Zambia Country Climate Risk Assessment Report

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List of Acronyms

ADB	African Development Bank
CSO	Civil Society Organisations
CSP	Country Strategy Paper
DJF	December, January and February
DMMU	Disaster Management and Mitigation Unit
DRR	Disaster Risk Reduction
ENSO	El Niño Southern Oscillation
GCF	Global Climate change Fund
GDP	Gross Domestic Product
GHGs	Green House Gases
IIED	International Institute for Environment and Development
INDC	Intended Nationally Determined Contribution
IPCC	Inter-governmental Panel in Climate change
JASZ	Joint Assistance Strategy for Zambia
LDCF	Least Developed Countries Fund
LEG	Least Developed Countries Expert Group
LUCF	Land use Change and Forestry
M&E	Monitoring and Evaluation
MAM	March, April & May
NAP	National Adaptation Plan
NAPA	The National Adaptation Programme of Action
NCCRS	National Climate Change Response Strategy
NDC	Nationally Determined Contribution
ND-GAIN	The Notre Dame Global Adaptation Initiative
NVAC	National Vulnerability Assessment Committee
ODA	Official Development Assistance
PPCR	Pilot Program for Climate Resilience
PS	Permanent Secretary
RVAA	Regional Vulnerability Assessment and Analysis
SADC -	Southern African Development Community
SCT	Social Cash Transfers
SDG	Sustainable development goal
SNDP	Sixth national development Plan
SON	September, October & November
SP	Social Protection
SREP	Scaling Up of Renewable Energies Program
UNDP	United Nations Development Programme
UNFCCC	United nations Framework Convention on Climate Change
UNICEF	The United Nations Children's Fund
UN-OHRLLS	The United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States
WRI	World Resource Institute's
ZMD	Zambia Meteorology Department

Executive Summary

Zambia is now a lower middle-income country with consistent and robust economic growth and has progressed to the medium human development category. Despite improvements in economic performance, Poverty levels remains high with more than 55% of the population living below the poverty line. Climate-induced changes are already exerting considerable stress on the country's vulnerable sectors which will haul people into further poverty. Floods and droughts have increased in frequency over the past three decades, costing the nation an estimated 0.4% in annual economic growth. Climate change impacts will have negative impacts on different sectors and increase vulnerability of the categories of the population who are already vulnerable

Zambia's Mean annual temperature has increased by 1.3°C since 1960, an average rate of 0.29°C per decade, meanwhile, the mean annual rainfall over Zambia has decreased by an average rate of 1.9mm per month (2.3%) per decade since 1960. The mean annual temperature is projected to increase by between 1.2 to 3.4°C by the 2060s, and between 1.6 to 5.5°C by the 2090s. Projections of mean rainfall do not indicate large changes in annual rainfall however, the proportion of total rainfall that falls in heavy events is projected to increase annually, which will lead to intensity of extreme events, especially floods.

The Zambia Meteorology Department is key in climate risk management and providing weather and climate information, and is working in partnership with different agencies to ensure delivery of effective weather and climate services, however, the climate change policy and institutional framework does not prioritise meteorology. The Meteorology Department is perceived as "scientific" and is low in the government hierarchy since it's just a department. This down plays the importance and influence of the department. In addition, there is lack of locally generated climate change projections despite coordinated efforts to develop downscaling in Southern Africa. Inadequate Station Network Density for country coverage is also a challenge with some of the meteorological and telecommunication equipment declared obsolete. With 70% of Zambian society depending on agriculture and other climate sensitive sectors, access to weather and climate services is pertinent.

