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Identifying Opportunities for Coherence between the Intended Nationally Determined Contributions and the Sustainable Development Goals: The Case of ECOWAS Member States

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List of acronyms

CCCEP	Centre for Climate Change Economics and Policy
COP	Conference of Parties
ECOWAS	Economic Community of West African States
FAO	Food and Agriculture Organization
GHG	Greenhouse Gases
GSGDA	Ghana Shared Growth and Development Agenda
IFAD	International Fund for Agricultural Development
iNDCs	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
NDPC	National Development Planning Commission
OECD	Organisation for Economic Co-operation and Development
SDGs	Sustainable Development Goals
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organisation

ABSTRACT

While the SDGs and INDCs are two of the most important policy frameworks of the twenty-first century so far, the interactions and trade-offs between the SDGs and the INDCs have not yet been analysed, especially in sub-Saharan African countries. Such analyses are paramount as their absence risks perverse outcomes for ECOWAS member states if they start assessing targets one after another without a coherent strategy. In particular, there is a lack of understanding on how the INDCs submitted to the UNFCCC can advance progress towards achieving the SDGs. This analysis was guided by the following research questions: i) what overarching priority areas or sectors to adaptation and mitigation are present in the INDCs of the member states of ECOWAS? ii) what kinds of alignments or coherence are present in the INDCs submitted by member states of ECOWAS and SDGs? iii) what are the co-benefits from the INDCs in contributing towards meeting the SDGs? iv) how are ECOWAS member states going to finance actions outlined in their INDCs submitted to the UNFCCC? The study used an iterative content analysis to explore the key themes for adaptation and mitigation and examined the key alignments between the SDGs and the INDCs of ECOWAS member states. The results show that agriculture and the energy sectors are top priority sectors where many of the INDCs have pledged various commitments. The analysis has also revealed significant alignment between the various mitigation and adaptation actions proposed in the INDCs and the Agenda 2030 for Sustainable Development, particularly across goals 1 (no poverty), 2 (zero hunger), 6 (access to clean water) and 7 (affordable and clean energy); 13 (climate action) and 15 (life on land). These alignments represent the opportunities and the various benefits that could be derived from the implementation of these INDCs in promoting the SDGs. The analysis reveal that ECOWAS member states will need international assistance (in the form of financial, technological and capacity building) to implement the various mitigation and adaptation actions outlined in their INDCs.

KEYWORDS

ECOWAS, climate change; sub-Saharan Africa; mitigation; adaptation; agriculture; sustainable development goals; nationally determined contributions

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1. Introduction

1.1. Paris Global Climate Agreement

At the 20th session of the Conference of the Parties (COP20) in Lima, Peru, in December 2014, under the Lima Call to Action, Parties to the UNFCCC were urged to submit their "intended nationally determined contributions" (INDCs) (UNFCCC, 2014), which outlined their commitments towards global agreement to tackle climate change (Ahmad et al., 2017). To date, 162 INDCs had been received and these represent actions of 189 countries, which are responsible for 98.8 of the global GHGs emissions[1]. Within the INDCs, parties indicated the key mitigation and adaptation actions they intend taking in order to reduce global emissions of greenhouse gases. The requirement for the submission was flexible as there was no guideline. Hence, the INDCs submitted by parties to the UNFCCC varied greatly. The commitments in the INDCs by parties to the UNFCCC formed the bases for the Paris Agreement, which was agreed in December, 2015 by the 196 Parties to the UNFCCC. The Paris Agreement is a legal binding framework to tackle climate change and seeks to hold global warming to well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit this to 1.5 ^{o}C. The Paris Agreement has been hailed as a "landmark achievement in multilateral diplomacy in the discourse on climate change" (FAO, 2016, p.1). On 4 November 2016, the Paris Agreement entered into force. Although, it has been reported that current mitigation offers outlined in the INDCs will not be sufficient to limit climate change within 2^{o}C (e.g. Boyd et al., 2015a and 2015b).

By adopting a bottom-up approach, the Paris Agreement enabled countries to present the types and scopes of their contributions based on their peculiar national circumstances (Northrop et al., 2016). Prior to the 2015 UNFCCC COP21, all the 15 member states of the Economic Community of West African States (ECOWAS) submitted their INDCs to the UNFCCC Secretariat and analysing these submissions is the overarching aim of this paper.

2. Agenda 2030 for Sustainable Development

Building on the Millennium Development Goals, the Sustainable Development Goals (SDGs) agreed in Sept 2015 include a set of 17 Sustainable Development Goals (with 169 targets) aimed at ending poverty, fighting inequality and injustice, and tackling climate change by 2030 (UNDP, 2015), in a more coherent climate-resilient development pathway. The SDGs "*reflect new global consensus on the major imbalances generated by existing economic and environmental trajectories, such as growing inequalities, climate change, biodiversity loss, and on the need to rapidly achieve sustainable development by reconciling economic, social and environmental*

[1]INDCs that have been submitted to the secretariat of the UNFCCC are published at: http://www4.unfccc.int/submissions/indc/Submission%20Pages/submissions.aspx.

concerns" (Northrop et al., 2016, p. 9). The 17 goals tackle issues pertaining to poverty (SDG 1), sustainable agriculture (SDG 2), good health and wellbeing (SDG 3), quality education (SDG 4), access to quality water (SDG 6), affordable and clean energy (SDG 7), sustainable infrastructure (SDG 9), sustainable cities (SDG 11). Others relate to climate action (SDG 13), land degradation (SDG 15), sustainable development and lifestyle (SDG 12), and partnership for sustainable development (SDG 17). Together, the 169 targets aimed to build resilience to climate change, ecosystem resilience whilst providing opportunities for inclusive economic growth and ensure water use efficiency (Northrop et al. 2016).

3. Alignment between these two frameworks for development

Together, these international agreements – the INDCs and the SDGs set a new trajectory for addressing climate change and offer important opportunities for countries to develop in a climate-resilient way. Various analyses have dissected African INDCs and their key components in terms of both mitigation and adaptation (Mbeva et al., 2015; Richards et al., 2015). Similarly, Boyd *et al.* (2015b, p. 7), reported that there was a *"mismatch between the ambitions presented in the INDCs and the overall objective of having a reasonable chance of avoiding global warming of more than 2°C"*. Ahmad et al (2017) explored the various pledges within the INDCs by Asian countries in relation to mitigation targets, climate finance, disaster reduction, and gender and social inclusion. Research has started on the SDGs too. Nilson et al (2016) identified the interactions amongst the SDGs and highlighted seven interaction types that exist between the goals and targets at any level. At the global level, Northrop et al (2016) examined the alignment between the INDCs and the SDGs. However, the interactions, synergies and trade-offs between the SDGs and the INDCs have not yet been analysed, especially in sub-Saharan African countries. Such analyses are paramount as their absence risks perverse outcomes for ECOWAS member states if they start assessing targets one after another without a coherent strategy. In particular, there is a lack of understanding on how the INDCs submitted to the UNFCCC can advance progress towards achieving the SDGs. Northrop et al. (2016, p. 2) stated that "*a deeper and more comprehensive understanding of the effective linkages between these two agendas will contribute to unlocking further ambition and enable movement beyond incremental, short-term measures to an approach that addresses the underlying barriers to a zero-carbon, climate-resilient future.*"

