

A circular graphic composed of 17 colored segments, each representing a Sustainable Development Goal (SDG). The segments are arranged in a ring around a central white circle. The colors include shades of blue, green, orange, pink, and red. A large green footprint graphic is positioned below the ring, with its toes pointing towards the center of the ring.

SDG FOOTPRINT OF AFRICAN NDCs

A light gray world map is shown in the background. The continent of Africa is highlighted in a darker gray color. A large green footprint graphic is overlaid on the map, with its toes pointing towards the center of the ring.

Advancing the
Co-benefits
Approach



SDG FOOTPRINT OF AFRICAN NDCs

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For further information on NDC-SDG linkages in Asia, log on to < www.NDCfootprints.org >

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Executive Summary

The adoption of the Sustainable Development Goals (September 2015) and the Paris Agreement (December 2015) were historic events in accelerating efforts to curb rising temperatures and setting the development agenda for the next few decades. Although they are aimed at addressing two different issues, climate action and sustainable development are not unrelated. Sustainable development policies can have climate co-benefits, just as climate change mitigation and adaptation policies can further the development agenda of a country. These synergies stand to help further global efforts in achieving the Sustainable Development Goals and the Paris Agreement simultaneously.

Despite minimal contributions to global emissions, the African region is one of the most vulnerable regions to climate change and its impacts. Designing policies that highlight potential co-benefits stands to help strengthen the African countries in achieving their respective Nationally Determined Contributions and overall development.

This report focuses on understanding the linkages between African region's Sustainable Development Goals and Nationally Determined Contributions. It includes a summary on the co-benefits approach to evaluate current NDC pledges made by a few select countries in the African region. It argues that certain African countries have already included potential co-benefits to be had from climate action.

Key Messages

- ▶ Almost all the NDCs have a mention of Goal 13 (Taking Urgent Action to Combat Climate Change and Its Impacts). This is followed closely by mentions of Goal 2 (End Hunger, Achieve Food Security and improved nutrition and promote sustainable agriculture) and Goal 17 (Revitalize the global partnership for sustainable development). The African NDCs have endorsed the co-benefits approach to combat the dual concerns of increasing climate vulnerability and meeting developmental needs.
- ▶ Instances of adaptation dominating the NDC narrative and calls for catalysing mitigation action was common to Africa. For example, Niger prioritizes sectors based on adaptation needs and sustainable development requirements to generate co-benefits for mitigation (intuitive in that the emissions of Africa are meagre compared to the rest of the world).
- ▶ Gender as an inclusive climate agenda had also found a niche in few African NDCs. Malawi's NDC, for instance, mentions the need to mainstream gender as a cross-cutting issue while addressing the impacts of climate change.
- ▶ The congruency observed among African NDCs was the envisioned contribution to climate action while having minimal contributions. Therefore, the ideas promoting socio-economic elevation, developing a poverty-free and egalitarian community has been reiterated in the African NDCs. The NDCs are reflective of a sustainable development approach that can further contribute to climate action and reduce the adversities, while simultaneously helping build capacities and reducing economic disparities.

1. Navigating Development In The Changing Climate

More than 50% of the African region constitutes of ‘Least Developed Countries (LDC)’ (United Nations Economic Analysis & Policy Division, 2018).¹ The rest of Africa is primarily comprised of Low-Middle Income (LMI) countries. Countries in the region are also inflicted by several developmental challenges like poverty, health and malnutrition

and lack of infrastructure. The region emitted only 2.8 GtCO₂e in 2014 as compared to 5.3 GtCO₂e emissions of US for the same year. These emissions, aggregated over two decades, are less than emissions of the United States and China in the single year 1990 (ibid.). To fulfil its economic and developmental goals, the region needs carbon space in the future.

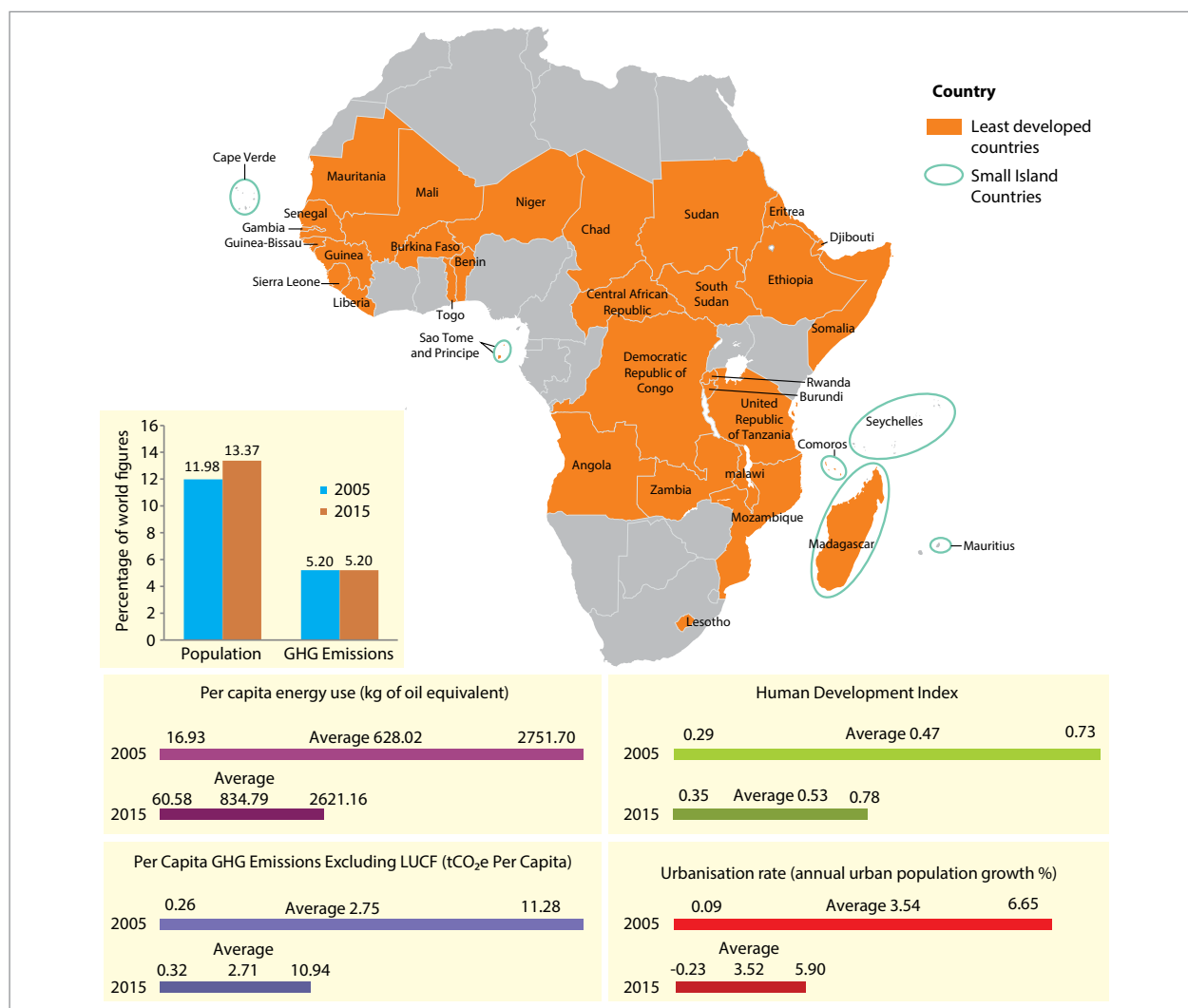




Figure 1: Africa Region




¹ 54% of Africa falls under the category of “Least Developed”.

