	4		
Total Countries including Agricultural adaptation	46	Total Countries including LULUCF adaptation	47

6. Most countries specifically refer to water and genetic resources management and resilience of crops and livestock. Most countries also highlight the vulnerability of the different agricultural sectors to climate-related hazards and as such 65% refer to early warning systems, disaster risk prevention and management mechanisms as key adaptation measures. Countries also prioritize improved data and monitoring (e.g. modelling, GIS, inventory) as key adaptation measure. FAO has developed a Modelling System for Agricultural Impacts of Climate Change (MOSAICC⁸) which is a multi-disciplinary package of models to support member countries to assess the impacts of climate change on agriculture.

7. Climate-Smart Agriculture (CSA) is being promoted as an integrated approach looking at the co-benefits between adaptation, mitigation and food security. In SSA 16 countries refer to CSA under adaptation measurements and another 13 under mitigation, while eight countries specifically refer to

⁸ FAO MOSAICC <http://www.fao.org/climatechange/34871-0c61824b36f6cd0dfe1daea75cf06e453.pdf>

CSA as an approach to pursue both adaptation and mitigation goals. Both the African Union and the Regional Economic Commissions (ECOWAS, COMESA) have launched CSA platforms to support their member countries to scale up the uptake within the region. It is envisaged that by 2025, twenty-five million smallholder farmers will have embraced the CSA approach.

8. Beside the conventional agricultural technologies, countries also prioritized measures to ensure transfer and uptake of these innovative technologies such as financial mechanisms, adaptive research and development, vulnerability assessments, mainstreaming of climate change into sectoral strategies and action plans and awareness raising and education. Agricultural insurance, credit and microfinance are covered by 12 countries in SSA (e.g. Eritrea, Ethiopia, Malawi, Mozambique, Niger, Nigeria, Senegal, Seychelles, Sierra Leone, Tanzania, Zambia and Zimbabwe). Over one third of the countries highlight extension, education and awareness as priority adaptation measures. This varies from general awareness actions on climate risks and adaptation technologies (e.g. Benin, Comoros), research on resilient agricultural mechanisms (e.g. Central African Republic), mainstream climate change into Education Curricula (e.g. Gambia), and increasing public awareness of climate-smart agriculture (e.g. Zambia). Only one country (e.g. Mauritius) highlights the need to promote sustainable consumption, besides the production aspect as key adaptation area.

9. Women play a vital role as agricultural producers and as agents of food and nutritional security across Africa. Despite being disproportionately affected by climate change, women and girls play a critical role in combating climate change through implementation of adaptation and mitigation actions within the AFOLU sectors. Only 5 countries explicitly highlighted the importance of promoting a specific gender-sensitive approach towards adaptation. Under the Comprehensive Africa Agricultural Development Programme (CAADP) and the 2014 Malabo Declaration on Agricultural Transformation, the New Partnership for Africa's Development Agency launched the Gender, Climate Change and Agriculture Support programme in 2015 (GCCASP⁹) to integrate gender issues and concerns of women small-scale farmers in responding to climate change in agriculture. FAO, IFAD and WB recently developed a module on gender in CSA¹⁰ with practical tools for countries to mainstream gender in the planning, design, implementation and evaluation of projects and investments in CSA.

AFOLU mitigation measures in the INDC

10. Countries recognize the mitigation potential in the AFOLU sector. At the same time it has also the highest potential for mitigation-adaptation co-benefits among all GHG-inventory sectors. Thirty-four countries intend to set mitigation actions in the agriculture sector and 40 countries in the forestry and other land use sectors. Mitigation measures highlighted by countries are given in table 2. The livestock subsector is considered highly relevant to intended mitigation measures; 12 countries specified measures related to enteric fermentation and improved feed. Through better and sustainable soil and manure management, 19 countries have proposed mitigation benefits. Nearly half of the countries that submitted specific agricultural mitigation actions highlight the important role of organic fertilizers.

⁹ NEPAD GCCASP http://caadp.net/sites/default/files/documents/Flagship-Programmes/Gender_Climate_Change_and_Agric_Support.pdf

¹⁰ http://www.ifad.org/gender/resources/gender_climate_smart.pdf

Table 2. Number of countries citing particular mitigation measures in AFOLU sectors

Main Agricultural mitigation measures	Number of countries	Main LULUCF mitigation measures	Number of countries
Soils/fertilizer	13	Reforestation	24
Agroforestry	11	Sustainable wood energy	22
Livestock management	12	SFM	19
Climate-Smart Agriculture	13	Biomass/bioenergy	16
Rice	9	Afforestation	12
Manure management	6	Avoided deforestation	10
Agriculture residue management	3	Land management	8
Agroecology	2	Fire management	8
Agricultural intensification	2	REDD+	7
		Restoration of degraded lands	4
		Land use planning	3
Total Countries including Agricultural mitigation	34	Total Countries including LULUCF mitigation	40

11. Within LULUCF sectors, most countries intend to reduce emissions from deforestation through reforestation (24), sustainable forest management (19) and afforestation (12). Over half of the countries (22) which submitted specific forest-related mitigation actions mentioned the importance of sustainable energy from wood sources and the promotion of improved cooking stoves. Additionally nearly half of the countries (16) mentioned a shift towards bioenergy as mitigation contribution which has implications for land use. It is good to note that three countries underline the importance of proper land-use planning in terms of mitigation benefits. FAO has developed the Bioenergy and Food Security (BEFS¹¹) rapid appraisal approach to support countries in designing and implementing sustainable bioenergy policies and strategies.

