Republic of Yemen

INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) UNDER THE UNFCCC

21 November 2015

Intended Nationally Determined Contribution (INDC) YEMEN

Executive Summary

Yemen prepared its Intended Nationally Determined Contribution (INDC) document in very challenging situation in which the country faces precarious security situation, and political turmoil including ongoing armed-conflicts. In spite of the ongoing violent conflict and prevailing security challenges, Yemen's INDC document was drafted through a participatory process which involved consultations of key relevant stakeholders and technical agencies and based on available national climate change assessment and analysis.

The Yemen's INDC document has been prepared in accordance with decision 1/CP.20 (Lima call for climate action) which also drawn upon available national climate change reports and studies including the Second National Communication (SNC 2013), National Adaptation Programme of Action (NAPA 2008), and recent thematic technical assessments in 2015 including mitigation and adaptation. This document has also consulted, among others, key national and sectorial documents including the National Strategy for Renewable Energy and Energy Efficiency and the National Water Sector Strategy and Investment Program (NWSSIP-2009),. Adaptation to climate change across major vulnerable sectors including water, agriculture and coastal areas represents the central focus of this document which also requires international collaboration including financial support, and capacity building to assist in addressing climate induced vulnerabilities to build resilience. Nevertheless, the INDC document provides a vision of collaboration with international community including potential conditional and unconditional mitigation trajectories to reduce GHG emissions relative to business- as- usual (BAU) scenario contingent on international support.

The latest GHG inventory in Yemen is available for the year of 2000 which reveals total GHG emissions of about 24.2Mt of Carbon Dioxide- Equivalent (Mt CO2-eq). Also GHG baseline and mitigation scenarios are available up to the year 2025 which had been projected using the Long range Energy Alternatives Planning System (LEAP) modeling. In addition, projections until the year 2030 have been estimated based on two factors including: First, the average GHG emission growth rate of about 2 percent per year for the baseline scenario; Second, the mitigation potential of about 14 percent below emission projections of the baseline scenario over 15 years timeframe. In General, Yemen is a Least Developed Country (LDC), and its GHG emissions nearly negligible accounting for about 0.1 percent of the aggregate world total. Also Yemen has low GHG emission per capita of approximately 0.92 t CO2-eq in 2011 and ranks at the lowest levels relative to the world average which had already reached 7 t CO2-eq per capita in 2010.

This INDC document **proposes 14 percent GHG emission reduction target by 2030 below BAU** which represents an estimated total cumulative GHG reduction of about **35** MtCO2-eq from 2020 through 2030**;** this includes **1 percent unconditional target and 13 percent conditional target**. This document also provides an **overview of provisional adaptation and mitigation needs which require international support** as specified in Lima Accord recognizing the special circumstances of LDCs. However, due to the current situation in Yemen, further studies will be

conducted in the future to determine the projected loss and damage of climate induced disaster risks scenarios as well as various adaptation and mitigation measures which require international support to accelerate the implementation of Yemen's INDC.

1. National Circumstances

Yemen is an arid Middle Eastern country, located at the southern end of the Arabian Peninsula. Yemen is one of the poorest countries in the Arab region facing multiple challenges and crisis. The daunting political and socio-economic challenges adversely minimized human development and economic stability. Increasing poverty rates, lack of employment opportunities, inequalities, lack of justice, political participation and competition over scarce natural resources, especially water, have been among the key triggers for the social and political unrest that erupted in 2011. The humanitarian and livelihoods conditions witnessed a declining trend in the last decade, especially during the transitional period following the socio-political unrest. Since then, the economy could not recover to the pre-crisis level and the country slipped into recession achieving negative economic growth. Failure to achieve peaceful transfer of power brokered by the Gulf Cooperation Council (GCC) deal during the transition period spiraled into a full-scale war and armed-conflict covering the majority of the country.

Within a few months the humanitarian conditions further declined rapidly reaching to Level 3 (complex and severe humanitarian conditions) making over 80 percent in need for humanitarian assistance. The remarkable resilience of the Yemeni people that withstood decades of underdevelopment has overstretched beyond its remaining coping mechanisms, plunging the majority of the people into vulnerability, poverty and insecurity in an unprecedented scale of humanitarian disaster. The 2015 full-scale war has destroyed the economy across the different sectors. Basic services largely collapsed throughout much of the country. Throughout most of the country, supplies of food, fuel and medicines are dangerously low or not available.