Drought, flooding, extreme temperatures and prolonged dry spells are threatening rural livelihoods through crop failures and degraded food and water security systems. It is estimated that the impact of climate change will cost Zambia approximately 0.4 percent of annual economic growth, which costs the country US$4.3 billion over a 10-year period. It is also estimated that without action, rainfall variability alone could lead to losses of 0.9 percent of the GDP growth over the next decade, thereby keeping a significant section of Zambia's population below the poverty line. Climate change related losses in agriculture are expected to amount to US$ 2,200– 3,130 million over the next 10-20 years. The findings from the economy wide modelling assessment suggest that climate variability has a pronounced negative effect on economic growth. Zambia's Country vulnerability Indices on vulnerability and readiness to improve resilience ranks it as highly vulnerable with low readiness which calls for a great need for investment and innovations to improve readiness and a great urgency for action

Zambia has put in place climate relevant policies and strategies to address climate change adaptation and mitigation. The country's INDC is guided by the desire to reduce poverty, attainment of low carbon climate resilient economy and sustainable development. Whereas the policies are in place, implementation is still low, encumbered with challenges of inadequate policy coordination, inadequate technical capacity, resource mobilisation skills, and effective decentralization.

Institutionalization of climate change has also not taken root and there is need for a national climate change monitoring and evaluation framework to assess adaptation and mitigation effectiveness.

Irish Aid Country Strategy Paper (CSP) 2013-2017 notes that Zambia is vulnerable to the effects of climate change because of its geographic exposure, and that Poverty and vulnerability is driven by interrelated factors including food insecurity, climate change, malnutrition, insecure livelihoods and ill-health. Climate change is considered as a cross cutting issue and integrated in the agriculture, livelihoods and nutrition programmes. Irish Aid Zambia contributes to climate finance through its bilateral aid and civil society programmes. Projects and programmes funded by Irish Aid have a strong agricultural focus to improve livelihoods, address food insecurity and build resilience of small scale farmers.

Key recommendations to improve climate change integration in development programming include;

- ✓ Strengthen resilience focusing on the nexus between climate change, disaster risk reduction, humanitarian response and development to reduce vulnerability and build resilience of the poor and vulnerable sections of the population

- ✓ Support private sector investment models for economic growth as well as focus on inclusive economic models that can increase incomes for the poor and vulnerable.

- ✓ Support climate risk assessments and climate risk management to strengthen early warning and planning for uncertainty. Food systems approaches will be important across all development programmes to improve food security, nutrition, but also enhance economic development for the poor.

- ✓ Integration of climate change, disaster risk reduction and social protection mechanisms into development programmes will be important to make sure that the impacts of climate change and disasters is reduced on the vulnerable communities

- ✓ Gender equality and climate justice should be a key focus. Gender analysis should be done across all programmes and policies to understand the different capacities and vulnerabilities of women and men, boys and girls
- ✓ Capacity building and strengthening of civil society partners and Government structures at national and sub national levels in climate change will be key to improve sustainable development, climate governance, planning for uncertainties, managing risks and reducing vulnerabilities resulting from climate change and disaster impacts.

- ✓ Investment in generating and disseminating accurate, timely and reliable weather and climate information will be important to inform different sector adaptation and climate risk management plans and decisions regarding changes in climate

- ✓ Strengthening integrated water resources management is important for Zambia, given the impacts of energy supply which is already costing the country. Climate variability and change will continue to affect water resources, it will be important therefore to explore innovative and climate sensitive approaches to improve and protect water catchment areas

1.0 Country Context

Zambia is a landlocked country located on the central plateau of the southern African region, with a land area of 752,612 square kilometres. The population for 2015 was estimated at 16,101,000[1] with a growth rate of 3.2% per year. The country has one of the highest fertility rates in the world at 6.2 births per woman[2]. According to the Demographic and Health Survey 2013-2014, Zambia is one of the most urbanised countries in sub-Saharan Africa, with about 40% of its inhabitants living in urban areas. The number of people in urban areas rose from 3.5 million in 2000 to 5.1 million in 2010.

Between 1980 and 2015, Zambia's Human Development Index (HDI) value increased from 0.398 to 0.579, an increase of 45.5 percent. Between 1990 and 2015. Zambia's life expectancy at birth increased by 16.5 years, mean years of schooling increased by 2.2 years and expected years of schooling increased by 5.0 years. Zambia's Gross National Income (GNI)[3] per capita increased by about 62.2 percent between 1990 and 2015. Zambia's 2015 HDI of 0.579 is below the average of 0.631 for countries in the medium human development group but above the average of 0.523 for countries in Sub-Saharan Africa. Zambia is now a lower middle-income country with consistent and robust economic growth and has progressed to the medium human development category. Despite improvements in economic performance, Poverty levels remains high with more than 55% of the population living below the government-defined poverty line.[4] In both rural and urban households, poverty levels are highest among female-headed households, with extreme poverty levels of over 60 per cent in rural areas and over 15% in urban areas.