At the same time, the region bears the brunt of the changing climate. Climate risks stemming from floods and droughts that frequently afflict the region impact livelihoods and socio-political security. Changing precipitation patterns could make certain regions more vulnerable to malaria with the greatest increase in incidence being in the highland region. However, the most significant health impacts are indirect in nature. While extreme weather events claim lives, they also foster under-nutrition and outbreak of water borne and vector borne diseases. The insufficient access to safe water, good sanitation and adequate healthcare is an added risk to an already vulnerable population (IPCC, 2014). African agrarian economies will not only witness a declining crop production rate which will impact food availability and nutrition but also reduce the revenue for the region by 90% by 2100 (Cuneo,

et al., 2017). People across the African region are dependent on ecosystem provisioning services like availability of food and water; ecosystem regulating services (weather and water systems). Apart from reduced agricultural production leading to food insecurity, climate change will have adverse effects on rich and diverse ecosystems in Africa (WWF, 2006). With the share of affected populace growing as temperature variability increases, the socio-political stability of a country will stand to be affected as well. Burke, et al., (2009) have found strong linkages between civil strife and temperature (increases) in Africa. Table 1 highlights the concerns the African region will face due to climate change; the table captures repercussions these countries stand to face in a national context that is ill-equipped in political and socio-economic terms.

Table 1: Impacts of climate change on Africa Region

Extreme events and Risk	Observed/ Projected trend and severe climate anomalies in the region
<p>Change in rainfall patterns and floods</p> <ul style="list-style-type: none"> ▶ Increased risk of droughts and shifts in the range of diseases. ▶ Adverse effects on livestock and rural population 	<p>A 'very likely' decrease in annual precipitation has been observed in the past century over parts of the western and eastern Sahel region in northern Africa, as well as 'very likely' increase in precipitation over parts of eastern and southern Africa.</p> <p>There has been a decrease in rainfall over eastern Africa between the March and May/June months, over the last three decades.</p> <p>Under the SRES A1B and A2 scenarios there will 'likely' be a reduction in precipitation over Northern Africa and parts of South Africa by the end of the 21st Century.</p> <p>Downscaled projections for complex topography such as Ethiopian Highlands indicate 'likely' increase in rainfall and extreme rainfall by the end of the century.</p>
<p>Rising temperatures</p> <ul style="list-style-type: none"> ▶ Adverse effects on crop productivity and livestock systems ▶ Changes in the incidence and geographic range of vector- and water-borne diseases 	<p>The results of decadal analyses of temperature show that there is an increased warming trend across the continent of Africa over the past 50-100 years.</p> <p>Minimum temperatures are rising more rapidly than maximum temperatures, along with an increase in surface temperatures by 0.5°C or more during the last 50-100 years.</p> <p>Land temperatures in Africa are 'likely' to rise faster than the global average, predominantly in the arid regions.</p> <p>It is 'very likely' that rising temperatures will have a negative impact on crop yields of major cereals and loss of livestock across Africa.</p> <p>Areas (highland areas in East Africa) that currently have very low temperatures to support malaria will experience increased malarial epidemics with rising temperatures.</p>

Extreme events and Risk	Observed/ Projected trend and severe climate anomalies in the region
<p>Droughts</p> <ul style="list-style-type: none"> ▶ <i>Reduced crop productivity and increased stress on water resources</i> ▶ <i>Adverse effects on food security</i> 	<p>It has been projected with 'medium confidence' that droughts will intensify in East and southern Africa as a result of reduced precipitation and /or increased evapotranspiration.</p> <p>Water availability affected due changing climatic patterns (both spatially and temporally) would impede continued economic development across the continent.</p>
<p>Sea-level rise and ocean acidification</p> <ul style="list-style-type: none"> ▶ <i>Adverse effects on livelihoods for countries dependent on coastal and ocean systems</i> ▶ <i>Disruption of transport systems, infrastructure and public services.</i> 	<p>It has been observed that the sea level rise and ocean acidification will have an adverse impact on the fragile coral reefs that are protective ecosystems. This would also have an impact on fisheries in Africa.</p> <p>There will be severe impacts on wildlife due to diseases and species extinction.</p>
<p>Cyclones/Typhoons</p> <ul style="list-style-type: none"> ▶ <i>Damage to infrastructure and loss of lives</i> 	<p>Cyclones lead to loss of lives and infrastructure. For example the storm swells experienced in Durban in 2007 led to damages estimated at US\$100 million.</p>

Source: AR5, The Intergovernmental Panel on Climate Change, 2014

¹ These countries in their NDCs had explicitly referred to sustainable actions for implementing NDCs.

2. SDG footprint of African NDCs

Countries in the region recognise the vulnerabilities they will face as a result of climate change. Therefore despite minimal contributions to climate change, African countries have shown political will to undertake climate action. Almost all countries have submitted their NDCs. The NDCs of the Africa region were studied to see how the SDGs are reflected in them. Annex I gives the details of methodology adopted. The same methodology was earlier used to study the SDG footprint of NDCs of Asian countries. It was found that Goal 13- 'Taking Urgent Action to Combat Climate Change and

It's Impacts' has been mentioned in almost all NDCs. This is followed closely by mentions of Goal 2 (End Hunger, Achieve Food Security and improved nutrition and promote sustainable agriculture) and Goal 17 (Revitalize the global partnership for sustainable development). The Goals that have least mentions are Goal 4, Goal 10, and Goal 16. Goal 2 (Reduce inequality within and among countries) finds mention only in two countries- Ethiopia and Seychelles. The figure below provides further details of the goals and the linkage trends in Africa.