In general, the economy of the country is dominated by the oil sector, which accounts for 27 percent of the Gross Domestic Product (GDP), 50 percent of national budget revenue and 70 percent of exports. Its population growth rate of 3 percent is one of the highest in the world and outpaces its economic growth rate. Nearly half the population is below 18 years of age and three-fourth of the population lives in rural area. Unemployment among 15 - 24 age groups is 53.7 percent of the labor force. Poverty ratio increased from 34.8 percent in 2006 to 54.4 percent in 2011. Consequently, more than half of the population is living with less than $2 a day and most of the disproportionately affected poor groups include women, children, small scale framers and sharecroppers, landless labor, nomadic herders and artisanal fishermen who are spread over 133,000 small rural settlements. Nearly 10.6 million or 41 percent of the population are food insecure, of which 5 million (19 percent) and 5.6 (22 percent) million are moderately and severely food insecure, respectively. Furthermore, Yemen ranks lowest on the

Global Gender Equality Index (GGEI). Social development indicators, such as children malnutrition, maternal mortality, and educational attainment remain discouraging.

Furthermore, water and land resources are already under chronic scarcity, and there are already a profound water and energy crises in the Yemen. The current political and security situation is expected to weaken the already ineffective governance capacities of institutions especially at the local community levels where the majority of the poor and extremely vulnerable dwellers live. With no resilience building support, the poor are expected to see greater levels of livelihood vulnerabilities particularly massive risks of deteriorating delivery of basic social services including water and energy. Environmental degradation of scarce natural resources especially water, and land compounded by climate change are among are among the key challenges the vulnerable dwellers will face in Yemen.

Agriculture, which sustains the rural poor, employs more than 50 percent of the total labor force of 6.6 million in 2009, but contributes by only 9.7 percent to the GDP while uses around 85 percent of its available water resources. Current projections on climate indicate that rising temperatures and frequent droughts will increase the incidences of land degradation and desertification. In addition, the water sector already faces formidable challenges, and water table is declining on average by about 2-7 meters annually due to groundwater over-exploitation. The increasingly growing water crisis in Yemen will have severe socio-economic and environmental consequences including, decreased agriculture productivity, reduced food security, increased conflict over resources, accelerated land degradation, and increased livelihood vulnerability.

Yemen's coastal communities and their livelihoods are currently threatened by coastal erosion and flooding of low-lying areas. Under conditions of sea level rise, these communities could face damage to assets and property, constraints on water supply and quality, as well as loss in agricultural yields. Shore coral reefs, already prone to damage by the intense wave activity of storms in the Red Sea and Gulf of Aden, may see an increase in intense wave activity and plausibly more frequent and severe storms which have drastic loss and damage costs. Cyclone Chapala is an example of climate induced disaster risks scenarios which Yemen is projected to face more frequently over the coming decades where international support will be required to help the country manage and reduce potential loss and damages involved besides building the necessary mechanisms for long-term and sustainable recovery processes.

Given the country's high levels of food import dependency, food insecurity and poverty, both global and local climate change impacts are likely to significantly influence its future development and food security. Accordingly, adaptation in the agricultural, water and coast sectors will have a substantial impact on economic growth and livelihoods. Under the current political and security situation in Yemen, poverty is expanding, and food insecurity is worsening. Increases of poverty add additional mounting pressures on the already degrading natural resources upon which the livelihoods of the most vulnerable communities and excluded groups rely. The vulnerability of the poor is further exacerbated under the looming impacts of climate

change and expanding ecological scarcities in such a way that is not only endangering the livelihood sustainability, but also triggering further social tensions and resources conflicts.

Yemen is not contributing a lot into the anthropogenic GHG emissions, but still highly vulnerable to climate change-related impacts. The largest share of the total anthropogenic CO_2 emissions in Yemen is produced in the energy sector, which is expected to dominate until 2030, followed by the agricultural, waste and industrial sectors. Consequently, mitigation measures in the energy sector represent the key opportunity for Yemen to proceed towards a low emission sustainable development.

Yemen has been party to the UN Framework Convention on Climate Change (UNFCCC) since 1996, and to the Kyoto Protocol since 2008 as non–Annex I Party. The Environmental Protection Authority (EPA) is the national focal point for the implementation of the UNFCCC Convention and Kyoto protocol. EPA played a leading role in coordinating the INDC preparations. In this context, Yemen intends to contribute to global efforts to limit greenhouse gas emissions growth contingent on support by the international community.

2. Yemen Mitigation Contributions

Table (1) Overview of Mitigation Targets

Unconditional targets	A **1 percent** reduction in GHG emissions by 2030 compared to a business as usual (BAU) scenario*
Conditional targets	An additional **13 %** reduction achievable under certain conditions, which would bring the total GHG reduction to **14 percent** below BAU emission levels by 2030 **
Financial needs	Yemen's conditional target is conditional upon: • Access to new sources of finance and enhanced support, compared to that received over the past years, to be mobilized through new climate finance mechanisms, such as the Green Climate Fund • Detailed cost estimation of required financial support will be updated in light of future circumstances by 2020

**Unconditional mitigation scenario:* It includes the mitigation measures which Yemen can implement without international support.