This paper provides a better understanding of how INDCs might facilitate SDG progress, particularly across goals 1 (no poverty), 2 (zero hunger), 6 (access to clean water and sanitation); 7 (affordable and clean energy); 13 (climate action) and 15 (life on land). Our analysis focused on six thematic areas – poverty, food security, water, energy, climate action and land degradation because they are of particular importance to the national economies of ECOWAS member states. The analysis builds on current CCCEP funded work on trade-offs and synergies between sector policy and climate compatible development in the Southern African Development Community

(England *et al.*, 2017; Stringer *et al*., 2017). Specifically, the study is guided by the following research questions:

i) What overarching priority areas or sectors to adaptation and mitigation are present in the INDCs of the member states of ECOWAS?
ii) What kinds of alignments or coherence are present in the INDCs submitted by member states of ECOWAS and SDGs?
iii) What are the co-benefits from the INDCs in contributing towards meeting the SDGs?
iv) How are ECOWAS member states going to finance actions outlined in their INDCs submitted to the UNFCCC?

4. Study approach

The study adopted a two-stage methodology. In stage one, the submitted INDCs of ECOWAS member states were analysed using iterative content analysis (Kalaba et al., 2013). In all, the study analysed 11 out of the 15 INDCs by ECOWAS states (Burkina Faso, Cape Verde, Liberia, Ghana, Guinea, Guinea Bissau, Niger, Nigeria, Sierra Leonne, The Gambia, and Togo), which were submitted by October 1, 2015. The study did not include the INDCs of Benin, Code d'ivoire, Mali, and Senegal because these were submitted in French. To identify the overarching priority areas or sectors to adaptation and mitigation, an in-depth content analysis of the INDCs was undertaken to retrieve emerging keywords. Appropriate keywords were selected based on the literature for mitigation and adaptation (Table 1). In order to ensure accuracy of keywords, each of the INDCs was read thoroughly. The dominant narratives and key themes that emerged from the content analysis were cross-checked against SDGs to highlight any similarities and contradictions. These themes were coded into key sectors as outlined in Table 1. The key metric in this analysis followed the approach described by Mbeva et al. (2015). The frequency at which a keyword appeared in all the INDCs analysed was used. For example, if the keyword is 'climate change', irrespective of the number of occurrence in a particular country's INDC, its count was recorded as one count.

Priority sectors in this analysis were understood to be sectors mentioned by most countries, and not how individual countries perceived priority. This is because the focus of this analysis was on the aggregate of ECOWAS member states, and not individual INDCs. For example, if all the 11 countries stated 'agriculture' as an adaptation sector and fewer countries mentioned 'biodiversity' as one of the adaptation sectors, then 'agriculture' was understood to be of greater priority to the ECOWAS member states, on aggregate. Positive and negative interactions between the 11 INDCs and SDGs (1, 2, 6, 7, 13 and 15) were considered. Positive interaction in this analysis means the measures/actions taken in the INDC will help achieve the SDGs. The interaction becomes negative when the action stated in the INDC affects the achievement of any of the SDGs. In stage two, the co-benefits from the identified priority sectors and their co-benefits were highlighted. Using expert interviews, the trade-offs from the various priority sectors and areas were identified.

Table 1: Keywords used in INDC searches (obtained from literature review)

Sector	Reference
	Mitigation
Agriculture	OECD (2016), Recha *et al.* (2014)
Forestry	Pekka (2007)
Energy	UNFCC (2015); Mbeva et al. (2015)
Land	Recha *et al.* (2014)
Transportation	Giuseppe (2010)
Industrialization	Szirmai *et al.* (2013)
Waste management	Atilio (2015)
Livestock	Ahmed et al. (2017)
	Adaptation
Human settlements	UNFCC (2015); Mbeva et al. (2015)
Early warning system	Bhutan (2006)
Tourism	Lépy *et al.* (2014)
Coastal Zone	UNFCCC (2007)
Sanitation	Oates et al. (2014)
Floods	UNFCCC (2007)
Capacity building	Carter et al. (2015)
Biodiversity	Schmitz *et al.* (2015)
Disaster management	Mbeva et al. (2015)
Fisheries/marine	UNFCCC (2007)
Food security	Mercer *et al.* (2014)
Health	WHO (2014), UNFCCC (2007)
Infrastructure	Chappin and van der Lei (2014)
Agriculture	OECD (2016), Recha *et al.* (2014), UNFCCC (2007)
Energy	UNCCC (2015) Mbeva et al. (2015)
Forestry	Pekka (2007), Butler *et al.* (2012)
Land management	Recha *et al.* (2014)
Water management	UNFCCC (2007)

5. RESULTS

5.1. Priority sectors for mitigation and adaptation identified in INDCs

This section presents the various priority sectors and areas identified in the 11 INDCs analysed. The sectors are classified under mitigation and adaptation.

5.1.1. Mitigation

Under the UNFCCC, mitigation and adaptation are the two key responses to the threat of climate change. Mitigation aims at slowing the rate of global warming by reducing the amount of greenhouse gases released (IPCC, 2007). Mitigation efforts are in line with main objective of the Climate Change Convention" which states that *any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system*" (UN, 1992). This analysis aimed at discovering whether the ECOWAS member states that had submitted their INDCs had

made any mitigation commitments and what were the key priority mitigation sectors. The analysis shows that mitigation goals of ECOWAS member states focused on combating deforestation and forest degradation, whilst promoting sustainable forest management through afforestation and agroforestry practices. The results show that all the 11 ECOWAS member states made various mitigation commitments. Figure 1 shows that mitigation sectors that were of high priority include energy, forestry, agriculture, and waste management. Land use was the least mentioned mitigation sector. Most of the INDCs provided evidence on quantified targets for the energy sector. For instance, Ghana's mitigation commitments include 10% renewable penetration by 2030 and the promotion of clean rural household lighting[2]. In terms of waste management, Ghana is committed to adopting an alternative urban solid waste management.