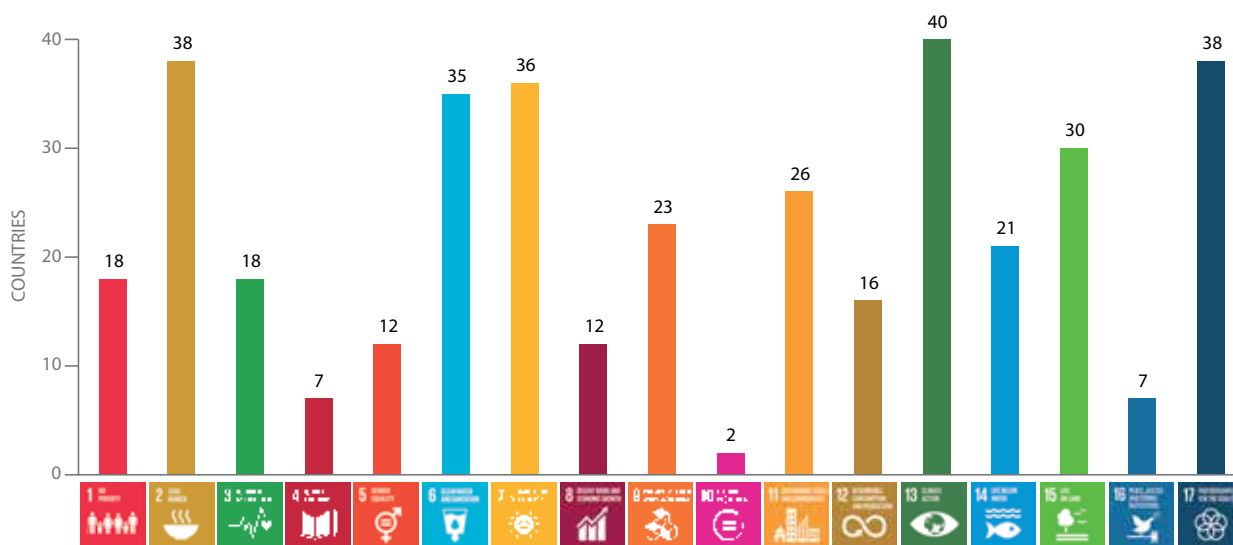


Figure 2: Linkage Trends for African countries

Other prominent features of these NDCs are (i) recognition of risks and vulnerabilities to climate change, and (ii) co-benefits approach synergising developmental policies and climate action. Following section presents key features of the NDCs submitted by the Parties in the region.

Recognition of risks and vulnerabilities to climate change

The countries in Africa have recognised the need to reduce vulnerabilities and build resilience. This is necessary not only to combat climate and its impacts, but also to ensure overall development.

Table 2: Recognition of extreme events NDCs-few examples

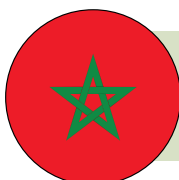
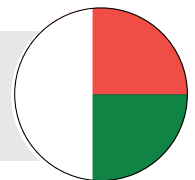


ETHIOPIA

“Ethiopia’s long-term goal is to ensure that adaptation to climate change is fully mainstreamed into development activities. This will reduce vulnerability and contribute to an economic growth path that is resilient to climate change and extreme weather events.” (Ethiopia NDC, pp. 4)

MADAGASCAR

“Madagascar is among the top-ten countries of the world having important and extensive coastal zones. Due to its geographical position, the island frequently experiences extreme weather events that significantly affect its national economy, as well as the population’s livelihood.” (Madagascar NDC, pp.1)



MOROCCO

“Studies show that in the future, Morocco will become more arid due to a decrease in precipitation, a concurrent temperature increase, and extreme weather events occurring with higher frequency. Projections show that the country’s decrease in precipitation will be to the order of 20 % on a 2050-time horizon, with a greater impact in semi-arid plains.” (Morocco NDC, pp. 16)

SOUTH AFRICA

“South Africa has observed and is projecting further trends of marked temperature increases, rainfall variation and rising sea levels as well as an increased frequency of severe weather events. Damage costs associated with severe climate related events (wild fires, storms, droughts and floods), including both direct and downstream costs were estimated for the present-day climate and for the near future under low and moderate-high mitigation scenarios.” (South Africa NDC, pp. 1 and 5)



3. Co-benefit Approach for Climate Action

As stated in most of the African NDCs, sustainable development has been a harbinger of economic growth and environmental persistence for the Parties. Since climate change can impact health, food security and ecosystems and the overall vulnerability of the population, adaptation strategies help build strong communities that can look towards development while addressing climate concerns and meeting mitigation targets. Similarly, mitigation actions themselves have also been projected to have co-benefits with a Party's developmental agenda.

Policy making in a developing country context requires a comprehensive approach that recognizes intersecting vulnerabilities. African NDCs have endorsed the co-benefits approach to combat the dual concerns of increasing climate vulnerability and meeting developmental needs. The co-benefits approach seeks to prioritise strategies that yield greater climate benefits without compromising on developmental imperatives of a country. These objectives can be achieved by the full range of co-benefits and costs associated with implementing climate strategies. This two-pronged objective is achieved by understanding the full range of co-benefits and co-costs of externalities arising from climate strategies.

This path enhances action potentials; reorient finances in accordance with stresses, while delivering effective results. The overall scope of contributions encompasses climate action and development closely to help build adaptation

capacities and reduce GHG emissions. African NDCs rely on sound developmental policies that can actually catalyse both climate action and development. Some of these NDCs have been mentioned in the next section. The analysis of African NDCs brought out five recurrent co-benefits, namely: economic growth; inclusive growth; food Security and good health & nutrition.

All of the NDCs submitted by African countries have reiterated the need to build resilience, adaptive capacity and developmental growth as a key outlook universally. While in some cases it was mitigation actions which saw stronger co-benefits, in others it was adaptation or perhaps both. Nevertheless the discourses in most of the NDCs saw approaches which could help to meet both environmental and developmental needs in a manner that emphasises the co-benefits approach. Noticeably, instances of adaptation dominating the NDC narrative and calls for catalysing mitigation action was common to Africa.

Since most of the African countries have meagre GHG emissions, mitigation is not of as much priority and requirement as is adaptation. Nevertheless, to reduce any future vulnerability, to make good on global agreements and to ensure the most effective contribution towards combating climate change, all NDCs have outlined both mitigation and adaptation strategies. In the study of African NDCs, we identified nine countries which implicitly followed a co-benefits approach to frame their mitigation and adaptation strategies.

4. Analysis of Select Countries

Burkina Faso

Burkina Faso's NDC includes a table on the co-benefits arising from the implementation of sectoral projects. The sectors range from agriculture and water, animal husbandry, biomass energy and renewable energy, land use and forestry, to health and urban development. While it specifies investment and implementation costs of each individual project, it outlines the extraneous benefits from the implementation of these projects.