In terms of Multidimensional Poverty (MPI)[5], 54.4% of the population are multi dimensionally poor while an additional 23.1 percent live near multidimensional poverty. The breadth of deprivation (intensity) in Zambia, which is the average deprivation score experienced by people in multidimensional poverty, is 48.6 percent. The MPI which is the share of the population that is multi-dimensionally poor. It shows that income poverty only tells part of the story. The multidimensional poverty headcount is 10.0 percentage points lower than income poverty. This implies that individuals living below the income poverty line may have access to non-income resources. The contributions of deprivations in each dimension (education, health and living

[1] https://esa.un.org/unpd/wpp/Download/Standard/Population/
[2] World population review, 2017
[3] the total value of all the goods and services produced by a country in a year including income from foreign investments, divided by the number of people living there
[4] African Economic Outlook, 2017. http://www.africaneconomicoutlook.org/en/country-notes/zambia
[5] MPI, identifies multiple overlapping deprivations suffered by households in 3 dimensions: education, health and living standards with specific indicators for each aspect

standards) to overall poverty complete a comprehensive picture of people living in multidimensional poverty in Zambia (UNDP, 2016).

Zambia's economy came under strain in 2015 and 2016 due to external constraints and domestic pressures. The Gross domestic product (GDP) grew at 2.8% in 2015 and 3.3% in 2016, much slower than the average 7.4% between 2004 and 2014. The external challenges included slower regional and global growth and lower global copper prices. Domestic pressures included power outages that intensified from mid-2015 to the end of 2016, impacting all sectors of the economy. Continuous fiscal deficits have also weighed on investor confidence, and low and poorly-timed rains led to reduction in agricultural income for the poorest Zambians and increased food prices in 2015 (World Bank, 2017). GDP growth is forecast to remain close to 3.0% in 2016, before improving in 2017 (4.2%) and again in 2018 (5.0%). For 2016, this assumes new power generation capacity comes on line and a better harvest is achieved. Despite the current slowdown, long-term investment in mineral and non-mineral sectors in Zambia remains attractive[6]. It is estimated that the impact of climate change will cost Zambia approximately 0.4 percent of annual economic growth. According to the Seventh National Development Plan (7NDP) 2017-2021 It is estimated that without action, rainfall variability alone could lead to losses of 0.9 percent of GDP growth over the next decade, thereby keeping a significant section of Zambia's population below the poverty line.

Climate-induced changes to physical and biological systems are already exerting considerable stress on the country's vulnerable sectors. Agriculture and food security, wildlife, forestry, water and energy, health and infrastructure have been adversely impacted, thereby affecting the economic, social, and environmental dimensions of sustainable development efforts. Forests are currently under threat from deforestation, a drawback to climate change mitigation. Between 1990 and 2000, Zambia had the highest rate of deforestation (851, 000 ha) in Southern Africa, which alone accounted for almost half the deforestation in the Southern African Development Community (SADC) region (Makano, 2011).

The fall in the country's hydro-power generation in the recent period by about 600 MW is mainly attributed to poor rainfall patterns. The lower supply of electricity has hampered growth prospects of Zambia's productive sectors of the economy, including agriculture, manufacturing, mining and services. Other adverse effects have led to increased costs of treating climate-related diseases such as malaria and the loss of natural environments, damage to infrastructure and disruption of biodiversity. Climate change adaptation and mitigation will, therefore, promote social wellbeing, including better health, growth of the economy and at the same time reduce environmental risks, such as shortage of water, air pollution and other effects.

The recently approved Seventh National Development Plan (7NDP) 2017-2021 departs from sectoral-based planning to an integrated (multi-sectoral) development approach under the theme "Accelerating development efforts towards the Vision 2030 without leaving anyone behind". The integrated approach recognises the multi-faceted and interlinked nature of sustainable development which calls for interventions to be tackled simultaneously through a coordinated approach to implementing development programmes. The new approach aims at dealing with the impact of the slow and fragile global growth prospects and domestic challenges, such as vulnerability to external shocks, and climate change effects. The goal of the 7NDP is to create a diversified and resilient economy for sustained growth and socio-economic transformation driven, among others, by agriculture.