***Note: Data given in the table above are subject to changes and update and Yemen has the right to make necessary changes relating to the baseline and mitigation scenarios in light of any up-to-date data by 2020.*

Figure (1) BAU Mitigation Scenario

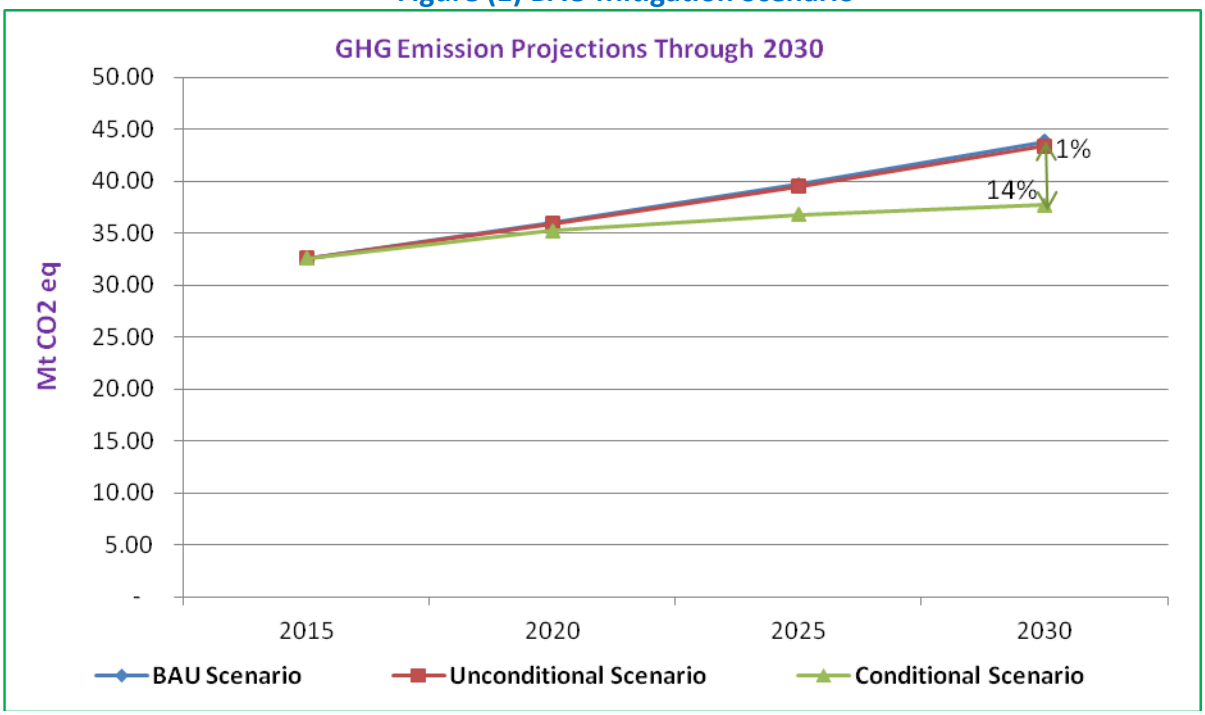


Table (2) Summary of Assumptions and Methodologies

Type of mitigation target	Emission reductions from projected emissions for the year 2030, according to a BAU scenario
Target economic sectors	**Energy:** Energy production and Energy demand (households, transport, industry, services, agriculture and fisheries) **Agriculture:** Cropping systems, Land-use for agriculture and forestry and Solar PV water pumping systems for irrigation **Wastes:** Solid wastes and Wastewater
Target greenhouse gases	The contribution of the Yemen is based on estimated carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions. Fluorinated and sulfur hexafluoride (SF_6) gases are not covered; they are rarely used in Yemen and their emissions are negligible as the products containing these gases are not produced in Yemen
Baseline scenario (BUA)	GHG emission projection for 2030, starting in 2020. Accordingly, projections do not take into account the mitigation measures and actions implemented from 2015 in the business-as-usual scenarios
Mitigation scenario	GHG emission projections for 2030, starting in 2020. The unconditional mitigation scenario is based on the implementation of the already scheduled or in-progress projects, all of whose funding has been defined, while the conditional scenario assumes the implementation of additional actions over the period 2016 - 2030