For example, the efforts in the agriculture and water sector are aimed to sequester carbon in the soil. The country's adaptation agenda outlines the need for integrating coherent policy making, by integrating it with activities and programmes catering to developmental planning (Burkina Faso NDC, pp. 16). The government of Burkina Faso has envisioned frameworks and policies such as Strategic Framework for Investment in Sustainable Land Management (SFI-SLM). In the 2030 horizon, efforts will lead to the sequestration of more than 5150 GgCO₂e by degraded land restoration. The potential co-benefits are its effect on food security and farmer income levels, as well as on the incidence of poverty. It also addresses the issue of

sustaining livelihoods: the use of bio digesters will help generate biomass energy; actions in forestry and land use sector will further help maintain soil quality, water availability and biological diversity as well, can potentially help local communities take up guardianship roles to continue sustainable use of forestry products.

Similarly, in the renewable energy section, investments in alternative energy sources like solar energy and biofuels are seen to reduce energy costs for businesses and homes, increase in productivity, as well as a drop in pollution levels generated in the generation of electricity and the transport sectors. Burkina Faso's NDC puts forth concrete measures to improve cooking stoves (Burkina Faso NDC, pp. 30). By making a case for energy efficiency, it purports better affordability. The new cookstoves are touted to save 15% to 45% of the energy used in cooking (depending on the level of technological innovation), reduce the time spent cooking, and reduce exposure to indoor air pollution and resultant respiratory diseases (ibid.). This stands to have livelihood-level impacts on the lives of the communities in which these cookstoves are introduced.

Burkina Faso



	GDP (% of world GDP)	Population (% of world Population)	Percentage GHG Emissions (% of world GHG emissions,)	Absolute GHG Emissions Excluding LUCF (MtCO ₂ e)	Per Capita GHG Emissions Excluding LUCF (tCO ₂ e Per Capita)	Per capita energy use (kg of oil equivalent)	Human Development Index	Urbanisation rate (annual urban population growth %)
2005	0.02	0.21	0.05	19.04	1.42	*	0.33	6.65
2015	0.03	0.25	0.05**	23.51**	1.38**	*	0.40	5.78

* Information unavailable

** 2013 emission figures

Central African Republic

The Central African Republic's NDC acknowledges that climate action in the agriculture and forestry sectors can have mitigation co-benefits. With the zeal to deliver sustainably towards GHG mitigation, the NDC demarcates energy, agriculture, LULUCF, industries and forestry as the main points of intervention. The National Programme for Investment in Agriculture, Food Security and Nutrition (PNIASAN) which looks into maintaining 6% of an annual agricultural GDP rate and food insecurity rate of 15% is touted to ensure smart agricultural practices on planned land for a fixed term. This is envisioned to prevent frequent deforestation

and increasing productivity. The NDC highlights the need for constant revision of PNIASAN in order to ensure the adequate funding channelled into efforts in the two sectors, and to address its impacts on the climate change and developmental concerns. In terms of co-benefits, the NDC also highlights the integration of adaptation measures into national developmental policies catering to most vulnerable sectors and communities. With initiatives on creating awareness and education about climate change which correlates with SDG 4 on education, the NDC also aims to improve technical knowledge and capacities with respect to early warning systems, and similar resilience mechanisms.

Central African Republic



	GDP (% of world GDP)	Population (% of world Population)	Percentage GHG Emissions (% of world GHG emissions,)	Absolute GHG Emissions Excluding LUCF (MtCO ₂ e)	Per Capita GHG Emissions Excluding LUCF (tCO ₂ e Per Capita)	Per capita energy use (kg of oil equivalent)	Human Development Index	Urbanisation rate (annual urban population growth %)
2005	0.004	0.06	0.12	46.55	11.28	*	0.32	2.04
2015	0.003	0.06	0.11**	49.23**	10.94**	*	0.35	1.38

* Information unavailable

** 2013 emission figures

Comoros²

The NDC of Comoros is built on its strategy for enhanced growth and sustainable development and its different programs for climate change. The overall objective is to reduce poverty, follow the sustainable development path while finding solutions to climate change. The NDC-SDG linkages are highlighted by its emphasis on deploying climate change adaptation actions through sectors like education, health, social development, tourism and transport.

Comoros aims to reduce its GHG emissions by 84% by 2030 compared to emissions outlined in its reference scenario for the same year (Comoros NDC, pp. 7). It aims to achieve this by moving to cleaner and efficient cooking alternatives, efficient heating, and installing renewable capacity, conditional on international support. The NDC also outlines the scope of emissions reduction through sinks from the forestry sector through afforestation. Comoros also mentions improving grid electricity supply and rehabilitation of existing power plants to reflect a 6% decrease in technical losses.

The archipelago's NDC happens to heavily emphasise the co-benefits of climate action that is adaptation oriented. With the majority of the population living in coastal areas, national actions of fighting poverty have already targeted protection of coastal areas and managing risk

to reduce vulnerability. The NDC is based on the existing national program of adaptation in Comoros. Through actions like implementing regulation for restoration of degraded forests, increasing women participation in decision making, promoting intensive agriculture, the NDC hopes to reduce vulnerabilities, increase resilience and achieve overall development.

Ghana

Ghana's NDC declares a 15% emission reduction from BAU scenario by 2030 which can be increased to an additional 30% reduction conditional on external support—i.e., finance, technology and capability building support (Ghana NDC, pp3). There is a need for greater investment in adaptation strategies rather than mitigation strategies. Ghana is advocating good governance credentials, capacity building and innovation in science and technology as well as raising the bar of educational capabilities under the realm of adaptation. The core sectors that have been identified for mitigation are energy, transport, forestry, industry, and waste.

In terms of co-benefits, Ghana has outlined specific action related results. In the arenas of mitigation actions, the contributions reflecting usage of renewable energy and energy efficiency have co-benefits of not only reducing GHG emissions but also improving standards of living by providing access to electricity, increasing

² Social parameters and other data unavailable for Comoros

Ghana



Year	GDP (% of world GDP)	Population (% of world Population)	Percentage GHG Emissions (% of world GHG emissions,)	Absolute GHG Emissions Excluding LUCF (MtCO ₂ e)	Per Capita GHG Emissions Excluding LUCF (tCO ₂ e Per Capita)	Per capita energy use (kg of oil equivalent)	Human Development Index	Urbanisation rate (annual urban population growth %)
2005	0.072	0.331	0.058	22.190	1.030	273.196	0.510	4.056
2015	0.099	0.375	0.068	30.890	1.170	339.806	0.579	3.484

job opportunities, saving woodlands from degradation and thereby also curbing air pollution, increasing productivity and revenue from public transportation, reducing congestions and the overall better management of the sector.

The strategies covered under adaptation like sustainable utilization of forest resources will help secure food; conserve biodiversity, increase in particular 20,000 cocoa farm incomes by doubling the average yield per hectare and therefore contributing to better land management (Ghana NDC, pp. 13). Another crucial sector which has a strong co-benefit would be waste, the establishment of proper waste management bringing up the organic fertilizer.

Ivory Coast³

The NDC of Ivory Coast demonstrates its will to reduce its carbon footprint by prioritising mitigation measures with co-benefits to improve resilience, prepare coherent sectoral policies and mobilise financial resources (Ivory Coast NDC, pp. 1).