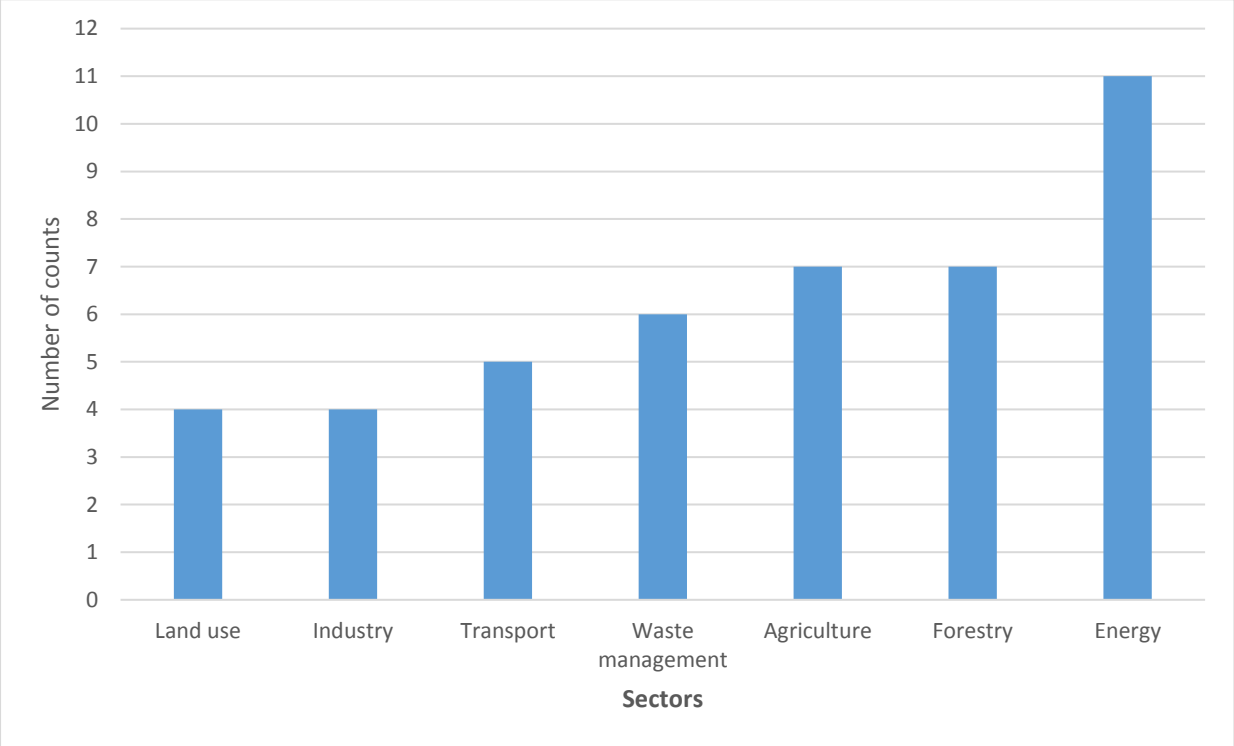

Figure 1: Priority areas for mitigation of INDCs submitted by ECOWAS member states

5.1.2. Adaptation

Adaptation is a priority for ECOWAS countries since they bear disproportionate impacts of climate change (UNEP, 2014; IPCC, 2007). The main adaptation focus of adaptation commitments relates to reducing vulnerability to climate change and building resilience in the various sectors that are vulnerable to the adverse impacts of climate change. From the analysis of the INDCs of 11 ECOWAS member countries, agriculture was rated as the most important adaptation sector, being mentioned in all the INDCs reviewed. The other sectors of significant importance included forestry

[2] Ghana INDC

(7), coastal zone management (6), disaster reduction (5), water resource management (5) and energy (5). Early warning systems, vulnerable groups and land use were also given equal importance in the INDCs, whilst transport and health were mentioned by only three countries. Human settlement and industry were the least prioritised adaptation commitments by the countries (Figure 2).

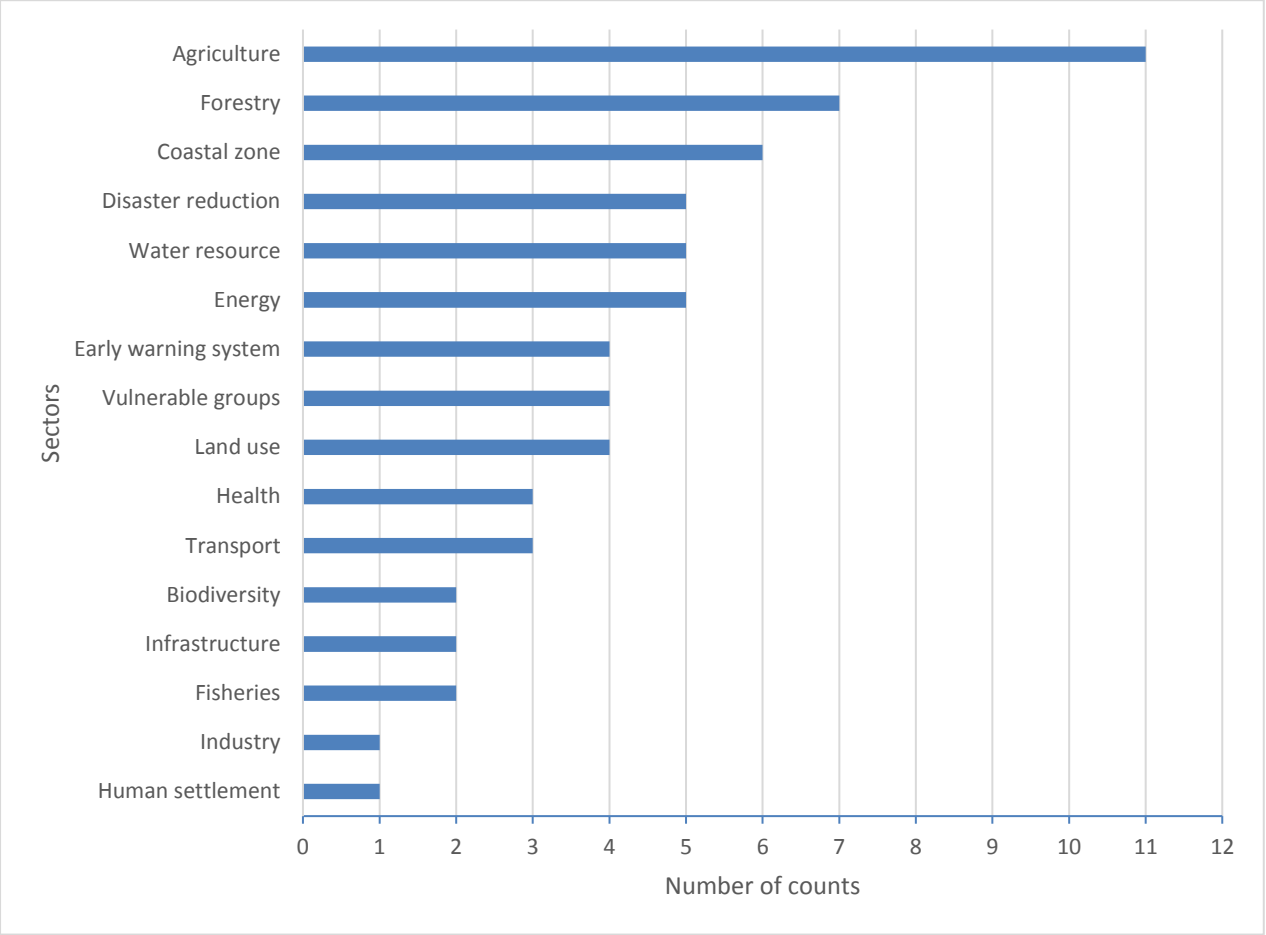

Figure 2: Priority areas for adaptation of INDCs submitted by ECOWAS member states