Global Warming Potential (GWP)	The GWP values used were those identified by the Intergovernmental Panel on Climate Change (IPCC) for the preparation of national emissions inventories in accordance with UNFCCC Decision 17/CP.8., for the preparation of national emissions inventories: GWP CO2 = 1 (by convention), GWP CH4 = 21 and GWP N2O = 310
Methodology for estimating Emissions	GHG baseline and mitigation scenarios are available up to the year 2025 which were projected using LEAP modeling. In addition, projections until the year 2030 have been estimated based on two factors including: First, the average GHG emission growth rate of about 2 percent per year for the baseline scenario; Second, the mitigation potential of about 14 percent below emission projections of the baseline scenario over 15 years timeframe. In this regard, considering that this report was built on old and poor data, under an exceptional situation, Yemen reserves the right to update its INDC according to the availability of new effective data and conditions

Table (3) Summary of Key Mitigation Data

	Years				Total (2010-2030)
	2010	2020	2025	2030	
Emissions- BAU (Mt Carbon Dioxide equivalent)	24.18	35.94	39.68	43.81	437.30
Emissions Unconditional Scenario (Mt CO_2eq)	24.18	35.90	39.50	43.35	434.97
Emissions Conditional Scenario (Mt CO_2eq)	24.18	35.25	36.74	37.67	402.33
Expected Emission Reduction- Unconditional Scenario	0.00	0.04	0.18	0.46	2.33
Expected Emission Reduction- Conditional Scenario	0.00	0.68	2.94	6.13	34.97

2.1 Unconditional Mitigation Measures

Unconditional mitigation measures are scheduled or in-progress projects, all of whose funding has been defined including those under implementation. Some mitigation measures under implementation are summarized in table (4).

Table (4) Mitigation Measures under Implementation

Sector	Measures
Energy	1. Mocha Wind farm Project, 2014-2019, (MUS$ 144.00) - Government funding: (US$ 19 Million) 2. Rural Energy Access Project, 2009-2017, (MUS$ 121.40) - Government funding: (US$ 12.20 Million)

	3. Marib Gas Turbine Power Station 400 MW- phase 2 (Total Cost = US$ 400 Million) - Government funding: (US$ 49 Million$) 4. The Expansion of Solar Power Technology in Yemen (US$ 50 Million) The project is being implemented nationally, with a particular focus on piloting solar technologies in government buildings, schools, hospitals and the agricultural sector (solar water pumping).

2.2 Conditional Mitigation Measures

The proposed conditional measures to reduce GHG emissions are summarized in Tables (5).

Table (5) Conditional Mitigation Measures

Sector/Sub-sector	Mitigation Measures
Energy - Power Generation	**Efficient power generation, transmission and distribution. (15 percent increase in energy efficiency in the power sector until 2025)**
	Switch to efficient power generation for new generation capacities that are to be installed, these include: - Combined-cycle gas turbine (CCGT) plants with overall efficiencies approaching to 60 percent for central (interconnected) power supply - Combined heat and power (CHP) generation systems with overall efficiencies of more than 80 percent appropriate for decentralized power supply for rural electrification, in industrial, commercial and residential sectors
	a) Promoting the use of renewable energy sources for electricity generation. - Off-grid electrification (electrification of individual rural Households-HH): 110.000 rural HH (45 percent of identified market potential) to be electrified Solar Home Systems until 2025 (installed capacity around 5.5 MWp)) - Rural electrification based on renewable energy (photovoltaic (PV) systems, solar home systems (SHS), wind energy converters, where feasible, and biomass, both in stand-alone and hybrid schemes) - Large-scale power generation from renewable energy sources (grid-connected), including solar thermal power plants, solar PV plants, and wind farms including : ▪ Grid electricity (large scale electricity generation): 15 percent of generation mix in 2025 (2600 GWh). This translates into an overall installed capacity in 2025 of: • 400 MW from wind farms • 160 MW from geothermal power stations ▪ 6 MW from power stations using landfill gas

Fuel switching to natural gas.	Promoting the wide use of natural gas for power generation, industry and other economic sectors
Residential and Commercial	- Launch energy-efficiency programs through establishing energy efficiency standards, energy use regulations and labeling and public awareness. - Promote active use of solar energy through use of solar water heaters instead of electric water heaters and use of solar-driven air-conditioning and solar refrigeration. (*Solar Water Heaters: 40 percent of market potential in 2025 (200,000 units) representing a saving potential of 457 GWh*)
Transport	- Improving energy use efficiency in transportation sector.
Industrial	- Introduction of renewable energy sources in the industrial energy supplies concepts (solar water heaters, solar based process heat/steam, photovoltaic and wind systems)
Agriculture	- Introduction of solar photovoltaic (PV) water pumping systems for irrigation - Proper land management to reduce methane from soil
Water	- Methane captures from wastewater treatment plants - Encouraging and expanding renewable energy-based water desalination
Wastes	- Landfill gas capturing for flaring or using for power generation

2.3 Fairness and Ambition

Yemen, as a Least Developed Country (LDC) whose emissions are less than 0.1 percent of global emissions, is not contributing a lot into the anthropogenic GHG emissions (0.92 Metric Tons per capita in 2011) but stands highly vulnerable to climate change-related impacts because of its fragile socioeconomic development and inadequate adaptive capacity. However, Yemen recognizes that in order to meet the 2 degree objective all countries will need to undertake mitigation. In view of that, Yemen's approach focuses on avoiding an increase of emissions per capita beyond this level, while pursuing its development goals.