Ivory Coast's mitigation actions are intended towards the agriculture, forestry, waste, energy and transport sectors. Overall, Ivory Coast aims to reduce GHG emissions by 28% below BAU by 2030 unconditionally, or 36% below BAU conditionally subject to international assistance in terms of financial support, capacity building, and technology development and transfer (IISD, 2015).

In order to achieve these reductions, Ivory Coast plans to invest in energy efficiency, institute a robust regulatory framework to oversee renewable energy and energy efficiency actions, create a waste reduction strategy for industries and nudge them to invest in energy-efficient technologies. It also plans to develop national legislation on heating efficiency standards for buildings (Climate Watch, 2018). The NDC mentions the development of domestic energy solutions for cooking which will not only contribute to reduction in GHG emissions but will also help increase community revenues and create green jobs.

Ivory Coast's adaptation efforts detail the impacts of climate change and resultant vulnerabilities of the country. The actions being taken on a national level enumerate the co-benefits associated with them. For example, the efforts being carried out in the agricultural sector lead to food security, reduction in poverty, an increase in social peace by increasing purchasing power and job creation (Ivory Coast NDC, pp. 12). The co-benefits also lead to a reduction in dependence on exports. The INDC highlights the need for resilient development in various sectors, and highlights loss and damage incurred due to climate change. It brings to fore obstacles, gaps and needs to be addressed to help adaptation actions succeed.


³ Social parameters and other data unavailable for Ivory Coast

Malawi

For Malawi the contributions are sector specific in the domains of energy, forestry and land use and agriculture. The sociological pattern is one where the nation is reliant on biomass energy for which forests are degraded, reducing the nation's capacity to increase its carbon sink threshold. Sustainability is important and therefore, management of resources is of paramount importance. Developmental concerns surround health, infrastructure, land-use planning, population growth, disaster management, wildlife, energy and gender. The energy and the forestry sector in particular offer a great scope for co-benefits. The climate risks could lead to

infrastructure failure which results in loss of machinery, biomass productivity due to floods, and droughts can be prevented by using affordable and renewable energy sources.

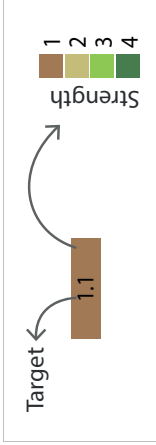
However, an outstanding feature of Malawi's NDC would be the emphasis added on gender inclusivity. Vulnerability and resilience has been captured through the lens of an overarching climate strategy where mainstreaming gender is a principle which yields positive co-benefits for women in the country. The socio-economic profile of the country has demarcated a strong ground for not just climate action but a sound gender response and sustainable development. Therefore, the gender response in itself can be a good co-benefit for the overall climate action strategy.

Malawi								
Year	GDP (% of world GDP)	Population (% of world Population)	Percentage GHG Emissions (% of world GHG emissions,)	Absolute GHG Emissions Excluding LUCF (MtCO ₂ e)	Per Capita GHG Emissions Excluding LUCF (tCO ₂ e Per Capita)	Per capita energy use (kg of oil equivalent)	Human Development Index	Urbanisation rate (annual urban population growth %)
2005	0.014	0.20	0.02	6.84	0.52	*	0.38	3.43
2015	0.018	0.24	0.02**	10.07**	0.61**	*	0.48	3.96

* Information unavailable ** 2013 emission figures



MALAWI



1.1	2.1	3.1	4.1	5.1	6.1	7.1	8.1	9.1	10.1	11.1	12.1	13.1	14.1	15.1	16.1	17.1
1.2	2.2	3.2	4.2	5.2	6.2	7.2	8.2	9.2	10.2	11.2	12.2	13.2	14.2	15.2	16.2	17.2
1.3	2.3	3.3	4.3	5.3	6.3	7.3	8.3	9.3	10.3	11.3	12.3	13.3	14.3	15.3	16.3	17.3
1.4	2.4	3.4	4.4	5.4	6.4	7.4	8.4	9.4	10.4	11.4	12.4	13.4	14.4	15.4	16.4	17.4
1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5
1.a	2.a	3.a	4.a	5.a	6.a	7.a	8.a	9.a	10.a	11.a	12.a	13.a	14.a	15.a	16.a	17.a
1.b	2.b	3.b	4.b	5.b	6.b	7.b	8.b	9.b	10.b	11.b	12.b	13.b	14.b	15.b	16.b	17.b
1.c	2.c	3.c	4.c	5.c	6.c	7.c	8.c	9.c	10.c	11.c	12.c	13.c	14.c	15.c	16.c	17.c
1.d	2.d	3.d	4.d	5.d	6.d	7.d	8.d	9.d	10.d	11.d	12.d	13.d	14.d	15.d	16.d	17.d
1.e	2.e	3.e	4.e	5.e	6.e	7.e	8.e	9.e	10.e	11.e	12.e	13.e	14.e	15.e	16.e	17.e
1.f	2.f	3.f	4.f	5.f	6.f	7.f	8.f	9.f	10.f	11.f	12.f	13.f	14.f	15.f	16.f	17.f
1.g	2.g	3.g	4.g	5.g	6.g	7.g	8.g	9.g	10.g	11.g	12.g	13.g	14.g	15.g	16.g	17.g
1.h	2.h	3.h	4.h	5.h	6.h	7.h	8.h	9.h	10.h	11.h	12.h	13.h	14.h	15.h	16.h	17.h
1.i	2.i	3.i	4.i	5.i	6.i	7.i	8.i	9.i	10.i	11.i	12.i	13.i	14.i	15.i	16.i	17.i
1.j	2.j	3.j	4.j	5.j	6.j	7.j	8.j	9.j	10.j	11.j	12.j	13.j	14.j	15.j	16.j	17.j
1.k	2.k	3.k	4.k	5.k	6.k	7.k	8.k	9.k	10.k	11.k	12.k	13.k	14.k	15.k	16.k	17.k
1.l	2.l	3.l	4.l	5.l	6.l	7.l	8.l	9.l	10.l	11.l	12.l	13.l	14.l	15.l	16.l	17.l
1.m	2.m	3.m	4.m	5.m	6.m	7.m	8.m	9.m	10.m	11.m	12.m	13.m	14.m	15.m	16.m	17.m
1.n	2.n	3.n	4.n	5.n	6.n	7.n	8.n	9.n	10.n	11.n	12.n	13.n	14.n	15.n	16.n	17.n
1.o	2.o	3.o	4.o	5.o	6.o	7.o	8.o	9.o	10.o	11.o	12.o	13.o	14.o	15.o	16.o	17.o
1.p	2.p	3.p	4.p	5.p	6.p	7.p	8.p	9.p	10.p	11.p	12.p	13.p	14.p	15.p	16.p	17.p
1.q	2.q	3.q	4.q	5.q	6.q	7.q	8.q	9.q	10.q	11.q	12.q	13.q	14.q	15.q	16.q	17.q
1.r	2.r	3.r	4.r	5.r	6.r	7.r	8.r	9.r	10.r	11.r	12.r	13.r	14.r	15.r	16.r	17.r
1.s	2.s	3.s	4.s	5.s	6.s	7.s	8.s	9.s	10.s	11.s	12.s	13.s	14.s	15.s	16.s	17.s
1.t	2.t	3.t	4.t	5.t	6.t	7.t	8.t	9.t	10.t	11.t	12.t	13.t	14.t	15.t	16.t	17.t
1.u	2.u	3.u	4.u	5.u	6.u	7.u	8.u	9.u	10.u	11.u	12.u	13.u	14.u	15.u	16.u	17.u
1.v	2.v	3.v	4.v	5.v	6.v	7.v	8.v	9.v	10.v	11.v	12.v	13.v	14.v	15.v	16.v	17.v
1.w	2.w	3.w	4.w	5.w	6.w	7.w	8.w	9.w	10.w	11.w	12.w	13.w	14.w	15.w	16.w	17.w
1.x	2.x	3.x	4.x	5.x	6.x	7.x	8.x	9.x	10.x	11.x	12.x	13.x	14.x	15.x	16.x	17.x
1.y	2.y	3.y	4.y	5.y	6.y	7.y	8.y	9.y	10.y	11.y	12.y	13.y	14.y	15.y	16.y	17.y
1.z	2.z	3.z	4.z	5.z	6.z	7.z	8.z	9.z	10.z	11.z	12.z	13.z	14.z	15.z	16.z	17.z