5.2. Alignment of INDCs with SDGs

This section presents the alignment between the INDCs and the SDGs (1, 2, 6, 7, 13 and 15). Generally, all the countries had measures in their INDCs that in one way or the other will help towards the achievement of SDGs 1, 2, 6, 7, 13 and 15. Table 2 shows that there are significant positive alignment and interactions between the INDCs and the various targets of the SDGs. For instance, Table 2 indicates that all the 11 INDCs of ECOWAS member states detailed various interventions aimed at ending poverty by 2030. For examples, Cape Verde "*seek to diversify income generating activities in rural areas by promoting artisanal fishing activities (providing training, equipment, and micro-credit) in coastal areas*"[3]. Ensuring food security (SDG 2) remains

[3] Cape Verde INDC, page 20

a major challenge in ECOWAS member states. Agriculture including the growing of crops, livestock production and fishing, is the main livelihood sources for the majority of these people. All the 11 INDCs indicated their commitment at improving the food security situation in the region. Gambia pledged to add value to agricultural produce whilst implementing livestock production to boost agricultural productivity. Gambia's INDC indicated; "*value addition of products will be promoted to complement and support crop diversification*". It continued: "*implementation of poultry, small-ruminants and cattle production at the local level will be improved*" (Gambia INDC, p. 11). Other intended actions included "a*dopting improved agricultural systems for both crops and livestock (for example, diversify livestock and improve range management; increase access to drought resistant crops and livestock feeds; adopt better soil management practices; and provide early warning/meteorological forecasts and related information*" (Nigeria INDC, p. 7). Niger INDC indicated "*improvement of the balance sheet of cereals and fodder, along with food and nutritional security*" (Niger INDC, p. 12). Increasing agricultural production is a viable option at guaranteeing food security and water access. To this end, measures have been provided to improve agricultural production including resilience building in the agricultural sector and reducing post-harvest loses.[4]

Improving water quality and protecting water-related ecosystem is also a major concern for many of the INDCs reviewed (Table 2). Several actions have been put forward in the INDCs that will help these countries to improve water quality (Target 6.3) whilst expanding water supply (Target 6.4). These actions included "*promoting integrated water resources management, guaranteeing stable and adequate water supply (for consumption, agriculture, ecosystems and tourism)*" (Cape Verde, INDC, p. 6). Others related to the "c*onstruction and/or improvement of reservoirs for micro-irrigation and livestock watering in rural areas throughout all regions*" (Togo, INDC, p. 18). West Africa continues to grapple with challenges in terms of providing reliable energy and clean energy supply for economic growth. The review shows that most of the countries want to diversify their energy sources. For instance, Guinea makes ambitious proposal to "*produce 30% of its energy (excluding wood-energy) from renewable energy sources"* (Guinea, INDC, p. 10).

Table 2 also highlights some of the climate actions (SDG 13) included in the INDCs of ECOWAS member states. The table shows that various adaptation and mitigation actions have been outlined to reduce the vulnerability of the agricultural systems to climate change. For instance, Liberia indicated: "*enhancing resilience to increasing rainfall variability through the diversification of crop cultivation and small ruminants rearing*"[5] (Liberia INDC, p. 13 & 15). Other countries indicated their preparedness to integrate climate change into national planning (Target 13.2). For example, The Gambia indicated that "c*limate change adaptation priorities will be mainstreamed into national*

[4] Ghana INDC
[5] Liberia INDC, pages 13 and 15

agriculture and livestock policies, plans and programmes"[6] (Gambia INDC, p. 10). Other areas relating to climate actions highlighted promotion of climate change education and public awareness (Target 13.2) aimed at "*increasing knowledge and awareness of climate change risks and opportunities*" (Nigeria INDC, p. 8). Countries such as Sierra Leonne has offered to "*strengthen the adaptive capacity of the most vulnerable groups and communities through social safety nets and insurance schemes*" (Target 13.1)[7] (Sierra Leone iNDC, p. 9)

Table 3 further shows various actions have been proposed to sustainably manage forest whilst combating land degradation and halting biodiversity loss. For instance, Guinea Bissau indicated in their INDC that the country will "develop *a national reforestation and sustainable management of forest and agro forestry ecosystems programme by 2025 and establish and schedule a new forestry policy.*"[8] (Guinea Bissau INDC, p. 5). Guinea also stated in the INDC: "*run re-afforestation programmes throughout the country, covering 10,000 ha per year, and ensure sustainable management of replanted areas*" (Guinea INDC, p. 12). Countries such as Nigeria and Sierra Leonne have also pledged in their INDCs to restore degraded land and increase natural forests. Nigeria also highlighted its intention to "*provide extension services to CSOs, communities and the private sector to help establish and restore community and private natural forests, plantations and nurseries* (Nigeria INDC, p. 7).

[6] The Gambia INDC, page 10
[7] Sierra Leone INDC, page 9
[8] Guinee Bissau INDC, pages 5 and 10.

Table 2: Alignment between the INDCs and selected targets of SDGs 1, 2; 3; 6; 7; 13; and 15

Goals	Selected Targets	Selected Examples from INDCs of ECOWAS member states
Goal 1: End poverty in all its forms everywhere	Target 1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day	**Eradicate extreme poverty** • "Livelihoods and sources of income for vulnerable communities in 5 Administrative Regions of the country will be diversified" *(Gambia, adapting the agriculture system to climate change in the Gambia, p. 11)*. • "Encourage informal savings and insurance schemes, and arrange for the availability of medium term credit (especially for industries in crisis)" *(Nigeria, strategies for industry and commerce, p. 8)*.
	Target 1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	**Reduce rural poverty** • "Job creation and reduction of the rural exodus" *(Niger, co-benefits, p. 12)*. • "Seek to diversify income generating activities in rural areas by promoting artisanal fishing activities (providing training, equipment, micro-credit) in coastal areas" *(Cape Verde, Adaptation contributions, p. 7).*
	Target 1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters	**Build resilience** • "Development of research programmes on the resilience of forest, wildlife and fish species" *(Burkina Faso INDC, p. 11).* • "Assist communities to reduce vulnerability through participatory planning of land use & housing" *(Nigeria, INDC, p. 21)*. • "Promotion and facilitation of early warning and disaster preparedness system, strengthen the adaptive capacity of the most vulnerable groups and communities through social safety nets and insurance schemes and enhance the resilience of the tourism value chain" *(Sierra Leone INDC, p.9)*.
Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round	**Guarantee food security and water access** • "Develop rice production by improving yields through use of varieties better able to cope with the impact of climate change (particularly ingress of salt water)" *(Guinea, Adaptation commitment, p. 7)* • "Implement strategies for improved resource management (for example, increase use of irrigation systems that use low amounts of water; increase rainwater & sustainable ground water harvesting for use in agriculture; increase planting of native vegetation cover & promotion of re-greening efforts; and intensify crop and livestock production in place of slash and burn)" *(Nigeria, Strategies for agriculture, p. 7)*.
	Target 2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers.	**Improve food security** • "Improvement of food processing and preservation methods" *(Burkina Faso, Food, p. 12).* • "Adoption and application of climate-smart and conservation agriculture through best agricultural practices that enhance soil fertility and improve crop yield" *(Sierra Leone, Long term global contribution, p. 8)*. • "Promotion of rice production systems with very low water consumption and low GHG emissions (SRI: System of Rice Intensification)" *(Togo, Priority adaptation measures/projects, p. 18)*.
	Target 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to	**Increase agricultural productivity** • "Sustainable crop intensification will be enabled by introducing innovative crop improvement and management practices" *(Gambia, INDC, p. 10)*. • "Implementing and upscaling the Climate-Smart Agriculture activities" *(Niger INDC, p. 12).*

	climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	• "Seek to disseminate more efficient small-scale irrigation techniques and promoting soil conservation schemes for farmers and rural producers" *(Cape Verde, Adaptation contributions, p. 7).* • "Adoption and application of climate-smart and conservation agriculture through best agricultural practices that enhance soil fertility and improve crop yield" *(Sierra Leone, Long term global contributions, p. 8)*.
	Target 2.5 By 2020, maintain the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species…]	**Maintain genetic diversity** • Establishment of a gene bank of climate resilient varieties of indigenous food crops *(Liberia, agriculture, p. 14).*
Goal 6: Ensure availability and sustainable management of water and sanitation for all	Target 6.1 by 2030, achieve universal and equitable access to safe and affordable drinking water for all	**Safe and affordable drinking water** • "Implement programmes to sustainably extend and improve water supply and water management infrastructure" *(Nigeria, strategies for freshwater resources, coastal water resources and fisheries, p. 20)*.
	Target 6.2 by 2030, achieve access to adequate and equitable sanitation and hygiene for all, and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	**Sanitation and hygiene** • "Implementing educational programs for the separation of basic waste types by households and waste producers" *(Cape Verde INDC, p. 5).* • "Improved sanitation and drainage of rainwater in the main urban centres and rational and sustainable management of waste in urban areas" *(Togo, Priority adaptation measures/projects, p. 18)*.
	Target 6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	**Improve water quality** • "Intensify programmes to survey water quality and quantity for both ground and surface water" *(Nigeria, strategies for freshwater resources, coastal water resources and fisheries, p. 20)*. • "Adopt alternative urban solid waste management and integrated water resources management" *(Ghana, mitigation and adaptation goal, p. 3 & 7)*. • "Conservation of rainwater and reuse of wastewater and improvement of groundwater management" *(Togo, Priority adaptation measures/projects, p. 18)*.
	Target 6.4 By 2030, substantially increase water use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	**Expand water supply** • "Increased access to potable water, integrated water management policy, greater water security for communities, increased protection of infrastructure from extreme climate events" *(Gambia, improve the climate and climate change resilient urban and peri-urban infrastructure, p. 10).* • "Capture and storage of rainwater (water retention basins and mini-dams) for water management in the dry season" *(Guinea Bissau, Reports view of the short and long-term adaptations, objectives and goals, p. 6)*.
	Target 6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	**Implement integrated water resource management to ensure water security** • "Development of master plans for water development and management and implementation of water-efficient irrigation techniques" *(Burkina Faso INDC, p. 11).* • "Initiate a national programme for integrated water resource management at the watershed level" *(Nigeria, strategies for freshwater resources, coastal water resources and fisheries, p. 20)*.

	Target 6.6 By 2020, protect and restore water related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	**Protect water-related ecosystems** • "Development of water reservoirs: construction of modern wells, high-flow boreholes, dams; development of ponds; stream diversion" *(Burkina Faso, Sustainable land management, p. 11).* • "Protection of water courses and water sources" *(Burkina Faso, Sustainable land management, p. 11)*.
Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all	Target 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	**Increase access to modern forms of energy** • "Improvement of the rate of access to electricity (overall, exceed 10% in 2010, 60% in 2030, of which 47% to 100% is in the urban zone and 0.4% to 30% in 2030 is in the rural zone" *(Niger, GHG emissions mitigation measures at the 2030 horizon; energy, p. 2)*. • "Develop and diversify secure energy backup systems to ensure both civil society and security forces have access to emergency energy supply" *(Nigeria, Strategies for energy, p. 7)*.
	Target 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	**Increase share of renewable energy** • "Rehabilitate existing hydro-power plants and build new hydro-power plants to increase hydro-power production capacity and *(Liberia INDC p. 12).* • "Scale up renewable energy penetration by 10% by 2030" *(Ghana, Energy, p. 3).*
	Target 7.3 By 2030, double the global rate of improvement in energy efficiency	**Intensify energy efficiency efforts** • "Produce and distribute 280,543 energy saving cook stoves that use fuel wood and 308,004 energy saving cook stoves that use charcoal by 2030" *(Liberia, Energy, p. 12)* • "Improving energy efficiency of large consumers, with particular focus on hotels, hospitals and public administration offices by 2030 or before, including through mandatory installation of solar-water-heater components" *(Cape Verde INDC, p. 4).* • "Promotion of energy efficiency, enhanced management and expansion of the energy mix through uptake of renewable energy sources (Solar, Wind, Hydro, Biomass) particularly in the rural areas of Sierra Leone" *(Sierra Leone INDC, p. 7)*.
Goal 13: Take urgent action to combat climate change and its impacts	Target 13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	**Enhance adaptive capacity** • "Climate information services to the agriculture sector and dissemination to wider rural communities will be promoted and strengthen disaster risk reduction institutions through institutional strengthening and capacity building" *(Gambia INDC, p. 11 & 12)*. • "Promote forestry/plantation of species resistant to drought and low rainfall by 2030" *(Guinea Bissau, p. 6)*. • "Promotion of efficient varieties resistant to climate change and making structural investments in coastal protection" *(Togo INDC, p. 18)*.
	Target 13.2 Integrate climate change measures into national policies, strategies and planning	**Integrate climate change in national planning** • "Building of a national hydro-meteorological monitoring system and improved networking for the measurement of climatic parameters" *(Liberia INDC, p. 13).*

		• "Support for the mapping of areas vulnerable to climate change and reforestation and protection of zones with fragile ecosystems (mountainsides, river banks) in the fight against floods, violent winds and erosion." *(Togo INDC, p. 18)*. • "Diversification of economic growth through strengthened transport sub-sector, particularly the infrastructure to contribute to the reduction of regional and global emissions of greenhouses and build a stable economy" *(Sierra Leonne INDC, p. 8)*.
	Target 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	**Promote climate change education and public awareness** • "Develop skills-based curriculum in subjects like science, geography, social studies, language arts, environmental education and technology that will empower children to better respond to the threat of climate change" *(Nigeria, Strategies for education, p. 22)*. • "Develop scientific and technical research on adaptation of new productive varieties with broad spectrum tolerance to climate adverse effects by 2025" *(Guinea Bissau INDC, p. 5)*
Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	**Sustainably manage forests and ecosystems** • "Implementation of good forestry and agroforestry practices (selective cutting of firewood, assisted natural regeneration, controlled land clearing, etc.)" *(Burkina Faso, Sustainable land management, p. 11).* • "Upscaling of good sustainable land management practices over all agro-ecological areas in order to increase the resilience of ecosystems and households and sequester carbon" *(Niger INDC, p. 2).* • "Promote Sustainable utilization of forest resources through REDD+" *(Ghana INDC, p. 3)*.
	Target 15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	**Restore degraded land and increase natural forests** • "Strengthening of the good practices of assisted natural regeneration and recovery of degraded land" *(Niger, INDC, p. 12)*. • "Increase the amount of forested land through reforestation of degraded lands" *(Liberia INDC, p. 14).*
	Target 15.3 By 2030, combat desertification, and restore degraded land and soil, including land affected by desertification, drought and floods…	**Combat desertification** • "Management of rangelands and pastures by managing grazing systems and grazing intensity, fire management and pasture rehabilitation" *(Sierra Leone INDC, p. 9)*.
	Target 15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	**Safeguard biodiversity** • "Community and participative management of forest, wildlife and fish resources" *(Burkina Faso, p. 11)*. • "Ensure effective conservation of classified forests and protected areas by means of strengthening supervisory arrangements (Guinean Parks and Nature Reserves Office and nature conservators); awareness-raising; participatory management; and enforcement of the criminal sanctions set out in the Forest Code" *(Guinea INDC, p. 12)*. • "Develop and maintain a frequent forest inventory system to facilitate monitoring of forest status; and initiate a research programme on a range of climate change-related topics, including long term impacts of climatic shifts on closed forests" *(Nigeria INDC, p. 7)*.