In addition, Yemen account for a small share of past global greenhouse gases, it is therefore putting forward actions that align with a low carbon development pathway, which to be fully implemented would require additional international support in the form of finance, technology transfer and capacity building. In addition, Yemen's INDC represents its aspiration to increase the resilience to climate change by introducing a comprehensive programme for adaptation action across sectors in support of livelihoods, and economic well-being of the Yemeni people. This represents a high level of fairness and ambition in light of Yemen's national circumstances.

3. Yemen Adaptation Measures

3.1 Climate change scenarios and vulnerability:

The Inter-governmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) shows that climate change will have impact on world weather patterns, and that some regions and sectors are likely to be particularly affected. Although patterns of change in precipitation under climate change are not fully certain, agriculture and water are evidently the region's top sectoral vulnerabilities. The average temperature rise in the region is faster than the global average and is likely to persist in the future. Currently developing countries situated in arid and semi-arid zones, which Yemen is one of them, are dealing with myriads of environmental and socio-economic challenges including poverty, resource degradation, alarming population growth, and low agricultural productivity. Yemen encompasses an area of about 45.5 million hectares, the majority of which is arid lands and desert.

Several studies were conducted to assess the impacts of climate change in Yemen including Yemen's Initial National Communication (INC 2001); National Adaptation Programme of Action (NAPA 2008); and Yemen's Second National Communication (SNC 2013). The three studies found that agriculture, water and coast are among the top vulnerable sectors in Yemen which is consistent with findings of the mentioned regional climatic projections. In 2010, the World Bank conducted a study entitled "Assessing the Impact of Climate Change and Variability on the Water and Agriculture Sectors, and the Policy Implications" which projected climate change impacts on agriculture and water sectors in Yemen under a range of assumptions about future emissions.

The impact of climate change in Yemen is expected to be particularly significant due to historical patterns of climatic variability, high levels of water scarcity and the country's reliance on climate-vulnerable sectors, such as water, agriculture, and coastal sectors. Average annual precipitation in the country is very low, ranging from less than 50 millimeters (mm) in the coastal plains and desert plateau regions to around 800 mm in the mountainous highland region in the west. To make matters worse, the precipitation distribution of Yemen is characterized by seasonally intense and short-lived heavy storms that produce flash floods interspersed with long dry periods leading to widespread drought.

The following provides a summary of major impacts of climate change in Yemen which represents priority areas of interventions for building resilience:

- Increased water scarcity and reduced water quality – leading to increased hardship on rural livelihoods;
- Increased drought frequency, increased temperatures, and changes in precipitation patterns – leading to degradation of agricultural lands, soils and terraces;
- Deterioration of habitats and biodiversity – leading to expansion of desertification;

- Reduced agricultural productivity – leading to increased food insecurity and reduced income generating activities;
- Increased sea levels – leading to deterioration of wetlands, coastal mangrove migration, erosion, infrastructure damage, and seawater groundwater intrusion;
- Increased climatic variability – leading to the possibility of spread and growth of vector borne and water borne diseases; and
- Impacts on coastal zones – leading to a loss of tourism activity due to sea level rise including loss of beaches.

In 2008, the flash flood of a severe tropical cyclone had caused one of the most serious natural disasters in Yemen over the past decades leading to loss of lives, and damages of houses, infrastructure, and agricultural sector. The flooding resulted in estimated damage and losses of $1.64 billion. An estimated 700,000 persons were internally displaced as a result of the severe flooding affected low-lying Wadie of Hadhramout and Al-Mahra in Yemen in 2008 which is said to be attributed to climate change induced tropical cyclone. More frequent and severe disaster risks are projected under climate change scenarios. Cyclone Chapala of this year is another recent example of climate induced disaster risks scenarios which have significant loss and damage costs in Yemen

On the other hand, considerable losses in grain production and husbandry have already been experienced in 2008/2009; when aggregate production was lower by 24 percent compared to 2007. This dramatic fall in food production was largely due to increasingly prolonged drought conditions, when most of water sources in valleys producing grain dried up. These changes in temperature and rainfall patterns are likely to worsen existing water scarcity conditions, loss of land productivity and desertification processes as well as frequency and intensity of climate induced drought and flood related disaster risks, which have been increasing over the past decade in all parts of the country including the latest Chapala tropical cyclone of November 2015. The involved loss and damage of such extreme weather events are significant but further studies will be conducted in the future to determine the estimated costs associated with the climate induced disaster risks scenarios.