Figure 6: Strength of NDC-SDG Linkage: Malawi

Niger

Like much of the African counterparts, Niger is a primary sector dependent (agriculture contributes to 80% of the income) nation. Niger's central aim is to articulate cogent adaptation strategies that will in turn help meet its mitigation goals, focussed mainly in the agriculture, forestry and land use sector (AFOLU). It aims to reduce GHG emissions by 3.5 % unconditionally by 2030 and can extend it to 34.6% based on financial assistance. The co-benefits arise from imparting

climate-smart agricultural practices will help in reviving degraded land, increasing productivity leading to enhanced food security, a tap on rural exodus due to job incentives and social cohesion (Niger NDC, pp. 12). In the energy sector as well, there is scope for improving livelihoods and also by providing access to potable water, education and health. The efficient transformations will mean technological elevation, gender alleviation (for women) and localizing benefits which will limit rural exodus.

Niger								
Year	GDP (% of world GDP)	Population (% of world Population)	Percentage GHG Emissions (% of world GHG emissions,)	Absolute GHG Emissions Excluding LUCF (MtCO ₂ e)	Per Capita GHG Emissions Excluding LUCF (tCO ₂ e Per Capita)	Per capita energy use (kg of oil equivalent)	Human Development Index	Urbanisation rate (annual urban population growth %)
2005	0.014	0.20	0.02	6.84	0.52	*	0.38	3.43
2015	0.018	0.24	0.02**	10.07**	0.61**	*	0.48	3.96


* Information unavailable ** 2013 emission figures

Swaziland

The NDC is strongly focused on looking at the developmental concerns for the country. Staying true to this framework, the NDC corresponds to sustainable development, poverty eradication and building adaptation capacity. Swaziland's co-benefits are oriented towards transforming the energy, transport and industrial processes sector. It seeks to reform its energy sector by switching to renewable energy sources which would contribute towards social equity and economic growth (Swaziland NDC, pp4). Since the modern energy applicability will improve rural livelihoods by reducing their dependence on unsustainable usage of wood, improving access to electricity, as a co-benefit, mitigation is contributing towards improving the sociological condition of the country. Furthermore, the transport sector will see usage of cleaner fuels and inclusion of ethanol blend in petrol by 2030 will positively

add to the sugar industry as the by products from that industry can be used as feedstock for the production of ethanol (Swaziland NDC, pp. 5).

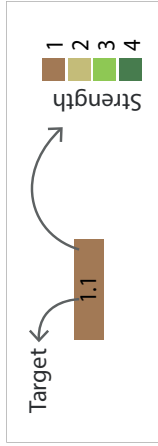
As far as adaptation is concerned, it holds prime importance for Swaziland. Despite low contributions towards GHG emissions, the repercussions of climate change will be worrisome for the nation and therefore building on an adaptation strategy that co-benefits its developmental concerns is imperative. Its National Adaptation plan looks into reducing climate and disaster risks, other actions also include safeguarding ecosystems and biodiversity, efficient use of water and its management and also ensuring agricultural contributions to food security. All of the mentioned strategies will cater to its prime motive of reducing poverty, strengthening the ecological infrastructure, as well as water and nutrition security.

Swaziland								
Year	GDP (% of world GDP)	Population (% of world Population)	Percentage GHG Emissions (% of world GHG emissions,)	Absolute GHG Emissions Excluding LUCF (MtCO ₂ e)	Per Capita GHG Emissions Excluding LUCF (tCO ₂ e Per Capita)	Per capita energy use (kg of oil equivalent)	Human Development Index	Urbanisation rate (annual urban population growth %)
2005	0.010	0.017	0.007	2.640	2.390	360.801	0.502	0.404
2015	0.009	0.018	0.006**	2.860**	2.250**	*	0.541	1.797

* Information unavailable ** 2013 emission figures



SWAZILAND



1.1	2.1	3.1	8.1	10.1	11.1	12.1	14.1	15.1	16.1	17.1
1.2	2.2	3.2	8.2	10.2	11.2	12.2	14.2	15.2	16.2	17.2
1.3	2.3	3.3	8.3	9.1	11.3	12.3	14.3	15.3	16.3	17.3
1.4	2.4	3.4	8.4	9.2	11.4	12.4	14.4	15.4	16.4	17.4
1.5	2.5	3.5	8.5	9.3	11.5	12.5	14.5	15.5	16.5	17.5
1.a	2.a	3.a	8.6	9.4	11.a	12.a	13.1	14.6	15.8	16.8
1.b	2.b	3.b	8.7	9.5	11.b	12.b	13.2	14.7	15.9	16.9
	2.c	3.c	8.8	9.a	11.c	12.c	13.3	14.a	15.a	16.10
		3.d	8.9	9.b	10.c	11.c	13.a	14.b	15.b	16.a
			8.10	9.c	10.c	11.c	13.b	14.c	15.c	16.b
			7.1	10.1	11.1	12.1	14.1	15.1	16.1	17.1
			7.2	10.2	11.2	12.2	14.2	15.2	16.2	17.2
			7.3	10.3	11.3	12.3	14.3	15.3	16.3	17.3
			7.a	10.4	11.4	12.4	14.4	15.4	16.4	17.4
			7.b	10.5	11.5	12.5	14.5	15.5	16.5	17.5
			8.a	10.6	11.6	12.6	14.6	15.6	16.6	17.6
			8.b	10.7	11.7	12.7	14.7	15.7	16.7	17.7
			8.c	10.a	11.a	12.a	14.a	15.a	16.a	17.a
			8.d	10.b	11.b	12.b	14.b	15.b	16.b	17.b
			9	10.c	11.c	12.c	14.c	15.c	16.c	17.c
			10	11.c	12.c	13.c	14.c	15.c	16.c	17.c
			11	12.c	13.c	14.c	15.c	16.c	17.c	18.c
			12	13.c	14.c	15.c	16.c	17.c	18.c	19.c
			13	14.c	15.c	16.c	17.c	18.c	19.c	20.c
			14	15.c	16.c	17.c	18.c	19.c	20.c	21.c
			15	16.c	17.c	18.c	19.c	20.c	21.c	22.c
			16	17.c	18.c	19.c	20.c	21.c	22.c	23.c
			17	18.c	19.c	20.c	21.c	22.c	23.c	24.c