6. Non-coherence (negative interactions) between INDCs and SDGs

Table 3 shows that some of the adaptation and mitigation actions outlined in the INDCs will interact negatively with the attainment of the SDGs. For instance, the drive towards the increased use of alternative energy sources (including solar and biofuels) (see INDCs of countries such as Burkina Faso and Ghana) has the potential to adversely affect food production, resulting in increased food insecurity (SDG 2). This results from the displacement of marginalised households from fertile agricultural lands in favour of commercial biofuel cultivation. Reduced food production could also imply reduced farm income to the farmer, which will perpetuate poverty (SDG 1), in a region characterised by high incidence of poverty and whose livelihoods depend on rain-fed agricultural systems. Low agricultural output has the tendency to also affect household food consumption (because most households in this region rely on food from their own farms) which in turn can affect the health of members of the households (SDG 3), making them more vulnerable to the adverse impacts of climate change (SDG 13).

Several INDCs submitted by the ECOWAS member states seek to use small-scale irrigation facilities in promoting agricultural outputs. For instance, Cape Verde's INDCs states "*Seek to disseminate more efficient small-scale irrigation techniques and promoting soil conservation schemes for farmers and rural producers*" (Cape Verde INDC, p. 7). Increasing irrigation through the construction of small dams in farming communities can negatively interact with other SDGs in two ways: First, small dams within these farming communities will serve as breeding grounds for malaria-causing mosquitoes and this could increase the incidence of malaria within these communities (SDG 3). Second, damming will result in decreased water availability for farming households (SDG 6) and cause conflict because of competing demands for water.

Table 4 below shows the key proposed actions under each sector in the INDCs of ECOWAs member states.

Table 3: Non-coherence (negative interactions) between INDCs and SDGs

Selected targets	Examples from INDCs of ECOWAS member states
Target 1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day	**Eradicate extreme poverty** • Cabo Verde makes an unconditional long-term commitment to engage in new afforestation/reforestation ("A/R") campaigns in the order of 10,000 hectares by 2030 (Cape Verde INDC, p. 5).).
Target 2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations.	**Guaranteed food and water security** • "Increase the percentage of protected areas from 15% to 26% and ensure its management, and an effective implementation of the Forest Act and the moratorium to ban the felling and export of timber over the next five years (Guinea Bissau INDC, p. 5).
Target 2.3 By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers	**Improve food security** • The promotion of private, community and State reforestation through the creation of plantations and the promotion of agroforestry on cultivated land (Burkina Faso, p. 9). • Increase the amount of forested land through reforestation of degraded lands (Liberia, p. 14). Development of alternative energy sources such as bio-fuels from sugarcane, corn, rice husk, etc. (Sierra Leonne INDC, p. 6). • The promotion of private, community and State reforestation through the creation of plantations and the promotion of agroforestry on cultivated land (Togo INDC, p. 9).
Target 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	**Increase access to modern forms of energy** Sustainable management of traditional energy sources (firewood and charcoal) (Togo INDC, p. 18).

Table 4: Co-benefits of mitigation and adaptation measures/projects under INDCs in promoting the SDGs

Sectors within submitted INDCs	**Co-benefits for various SDGs**
Energy	

1. Increased energy penetration through installation of small-medium hydro 2. Biomass energy (e.g. improved cook stoves – Burkina Faso) 3. Energy from recycling of wastes 4. Renewable energy (e.g. increased use of biofuels, solar etc.) 5. Strengthening existing energy infrastructure	Create employment for the youth and ensures energy security for rural communities (e.g, Ghana, SDG 1). Reduced consumption of fossil fuels that reduces the release of greenhouse gases (SDG 3). Reduce the dependency on firewood and hence reduce the destruction of forest resources (e.g., Ghana, SDG 15). Improves health of women by avoiding disease caused by inhaling carbon monoxide (SDG 3) which results in saving from reduced health care costs (SDG 1). Reduction in cooking time means that the users of the cook stove can devote more than half of the original time to other profitable activities and thus increase their income (e.g, Burkina Faso and Gambia). The use of biomass energy would reduce the destruction of biomass and demand for firewood as cooking fuel (e.g, Burkina Faso and Gambia). Generating energy using wastes improves urban snatiation and provides methane as a source of energy (SDG 7). Landfill gas energy generates revenue from the sale of the gas (SDG 1). It can also create jobs associated with the design, construction and operation of energy recovery systems. Recovery of methane gas would reduce the dependency on firewood and consequently conserving the forest (SDG 15) (examples, Gambia and Ghana). Reduction in energy cost for households leading to improved savings for other things. It would create job opportunities for the local people (for example, Nigeria).
Agriculture 1.Early warning and disaster prevention 2. Develop and promote drought-resistant, flood-tolerant and early maturing crop species (e.g. climate smart agriculture). 3. Improved resource management (i.e. increased use of irrigation systems) 4. Resilience building in vulnerable communities	This would reduce household's expenses on food during crop failure and reduced yield (e.g., Sierra Leone and Ghana). Reduction in crop failure and consequently result in increased crop productivity (SDG 2). This would contribute to sustaining productivity hence increasing crop yield and food availability (For example, Liberia). This would contribute to increased crop yield and food availability (for example, Nigeria) and increased crop productivity will lead to increased farmer income thereby reducing incidence of poverty (SDG 1). Reduce the vulnerability of crops to agriculture consequently reducing the impact of climate change (e.g. Nigeria). It reduces the incidence of diseases associated with floods such as cholera, dysentery, malaria and bubonic plague and consequently spends little or no money seeking treatment (e.g, Sierra Leone). Building resilience of local food systems will be critical to averting large-scale future shortages and to ensuring food security (e.g, Togo and Ghana, SDG2).