Thus, climate change represents a major threat to Yemen's economy and food security, which are overwhelmingly dependant on rain-fed agricultural production. Some of the critical underlying causes of current vulnerability relate to heavy reliance on agriculture, high population growth and poverty rates, with increasing inequalities. The agricultural sector currently uses over 90 percent of all freshwater resources. In addition, a combination of rural economic growth and demographic pressures is driving up demand for water, especially those extracted from the groundwater reserves.

Consequently, Yemen's aquifers are being mined at such a rate that groundwater levels have been falling by 2 to 7 meters annually. Climate change will clearly exert additional pressure on recharge rates through rainfall decline and lead to accelerated depletion. As such, modeling results predict groundwater reserves will be exhausted by about 2025-2030. Climate models which had been deployed based on regional scenarios indicates that Yemen is projected to

witness greater variability, with an increased frequency of intense rainfall events and therefore possibly an increased risk of drought and floods- see three projected climate scenarios below as shown in Figure (2). Also, the marginal impact of climate change scenarios on rainfall and crop production is shown in Table (6). The common factors in the predictions are:

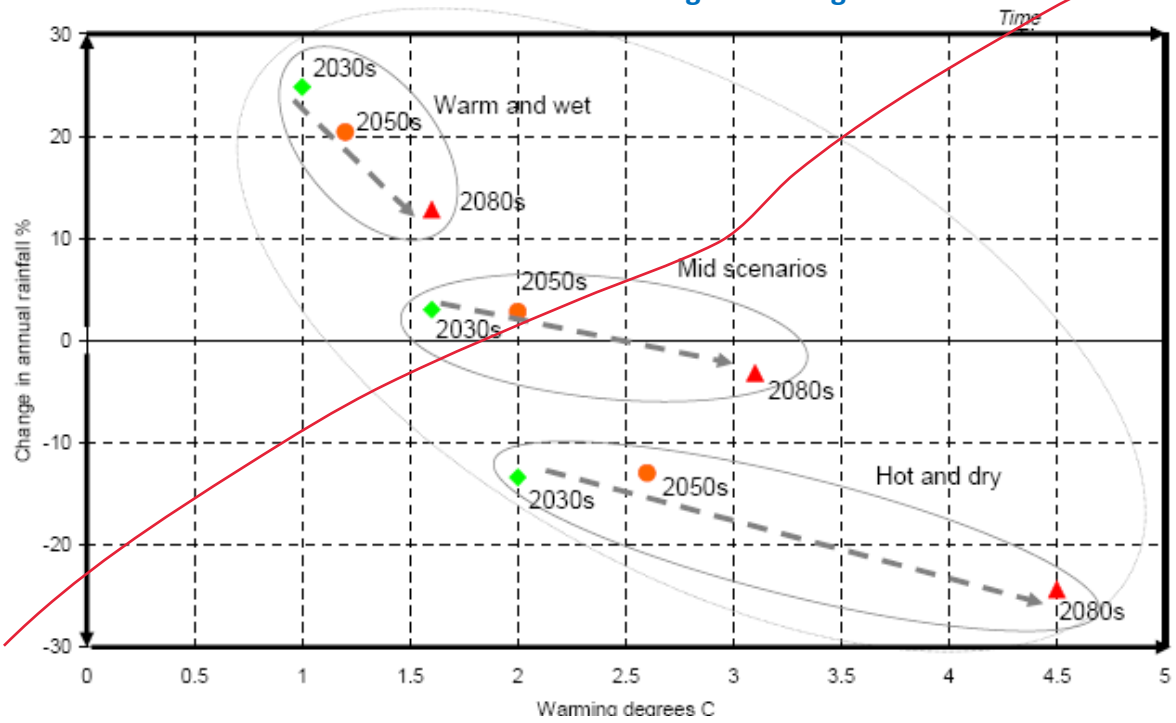
- Yemen will be getting warmer, most likely at a faster rate than the global average (by between 1 and 4.5°C towards the end of century) and more arid.
- It is likely that there will be more variability of rainfall patterns within years.
- There will be an increased frequency of intense rainfall events and therefore an increased risk of floods and drought.

In a nutshell, Yemen is anticipated to experience steadily rise in temperatures, and an increase in variability of rainfall and in heavy precipitation events under climate change. Rainfall changes will be accompanied by changes in the intensity of wind and frequency of high temperatures and changed cloudiness. Less predictable rainfall and a hotter and possibly drier climate would place Yemen's people and economy under further stress. Climate change could also badly affect 52 percent of Yemen's workforce working in the agricultural field.