Figure 8: Strength of NDC-SDG Linkage: Swaziland

Zambia

There are three programs under Zambia's adaptation strategy mentioned in its NDC which resound with the co-benefits approach. Adaptation of strategic productive systems (in agriculture, wildlife and water sectors), will promote conservation of water catchment areas, promote rainwater harvesting, improve water storage, improve infrastructure for water transport, and adopt integrated water resource management. This would lead to an improvement in water security, increase in the resilience of hydrological systems, and an improvement in the quality of water. The second program on 'Adaptation of strategic infrastructure and health systems' aims at strengthening health surveillance and also promote sustainable land use plans that improve efficiency and cost-effectiveness, reduction in land use conflicts, strategic alignment of resources and preservation of biodiversity. This has repercussions on SDG 10: Reduced Inequalities as it will impact indigenous peoples' livelihoods.

Lastly, the program on 'Enhanced capacity building, research, technology transfer and finance for adaptation' aims to enhance capacity building

by conducting training for farmers and other staff, conducting public awareness campaigns, train management in relevant sectors, and conduct and disseminate research on specific local adaptation scenarios. This will improve adaptation knowledge and skills, increase resilience and adaptive capacity, increase public awareness, improve sectorial management, improve decision making of farmers and policymakers, reduce GHG emissions and improve early warning systems. Secondly, it also looks at water sector and conducting water availability/deficiency assessment which could help improve water security, implement appropriate water technologies based on the research, and establish monitoring systems. This strategy will ensure improvement in human health due to access to clean water, and an improvement in skills of locals in the field of water technology. Finally, integrating all of the aforementioned climate action strategies into development strategies captures the essence of sustainable development well for Zambia, and this will lead to enhancement in economic resilience, reduction in poverty, job creation, and conservation of the ecosystems and biodiversity.

Zambia								
Year	GDP (% of world GDP)	Population (% of world Population)	Percentage GHG Emissions (% of world GHG emissions,)	Absolute GHG Emissions Excluding LUCF (MtCO ₂ e)	Per Capita GHG Emissions Excluding LUCF (tCO ₂ e Per Capita)	Per capita energy use (kg of oil equivalent)	Human Development Index	Urbanisation rate (annual urban population growth %)
2005	0.039	0.185	0.113	43.100	3.580	607.670	0.479	3.837
2015	0.054	0.219	0.111**	50.410**	3.330**	635.330	0.579	4.130

* Information unavailable ** 2013 emission figures

Annex 1: Methodology adopted

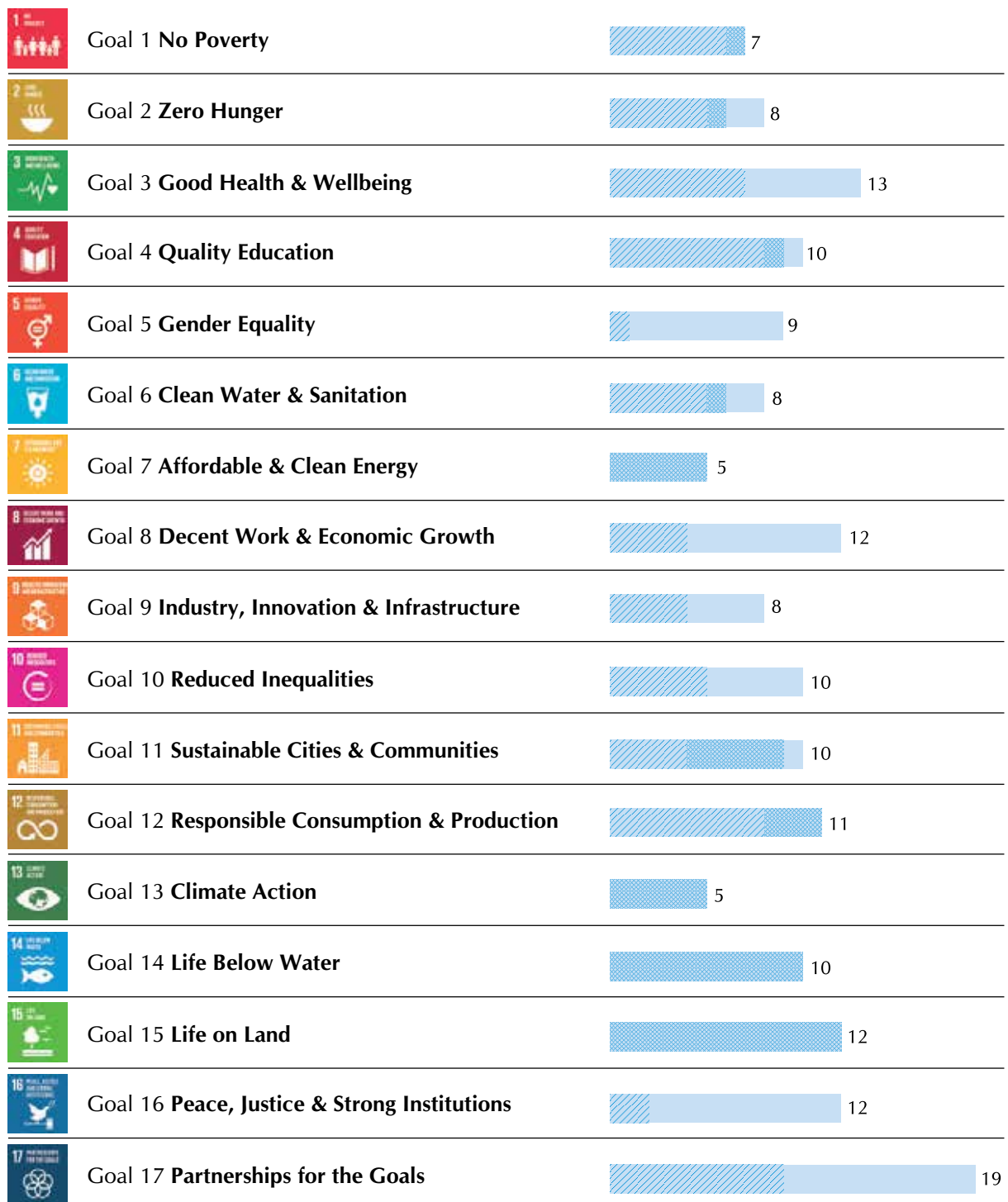
TERI attempted to highlight the synergies between the SDGs and NDCs in its Asia Report, 2015. The Africa report follows similar methodology, with some deviations. The Africa report, beyond a keyword analysis, includes a summary of how African NDCs have followed a co-benefits approach to achieve their climate targets and development goals simultaneously. This is done keeping in mind that African countries, with the exception of South Africa, are not significant polluters in terms of emissions from energy generation.