[6] http://www.africaneconomicoutlook.org/en/country-notes/zambia accessed on 08/08/2017

2.0 Current and future Climate scenarios in Zambia

Zambia has a tropical climate, temperatures remain relatively cool throughout the year due the high altitudes of the East African Plateau. The highest seasonal temperatures are reached in the hot, dry September, October and November (SON) (22-27°C), and coolest in the winter months June, July and August (JJA) (15-20°C). The hot summer months are very dry, receiving almost no rainfall between June and August. Rainfall in Zambia is also strongly influenced by the El Niño Southern Oscillation (ENSO), which causes further inter-annual variability. El Niño conditions (warm phase) bring drier than average conditions in the wet summer months of December, January and February (DJF) in the southern half of the country, whilst the north of the country simultaneously experiences significantly wetter-than average conditions. The reverse pattern occurs with La Niña (cold phase) episodes, with dry conditions in the north and wet conditions in the south. Zambia was one of the countries in Africa most severely affected by the 1997/1998 El Niño event, suffering flooding due to abnormally persistent and heavy rainfall in the north, as well as near-drought conditions in the south (McSweeney et al, 2010)

2.1. Current Climate Trends[7]

Temperature

Zambia's Mean annual temperature has increased by 1.3°C since 1960, an average rate of 0.29°C per decade. The rate of increase is most rapid in the winter, at 0.34°C per decade. The average number of hot days[8] and hot nights per year in Zambia have increased while the frequency of cold days[9] and nights have decreased significantly since 1960 in all seasons.

Precipitation

The mean annual rainfall over Zambia has decreased by an average rate of 1.9mm per month (2.3%) per decade since 1960. This annual decrease is largely due to decreases in DJF rainfall, which has decreased by 7.1mm per month (3.5%) per decade. Daily precipitation observations show some indication of reductions in the contribution of heavy events to total rainfall, and the magnitude of maximum 1- and 5-day rainfalls, but none of these trends are statistically significant.

2.2. Future Climate projections

Temperature

The mean annual temperature is projected to increase by between 1.2 to 3.4°C by the 2060s, and between 1.6 to 5.5°C by the 2090s The range of temperature provided reflects global greenhouse gas emission trajectories, should emissions be substantially reduced in the near future, temperature increase will be less. However, should emissions continue to rise, or be maintained, higher temperatures will result. The projected rate of warming is a little more rapid in the southern and western regions of Zambia than the northern and eastern regions. All projections indicate substantial increases in the frequency of days and nights that are considered 'hot' in current climate.

[7] McSweeney, C., et al 2008. http://country-rofiles.geog.ox.ac.uk/index.html?country=Zambia&d1=Reports

[8] Hot' day or 'hot' night is defined by the temperature exceeded on 10% of days or nights in current climate of that region and season.

[9] Cold' days or 'cold' nights are defined as the temperature below which 10% of days or nights are recorded in current climate of that region or season.

Annually, projections indicate that 'hot' days are projected to occur on 15-29% of days by the 2060s, and 16-49% of days by the 2090s. Days considered 'hot' by current climate standards for their season are projected to occur 22-80% of days by the 2090s. Nights that are considered 'hot' for the annual climate of 1970-99 are projected to increase more quickly than hot days, occurring on 26-54% of nights by the 2060s and 30-80% of nights by the 2090s. All projections indicate decreases in the frequency of days and nights that are considered 'cold' in current climate.

Zambia's climate outlook by 2060

- Erratic precipitation, less rain
- General drying trend, with uncertainty of onset of the rainy and dry seasons.
- Likelihood of changes in patterns and extremes
- General rainfall events will tend to become less frequent, while more intense rainfall events, separated by a large number of dry days, will tend to become more frequent
- The proportion of total rainfall coming from extreme precipitation events is expected to increase

Gannon et al, 2014.