Table (6) Marginal Impact of Climate Change Scenarios on Rainfall and Crop Production

Scenario	Mid			Hot and Dry			Hot and Wet		
Year	**2030**	**2050**	**2080**	**2030**	**2050**	**2080**	**2030**	**2050**	**2080**
Temperature (C°)	+1.6	+2	+3.1	+2	+2.6	+4.5	+1	+1.2	+1.6
Rainfall	+3%	+3%	-3%	-13	-13	-24	25%	20%	13%
Crop Production	+1%	+1.1%	-6.3%	-10.7%	-11.2%	-27.2%	14.1%	11.7%	6.5%

Figure (2) Simplified Climate Scenarios Showing Changes in Annual Average Precipitation and Annual Average Warming



3.2 Adaptation Measures

Owing to the multidimensional nature of vulnerability in Yemen, adaptation is centered around multi-sectoral and stakeholder consultations to build up resilience of the major priority sectors being affected by climate change. In addition to the already planned and implemented short-term adaptation measures and actions, Yemen intends to plan and implement medium- and long-term resilience building measures to address the impacts of climate changes, given that these changes has already significantly affected most sectors relevant to economic, food and water security of Yemeni citizens.

Yemen's water scarcity represents a direct pressing factor and threat to its economy and directly affects the food security of the Yemeni citizens. However, Yemen spares no effort to play a positive role in this international orientation in accordance with its national interests and the rights of Yemeni people in the provision of decent living conditions.

It is expected that Yemen will witness a noticeable increase in the annual temperature as well as a steady decrease in the annual rainfall. As mentioned above, Yemen is highly vulnerable to climate change and it is therefore expected that the effects of climate change would obviously affect water, agriculture, health and bio-diversity sectors due to their structural fragility as well as the lack of institutional and technical capacities including other necessary means to cope with the effects and minimize the risks of climate change. This document therefore provides a vision for adaptation which would set the ground to build resilience under the identified climate risk scenarios, which represent the cornerstone for achieving sustainable development.

Such a vision will also set the ground for enabling actions which include preparation of National Adaptation Plan (NAP). NAP will provide the necessary information including on medium- and long terms climate vulnerabilities, and investment programmes to build resilience under the projected climate risks scenarios. Building of resilience will necessarily require international support to enable Yemen to adapt to the effects of climate change.

Yemen's Future Plan to address the effects of climate change will require measures to reduce the risks and enhance adaptation especially of already fragile and most vulnerable sectors, in particular, the unprecedented droughts, land degradation, sea level rise and coastal storm surges which recently have caused widespread devastation of coastal communities, as evidenced by most recently Chapala Cyclone in November 2015. These can be realized through a range of actions aimed at promoting resilience to the effects of and disaster risks associated with local and global climate change scenarios.

3.2.1 Presentation of current adaptation measures

A number of institutional actions are being carried out in Yemen, many of which are set to offer significant insights and experiences on current and potential mitigation and adaptation strategies for addressing climate change. A selection of the main programmes under implementation includes:

1- Many key programs identified in NAPA are either planned or under implementation such as the national early warning system for natural disasters and climate change vulnerability assessment of key sectors;
2- Yemen is a pilot country for CIF's Pilot Project for Climate Resilience (PPCR). As the poorest country in the Middle East, the Yemen PPCR strategic programme is designed to reduce the vulnerability of coastal populations and integrate climate resilience and adaptation planning and capacity into the water and agricultural sectors with investments in three focus areas:
   (i) Climate Information System and Pilot Program for Climate Resilience (CISPPCR) - Climate Services - (budget:US$19 Million);
   (ii) Integrated Coastal Zone Management (budget: US$ 20 Million); and
   (iii) Natural Resource Management and Rural Livelihoods (budget: US$ 11 Million).
3- The "Small Holder Agricultural Productivity Enhancement Program (SAPEP) under Global Agriculture and Food Security Program (GAFSP), (budget: US$ 36 Million);
4- Rural Growth Program (budget: US$ 167 Million);
5- Rain-fed Agriculture and Livestock Project (budget: US$ 12.9 Million);
6- Conservation and Sustainable Use of Biodiversity;
7- Climate Resilience of Rural Communities (CRRC) Project;
8- Third National Communication and First Biennial Update Report to the UNFCCC (budget: US$ 0.852 Million);
9- The 'Small Holder Agricultural Productivity Enhancement Program (SAPEP) under Global Agriculture and Food Security Program (GAFSP), (budget: US$ 36 Million).