12. Despite the significance of the AFOLU sectors and their potential for mitigating climate change, only a small share of the INDCs provide an estimate of the projected GHG reductions. Nine countries explicitly incorporate AFOLU GHG-targets. Estimations on total emission reductions range from 0.08% to 81.7% at the 2030 time horizon compared to the Business As Usual (BAU) scenario. The emission reductions proposed also will depend on the conditionality and availability of finances and technological support.

13. The limited level of GHG projections reflects uncertainties regarding both data and accounting principles in the AFOLU sector. Most countries highlighted the need for capacity building on data and monitoring, and the development of a robust GHG inventory is seen as a crucial first step in the National Development Planning Process as well as the development of a NAMA portfolio. The FAO Mitigation of Climate Change in Agriculture (MICCA) Programme recently developed an online toolkit¹² to support member countries with the identification, development and implementation of country AFOLU specific mitigation actions in the context of national sustainable development and will shortly launch an e-learning tool on GHG inventories.

Capacity building, technology transfer and finance

14. Capacity building and technology transfer are key elements within the new Global Agreement. Most countries highlight the requirement of international support in forms of finance, investment,

¹¹ FAO Bioenergy and Food Security (BEFS) Approach <http://www.fao.org/energy/befs/en/>

¹² Tool on Nationally Appropriate Mitigation Actions in agriculture, forestry and other land use sectors <http://www.fao.org/climatechange/micca/nama-tool/en/>

technology development and transfer, and capacity-building both in adaptation as well as mitigation to fully realize their intended contributions.

15. Countries highlighted the critical role of south-south and north-south cooperation collaboration to facilitate the required capacity building and transfer of technologies. Some countries also specify that a minimum of 10% of the needed investment should be allocated to capacity building and enhancement at the individual, institutional and systemic levels. Some key areas for capacity building mentioned by the countries are: integrated capacity needs assessments across all levels, collection and processing of climate-related data to the AFOLU sectors in particular, enhanced awareness and education concerning climate change impacts and opportunities, developing and improving the national, sub-regional and regional policy environment required for adequate adaptation and mitigation programmes, enhanced research-policy-practitioners interface.

16. Most countries highlight the requirement of transfer of appropriate adaptation and mitigation technologies especially within the AFOLU sectors. Some countries also emphasize the need to scale up indigenous practices combined with innovative technologies. Some key areas mentioned in the INDCs are: technological capacity to undertake effective climate modelling and risks, implementation of specified adaptation technologies highlighted in the INDC, promotion of research and development, adopting new technologies, and harnessing them for the national context.

17. Of all the countries that have adaptation commitments, 60% (28 countries) include estimations of the financing needed to implement the proposed adaptation measures; this totals \$185 billion US. Assuming the first part of the Global Agreement will be up to 2030, this gives about \$12 billion US per year needed by this subset of countries. Small Island Developing States (SIDS) within the African continent require \$4.5 billion US (2%) of the total mentioned adaptation cost. But only half of the SIDS included targeted costing of their adaptation measures in the INDCs.

18. Only 11 countries specify financing requirements for agricultural adaptation of which 8 have identified high financing needs (98% of the total amount underlining the sector's vulnerability to climate change) ranging from \$1.5 to \$ 35 billion US. The median requested amount for agricultural adaptation finance is \$113 million US per year (assuming a 15-year time frame up to 2030). Only 10 countries mention financing requirements related to adaptation in the LULUCF sectors, with a much lower amount than in the agriculture subsector because of the scope of adaptation actions proposed linked to management and planning issues. Reference is made to the Clean Development Mechanism and the REDD+ framework by more than half of the countries to support investment within the LULUCF context, both for adaptation and mitigation purposes. As such, 10 countries specifically recognize the role that carbon markets can play in the mobilization of resources and promotion of the development and transfers of climate friendly technology.

19. Most countries make their INDCs contingent on availability of financial and technical support from developed countries. The most frequently identified sources of financing are international financial support and public domestic funding. The Green Climate Fund is mentioned by half of the countries as well as the Global Environment Facility (GEF) to offer the required conditional funding. Private sector investments are also mentioned to finance the required uptake of innovative adaptation and mitigation activities. The presence or the establishment of specific national climate funds is mentioned in 10 INDCs to facilitate domestic and international funding towards key climate change programmes.

20. Proper measurement, reporting and verification systems will need to be drawn up in all countries in order to communicate or update every five years their INDCs to the Conference of Parties as agreed in the Paris Agreement (Decision 1/CP.20)¹³. The technical capacity, as well as research and stakeholder coordination will need to be reinforced in order to carry out this important activity.

¹³ UNFCCC Paris Agreement <http://unfccc.int/resource/docs/2015/cop21/eng/109.pdf>