•**Forestry** 1.Sustainable utilization of forest resources through REDD+ 2. Reduce illegal and indiscriminate felling of trees 3. Afforestation/Reforestation (Cape Verde) 4. Community based forest resource management	Sustainable REDD+ would increase the carbon sinks and consequently reduce GHGs emitted into the atmosphere (e.g, Ghana). Reduction in the destruction of forest resources and biodiversity (e.g., Ghana). Protecting natural forest will conserve soil and water and reduce water erosion (Burkina Faso). It would also reduce the loss of revenue that may be generated from legal logging of forests consequently resulting in economic growth. This would increase the carbon sinks and consequently reducing the impacts of climate change (e.g, Guinea Bissau and Nigeria). This would reduce the destruction of biodiversity and also reduce degradation of forested lands (e.g, Guinea Bissau and Nigeria). It would serve as a source of income for local people who would be involved in the planting of trees. This would generate a long-term sequestration gain and consequently slow down climate change. This would reduce the rate of desertification and degradation and would enrich species diversity. The involvement of community members in the management of forest resource would create jobs for people (For example, Nigeria) and reduce illegal logging of trees since the community is involved in the management of the forest resource and this would help in the protection of the forest (e.g, Nigeria).
Water resource management 1. Irrigation 2. Coastal zone/mangrove management 3. Integrated water resource management including watershed management (e.g. Ghana and Togo)	Employment of and energy-efficient methods and techniques of irrigation can ensure agricultural productivity and consequently economic growth. Increasing the area under irrigation can also ensure uniform and continuous supply of water to farmlands and this can increase crop yield consequently improving household food availability. The sustainable harvest of mangrove products for market can create valuable business for local communities and small-scale food producers, in particular women, indigenous peoples, pastoralists and fishers. Mangrove belts of sufficient width act as storm barriers that strengthen the resilience of coastal zones from climate-related hazards such as storm surges and sea-level rise and control coastal erosion. Restoring coastal zones/mangroves means regaining extremely productive ecosystems that provide breeding and nursery grounds and ideal habitats for a variety of plant and animal species This would allow people especially women and girls to devote more time to other activities that will enhance their economic and social empowerment such as literacy programmes, skills development, and promotion of income generating activities to improve the quality of their lives. The impacts of climate change on water resource would be reduced due to the decreased degradation of catchment areas and river basins.
Transport 1. Sustainable mass transportation	This would reduce the emission of GHGs into the environment and also the dependency on fossil fuels. Improvement in road infrastructure will reduce the amount of time for commuters thereby increasing productivity and reducing GHGs emission.
Industry 1.Increased knowledge and awareness of climate change	This would inform people to plan ahead so that they do not incur any unplanned expenses which derail their household income. This would help farmers to know what to plant and when to do it so as to increase crop productivity and availability

2.Encourage informal savings and insurance schemes	This would help increase the income levels of households and also provide some form of support/relieve in case of disaster. This could help farmers expand their farms and also ensure proper farm management to increase crop yield (SDG 2).
3.Adoption of green technology in industry (Nigeria)	This would create jobs for people and also allows for rapid and sustained increases in living standards for all people (For example, Nigeria). Rural industry for preserving food or perishable crop will improve household food availability.
Waste 1.Efficient urban solid waste management system	The urban population would make a living from the recovering recyclable materials from waste. Degradable waste can be used as manure to boost crop yield and also waste from manufacture of food products can be given to animals as feeds. Efficient management of waste would reduce the climate change impact of methane and CO_2 from poorly managed dumpsites. Seeping of chemical from dumped waste into groundwater, streams and rivers would be reduced drastically consequently ensuring healthy ecosystem.
2. Increased private sector involvement in waste management	This would generate employment for the private sector and ensure efficient collection of wastes – (e.g., Liberia).

6.1. Financing of adaptation and mitigation actions under the INDCs

Funding is a major issue for the implementation of the various mitigation and adaptation actions outlined in the INDCs submitted by the majority of ECOWAS member states (Table 5). Although the member states have outlined impressive list of possible actions, most of these actions are conditional on their ability to secure international or foreign assistance. Several ECOWAS member states (including Ghana, Burkina Faso, Guinea Bissau, Sierra Leonne, Niger etc.) have requested for external international financial support in order to implement the various actions outlined in their INDCs. For example, the INDC of Sierra Leone states: "*this target [maintaining Sierra Leone emission levels relatively low close to the world average of 7.58 $MtCO_2e$ by 2035 via green growth pathways in all economic sectors] will only be achieved by Sierra Leone with the availability of international support that will come in the form of finance, investment, technology development and transfer, and capacity building. This would require substantial donor support estimated at about $900 million*." Nigeria's INDC also states "*International finance and investment, technology and capacity-building will be needed to achieve the ambitious intended contribution*" (Nigeria INDC, 2015, p. 18).

Table 5: Sources of funding for implementing commitments under INDCs of ECOWAS member states

Country	**Adaptation (US$ billion)**	**Mitigation (US$ billion)**	**Source of funding**
Burkina Faso	8.45 billion (p. 13 – 22)	1.84 billion (p. 5)	International and domestic sources
Cape Verde	Not available	Not available	Not available
Gambia	N/A	N/A	Not available
Ghana	12.79 (p. 2)	9.81 (p. 2)	6.3 billion from domestic sources & 16.3 billion from international support
Guinea	Estimated funding of 1.7 billion over the period	Funding needs 6.5 billion over the period for the energy sector	N/A
Guinea Bissau	42 million (p. 8)	700 million (p. 10)	500 million foreign aids (p. 10)
Liberia	13 million (p. 15)	N/A	GEF/Least develop fund (p. 15)
Niger	1.607 billion (p. 3)	7.060 billion (p. 3)	International support (87 %) and domestic sources (13 %) (p. 14)
Nigeria	N/A	N/A	N/A
Sierra Leone	N/A	900 million (p. 7)	International support (p. 7)
Togo	1.54 billion (p.7)	1.10 billion (p. 8)	N/A

7. Discussion

7.1. Priority areas for mitigation and adaptation in INDCs

Our analysis indicates that the energy sector is the topmost priority for the ECOWAS member states. The sector was highlighted in all the INDCs reviewed. This can be attributed to the low coverage of national grid in many parts of this region. It is estimated that about 620 million people in sub-Saharan Africa are not connected to the grid. Economic growth is closely linked to the availability and accessibility of clean energy by industry. The energy sector is also crucial to achieving SDG 1 (eradicating poverty) and SDG 13 (climate actions). The WHO (2016) estimated that 2.8 billion people had no access to clean energy and as many as 43 million people were dying from indoor pollution. Access to clean energy is especially problematic for ECOWAS member states as many of the people in this region rely on biomass fuel including wood fuel (Bervoets et al., 2016). The FAO (2014) estimates that wood energy is the primary energy source as cooking fuel by one third of all households worldwide. The many actions highlighted in the INDCs relate to improving energy supply in order to power economic activities. Many have also indicated their readiness to improve energy infrastructure whilst promoting renewable energy sources. Such findings are in consonance with other studies suggesting that energy is the key mitigation sector for many INDCs submitted by African countries (Mbeva et al., 2016). Ghana, for instance, has pledged to promote clean rural households lighting. The actions outlined for the energy sector are in line with the overall energy policy for ECOWAS, which was adopted by the 43rd Ordinary Session of the ECOWAS Authority of Heads of State and Government, held in Abuja, Nigeria, in July 2013. This energy policy seeks to increase grid connection by renewable energy by 48% by 2030 (ECOWAS, 2013).