Figure 4 provides a snapshot of SDG targets where climate change concerns are reflected in some form or the other. These can be categorised into two categories (TERI, 2015):

- ▶ **Explicit Linkage:** where climate concerns are explicitly mentioned in or as targets. For instance, mention of keywords like 'vulnerable', 'resilience', 'exposure', 'vulnerability', 'climate', 'extreme events', 'environmental

shocks' and 'disasters', 'renewable energy', 'ecosystem', 'water scarcity', 'water-borne diseases', 'resources efficiency', 'efficiency', 'sustainable lifestyles', amongst others;

- ▶ **Implicit Linkage:** where the targets implicitly address one or more concerns of climate change. For instance, where target/ indicators have been widely discussed in literature as a means to achieve or assess mitigation or adaptation outcome. Targets which are imperative for economic growth and development but are a little farfetched in order to address a climate concern have not been considered to have explicit or implicit linkage. For instance, Target 3.5 on strengthening the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol. This makes it evident that SDGs cover more than one global challenge.



Total number of targets
 Implicit Linkage
 Explicit Linkage

6. References

- Awojobi, O. & Bonn-Rhein-Sieg, H., 2017. The Impacts of Climate Change in Africa: A Review of the Scientific Literature. *Journal of International Academic Research for Multidisciplinary*.
- Burke, M. B. et al., 2009. Warming increases risk of civil war in Africa. *PNAS*, p. 20670 –20674.
- Schmidhuber, J. & Tubiello, F. N., 2007. Global food security under climate change. *PNAS*, 104(50), p. 19703–19708.
- Boko, M. et al., 2007. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. pp. 433-467.
- Caroline Kende-Robb, Brookings, 2015. How Africa can show the world the way to a low-carbon future: 10 facts, 10 actions. [Online]
Available at: <https://www.brookings.edu/blog/africa-in-focus/2015/08/17/how-africa-can-show-the-world-the-way-to-a-low-carbon-future-10-facts-10-actions/>
[Accessed 8 February 2019].
- Climate Watch, 2018. NDC Content Overview. [Online]
Available at: <https://www.climatewatchdata.org/countries>
[Accessed 2018].
- Cuneo, C. N., Sollom, R. & Beyrer, C., 2017. The Cholera Epidemic in Zimbabwe, 2008–2009: A Review and Critique of the Evidence. *Health and Human Rights Journal*.
- Food and Agriculture Organisation of the United Nations, 2018. FAOSTAT. [Online]
Available at: <http://www.fao.org/faostat/en/#country/45>
[Accessed 2018].
- Green Climate Fund, 2017. GCF Spotlight. [Online]
Available at: <https://www.greenclimate.fund/spotlights/gcf-spotlight-on-cote-d-ivoire>
[Accessed 2018].
- Gregory, P., Ingram, J. & Brklacich, M., 2005. Climate change and food security. *Philosophical Transactions of the Royal Society B: Biological Sciences*.
- IISD, 2015. Côte d'Ivoire Submits INDC. [Online]
Available at: <http://sdg.iisd.org/news/cote-divoire-submits-indc/>
[Accessed 2018].
- IPCC, 2014. Climate Change: Impacts, Adaptation, and Vulnerability, s.l.: IPCC.
- Nordqvist, P. & Krampe, F., 2018. Climate change and violent conflict : Sparse evidence from South Asia and South East Asia. Solna: Stockholm International Peace Research Institute.



Plumer, B., 2009. Global Warring. The New Republic, 20 November.

The Sustainable Development Goals Centre for Africa; Sustainable Development Solutions Network, 2018. Africa SDG Index and Dashboards Report 2018, Kigali and New York: The Sustainable Development Goals Center for Africa and Sustainable Development Solutions Network.

Thiaw, I., 2015. Is the changing climate changing African ecosystems?. Ecological Society of America.

Thomas, C. D. et al., 2004. Extinction risk from climate change. Nature, Volume 427, pp. 145-148.

United Nations Development Programme, 2016. Sustainable Development Goals. [Online] Available at: <http://www.undp.org/content/undp/en/home/sustainable-development-goals.html> [Accessed 7 February 2019].

United Nations Economic Analysis & Policy Division, 2018. LDCs At a Glance. [Online] Available at: <https://www.un.org/development/desa/dpad/least-developed-country-category/lDCs-at-a-glance.html> [Accessed 6 February 2019].

USAID, 2017. Risk Expands, But Opportunity Awaits: Emerging Evidence on Climate Change and Health in Africa, Washington D.C., USA: USAID.

Wheeler, T. & Braun, J. v., 2013. Climate Change Impacts on Global Food Security. American Association for the Advancement of Science, 341(6145), pp. 508-513.

World Bank, 2015. World Bank. [Online] Available at: <https://data.worldbank.org/indicator/SL.EMP.TOTL.SP.ZS?view=chart> [Accessed November 2018].

World Resources Institute, 2015. CAIT Climate Data Explorer. [Online] Available at: [http://cait2.wri.org/historical/Country%20GHG%20Emissions?indicator\[\]=Total%20GHG%20Emissions%20Excluding%20Land-Use%20Change%20and%20Forestry&indicator\[\]=Total%20GHG%20Emissions%20Including%20Land-Use%20Change%20and%20Forestry&year\[\]=2014&sortIdx=NaN&cha](http://cait2.wri.org/historical/Country%20GHG%20Emissions?indicator[]=Total%20GHG%20Emissions%20Excluding%20Land-Use%20Change%20and%20Forestry&indicator[]=Total%20GHG%20Emissions%20Including%20Land-Use%20Change%20and%20Forestry&year[]=2014&sortIdx=NaN&cha) [Accessed 2018].

WWF, 2006. Climate Change Impacts in East Africa, Gland, Switzerland: WWF.

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