3.2.2 Presentation of planned adaptation measures:

The implementation of adaptation measures will be based on related national frameworks and sectoral strategies such as the National Water Sector Strategy and Investment Plan (NWSSIP), the National Agriculture Sector Strategy (NASS) and the National Biodiversity Strategy and Action Plan (NBSAP), among others. A wide-ranging of measures is proposed to address climate vulnerabilities of priority sectors and thematic areas and this includes:

1- Promotion and scale-up of rainwater harvesting to reduce climate induced water shortage;
2- Promoting agriculture drought management as well as sustainable crop and livestock management;
3- Plan and implement proper land resources management programs.
4- Llivelihood approaches for integrating natural resources management and preservation of sensitive ecosystems;
5- Disaster risk management including flood and drought management.
6- Capacity Building for integrated coastal zones and marine resources management.
7- Capacity building and awareness raising; and
8- Institutional capacity for building resilience climate change including planning, programing, monitoring and resources mobilization.

Also there are a number of pipelined projects with support from United Nations Development Programme (UNDP), and Global Environmental Facility (GEF) with the aim of building climate resilience of vulnerable local communities in Yemen which include:

- Promote and build climate resilience to reduce vulnerability in Wadis and coastal areas;
- Enhance livelihood approach for integrating natural resources management and preservation of sensitive ecosystems.
- Introduce and scale-up renewable energy applications to reduce rural communities' vulnerability.

The implementation of Yemen's INDC relating to adaptation will largely depends on financial support by the UNFCCC climate financing mechanisms including on the Green Climate Fund (GCF). Also Yemen needs international support for preparation and implementation of NAP to address the effects of climate change in a sustainable manner. In this context, Yemen will need support in terms of finance, capacity building and technology transfer.

Equally important, support should also include focus on building medium- and long-term resilience capacity needs of the poor, and excluded groups, while at the same time responding to the emerging vulnerabilities being largely amplified by the escalating political-security economic consequences through a set of urgent but scalable livelihood strengthening interventions (i.e. labor-intensive terrace rehabilitation, community-based natural resource conflict-sensitive management, and income-generating livelihoods) that reinforce short-term resilience capacity needs at the grassroots levels.

4. Issues and Needs

As a LDC, Yemen is a resource-constrained country with limited capacities but still experiencing tremendous development challenges, and pressing priorities. Yemen also has the lowest Official Development Assistance (ODA) of per capita at US$12.7 or just 2.2 percent of GDP, compared to US$33.4 per capita (18.7 percent of GDP) for other least developed countries in the world.

A range of factors pose challenges to addressing climate in Yemen. These include weak governance and institutional structures, lack of long-term reliable data or technical capacity to analyze the data, uncertainties in regional and local climate scenarios as well as socio-economic scenarios, generally low awareness levels regarding climate change, low institutional or technical capacity to interpret, modify, or develop existing models or methodologies, and a dearth of research on applicable policy measures to address climate change.

With the current weak adaptive and institutional capacity, it is unlikely for Yemen to build up adequate climate change resilience, and ensure low-emission development trajectories unless

sufficient support has been provided to enable Yemen implement its ambitious GHG emissions reduction targets as well as adapt to the impacts of climate change.

Yemen is geographically divided up by five major land and eco-climatic systems in addition to the different socio-economic rural-urban settings, and geographical and topographical characteristics, and localities across the various governorates, and districts of the country. Each and every specific locality would probably have its own locality specific adaptation needs. However, it can be noted that each of the aforementioned studies has only covered a limited number of sectors through scattered and selected pilot areas. Different areas have not been covered, and new emerging climate change associated impacts including spread of diseases such as Dengue have not yet been explored In addition, these studies have only provided a generic outlook rather than location-specific information which sounds to have very low applicability across the diverse geographic, topographic landscapes of the country.

Therefore, more studies will be conducted under the NAP process which will provide up-to-date analysis with economy-wide adaptation needs including on costing of investments covering the various medium- and long-term adaptation measures, as well as loss and damage associated with climate induced disaster risk scenarios. Therefore, it is important to note that this INDC document has drawn on available reports and studies while other national-wide and locality-specific vulnerabilities, and adaption needs have not been reflected owing to lack of sufficient information at this stage when the INDC is drafted.

Additional ssupport will also needed on issues relating to Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) as well as Ecosystem-Based Adaptation (EBA) including on sustainable management of natural resource, and disaster risk management (DRM) to help the country reduce potential loss and damages associated with climate induced disaster risk scenarios such as the already occurring extreme hydrological weather events including more frequent and severe droughts and floods..

Consequently the implementation of Yemen's INDC will need significant support in terms of capacity building and technology development and transfer. Without such support under such a fragile situation, the looming environmental scarcity threats, and climate change impacts and potential risks will further compound the mounting political-security effects on the poor in general and the most vulnerable in particular.