Agriculture and forestry were the other topmost priorities for ECOWAS member states. This is understandable given that agriculture and forestry provide the livelihood of majority of people in this region. SDG 2 which aims at ending extreme hunger is quite crucial to ECOWAS member states because agriculture provide livelihoods opportunities to many households across West Africa. The agricultural sector also provides food security and nutrition of a significant proportion of the poorest and most vulnerable in West Africa (FAO, 2016). Food availability and accessibility is a challenge in sub-Saharan Africa. About 33 percent of the population of sub-Saharan Africa, or close to 200 million people, are undernourished. The region as a whole remains susceptible to frequent food crises and famines which are easily triggered by pest infestation, droughts, or floods, economic downturns or conflicts (Kidane et al., 2006). The FAO (2015) indicated that out of the estimated 795 million undernourished people in the world between 2014–2016, 233 million

of these people were from Africa. With the world population estimated to increase to 9 billion by 2030, agriculture is expected to play a leading role feeding this increasing population, while providing income, employment and environmental services (FAO, 2014). It is estimated that 80 percent of food consumed in developing countries are produced by small-holder farmers (IFAD, 2013). Yet, agriculture in this region is subsistence agriculture, which utilizes rudimentary technology for farming. This coupled with their inability to access improved farm inputs and technologies have resulted in low agricultural yields, which invariably affect their income levels. The agricultural sector is the most vulnerable sector to the adverse impacts of climate change because majority of farmers rely on rain-fed systems (IPCC, 2014). Agriculture acts as a significant catalyst driving deforestation in many dryland farming systems (Hosonuma et al., 2012).

7.2. Alignments between the INDCs and SDGs

Our analysis has demonstrated that the various mitigation and adaptation actions outlined in the INDCs of ECOWAS member states aligned with the 2030 Agenda for Sustainable Development, particularly, those SDGs aimed at ending extreme poverty (SDG 1), improving food security (SDG 2), improving access to water (SDG 6), ensuring clean energy (SDG 7), tackling climate change (SDG 13) and halting land degradation and deforestation (SDG 15). Ending extreme poverty is a priority of the ECOWAS member states and sub-Saharan Africa in general, because of the prevalence of poverty in this region. An estimated 800 million people live on less than 1.25 dollars per day (World Bank, 2016). Many of these people do not have adequate food and energy and also live in areas prone to adverse impacts of climate change. Since 1990, income poverty level has dwindled in all regions of the world except sub-Saharan Africa, where there has been an increase both in the incidence and absolute number of people living in income poverty. The issue of poverty is enhanced when there is insufficient productive and profitable work especially in the rural communities due to limited livelihood opportunities.

Several measures have been outlined by ECOWAS member states to tackle the issue of food security hence fulfilling SDG 2. Although the agricultural sector can contribute to climate change, within the agricultural sector, various actions relating to promotion of efficient varieties resistant to climate change (Togo INDC, 2015), agricultural resilience building in vulnerable landscapes (Ghana INDC, 2015), development of drought-resistant, flood-tolerant and early maturing crop species (Liberia INDC, 2015), and adopting better soil management practices and early warning systems (Nigeria INDC, 2015) have all been identified as key agricultural adaptation actions. Therefore, the various climate actions

outlined in the agricultural sector should be a driver for sustainable development (FAO, 2016), particularly as pathways for the eradication of extreme poverty whilst ensuring food security and nutrition. Not only are countries interested in increasing food productivity, ECOWAS member states however stipulated measures to ensure food accessibility through the expansion and construction of roads leading to farming communities. The agricultural sector dominates most of the INDCs submitted by the ECOWAS member states because of the importance attached to the sector. Most of the development plans of ECOWAS member states are hinged on the modernization of the agricultural sector. For instance, Ghana's development plans including economic and social transformation, as stated in the GSGDA (2010-2013), are based on the modernization of the agricultural sector (NDPC, 2010). Therefore, the agricultural sector should be a priority for the international assistance given the importance attached to the sector in the various INDCs and the potential of the sector to enhance adaptation and mitigation ambition (FAO, 2016). The agricultural sector has also been earmarked by many of the INDC to deliver adaptation-mitigation synergies through Climate-Smart Agriculture (see Figures 1 and 2) (FAO, 2016). About 55% of the INDCs analyzed in this study (including Liberia, Ghana, Togo, Niger, Nigeria and Sierra Leone) explicitly mentioned Climate-Smart Agriculture in their INDCs.

The various measures outlined in the INDCs aligned with the SDG 13 (climate actions). Tackling climate change through appropriate climate action is critical to ensure economic growth and livelihood sustainability for many households across the ECOWAS region. Sub-Saharan Africa including West Africa is projected as the most vulnerable region to the adverse impacts of climate change (Niang et al 2014) due to the regions low adaptive capacity. To this end, many of the INDCs have outlined key actions aimed at increasing the adaptive capacity and promoting agricultural systems that are less vulnerable to the adverse impacts of climate change. Many of the INDCs have indicated the integration of climate change into national policies. This is important and allows members states to adopt a holistic approach in dealing with climate change. SDG 15 aims at sustainably managing forests and ecosystems, combat desertification and restore degraded land and increase natural forests. Many of the INDCs reviewed have highlighted actions to safeguard forest resources. This is important considering the rate of deforestation in the Africa and the potential of forest to sequestrate carbon.

7.3. Financing of INDCs actions

Financing of adaptation and mitigation strategies poses great challenge to many of the countries whose INDCs were reviewed in this study. The review showed that many of the

mitigation and adaptation actions indicated are conditional on countries ability to secure international financial and technological support. Many developed countries have pleaded financial and technological support as well as capacity building (see INDC of Japan), yet, is reported that the proposed US$100 billion of finance to be mobilized by developed nations by 2020 may not be enough in meeting the full cost of low-emission climate-resilient development in developing countries. Therefore, the international community should pay attention to the role of finance in contributing to the attainment of low emission and climate resilient economic growth (Hedger and Nakhooda, 2015).

8. Conclusions

This analysis has identified the key mitigation and adaptation priority sectors set out in the INDCs submitted by ECOWAS member states. Agriculture and the energy sectors are identified as key sectors where many of the INDCs have pledged various commitments. The analysis has also revealed that there is significant alignment between the various mitigation and adaptation actions proposed in the INDCs and the Agenda 2030 for Sustainable Development, particularly across goals 1 (no poverty), 2 (zero hunger), 6 (access to clean water and sanitation), 7 (affordable and clean energy); 13 (climate action) and 15 (life on land). These alignments represent the opportunities and the various benefits that could be derived from the implementation of these INDCs in promoting the SDGs. Nevertheless, the analysis has also highlighted some potential non-alignments and potential negative interactions between the INDCS and the SDGs. This relates to areas of improving renewable energy sources including biofuels. It is therefore important that national governments analyse the potential interactions to identify areas of convergence and avoid situations where SDGs will perpetuate the existing inequality and vulnerability across the ECOWAS member states. The key message from this analysis is that although there are various opportunities for the INDCs of ECOWAS member states to promote the attainment of the SDGs, ECOWAS member states will need international assistance (in the form of financial, technological and capacity building) to implement the various mitigation and adaptation actions outlined in their INDCs.

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