Precipitation

Projections of mean rainfall do not indicate large changes in annual rainfall. Seasonally, the range of projections from different models is large, but ensemble indicate decreases in September, October & November (SON) rainfall (-39 to +14% by 2090) and increases in December, January and February (DJF) rainfall (-11 to +15%), particularly in the north-east of the country. The proportion of total rainfall that falls in heavy events is projected to increase annually, but mainly in DJF and March, April & May (MAM).

2.3. Green House Gas (GHG) Emissions for Zambia

According to the World Resources Institute (WRI) CAIT climate data explorer for Zambia[10] for the years 1990-2013, latest emission values excluding Land Use Change and Forestry (LUCF) were 50.10 % with per capita GHG emissions of 3.29 tCO_2e presenting 20.56% absolute Change from earliest emission values(1990) to the latest value(2013). Total emissions values including LUCF were at 390.17% with per capita emissions of 25.59 tCO_2e and 1.78% as absolute change from earliest to latest value. The contributions by sector (emissions per capita) are from LUCF (22.31 tCO_2), Energy (1.59 tCO_2e), Agriculture (1.52 tCO_2e), waste (0.14 tCO_2e) and industrial processes (0.04 tCO_2e)

The predominance of emissions from LUCF suggests that the greatest opportunities for mitigation exist in this sector and that national mitigation efforts should place a strong focus on this area. The Indaba Agricultural Policy Research Institute (IAPRI) estimates that 2/3 of urban residents rely on charcoal for cooking, and a recent scoping study by CIFOR on the charcoal and timber trade in Zambia observes that in the absence of alternative energy sources, charcoal demand and production will increase in tandem with the country's rapid urbanisation rate.

[10] http://cait.wri.org/profile/Zambia

Zambia's National Policy on Climate Change 2016 recognises that deforestation rates are high, estimated at between 250,000 and 300,000 hectares per annum, and lists the principal causes as charcoal and firewood consumption; timber production; unsustainable agricultural methods such as shifting cultivation; and other land use practices. However, it places limited emphasis on the contribution of deforestation and forest degradation to national GHG emissions, and does not explicitly link them to potential alterations in the country's hydrology and consequent impact on water availability.[11]

The country's Intended Nationally Determined Contribution (INDC), 2015 commits to make significant emission reduction through implementation of the prioritised actions, and aims to provide leadership in the region through a set target of 47% emission reductions, with 2010 being the base year. The country's INDC is guided by the desire to reduce poverty, attainment of low carbon climate resilient economy and sustainable development. The country is committed to meeting its obligations under the Convention by implementing ambitious mitigation and adaptation programmes across the prioritized sectors, however this will be dependent on the level of external support received to implement the plans, in addition to local resources that will be available.

2.4. Zambia's climate and weather information generation and management

The Zambia Meteorology Department (ZMD) is under the Ministry of Transport and Communication, and has 41 manual weather stations and 68 automated weather stations covering all 10 provinces but only present in half of the 105 districts. The ZMD network is supplemented by other networks operated by institutions such as the Zambian Electricity Supply Corporation (ZESCO), and new initiatives such as the southern African Science Service Centre for Climate Change and Adaptive Land Use (SASSCAL). Some of this data is available to researchers through global station data archives such as the Global Historical Climatology Network. However, for many stations, publicly available records end in the late 1990s or early 2000s, which limits analysis of recent variability and trends. Given the limit in distribution of weather equipment, coupled with the divergence of the country in terms of topography and micro climates, the accuracy of the weather forecasts generated is estimated to be between 60-65%.

The products produced by ZMD include; Seasonal Weather Forecast, Crop Weather Bulletins, Daily Weather Forecast, Climate Databank services (Data supplied on request), Seven-Day Weather Forecast, T.V. Weather Reports and Forecast, Flash Floods Forecast, Climate variability and Climate Change Adaptation Awareness messages (Television and Radio), Aviation services and Early Warning Systems on severe weather such as droughts, floods and flash floods. The products are disseminated to users through radios, Television, email, Newspapers and the ZMD website. Dissemination is also done through community based dissemination programmes where communication of weather and climate information to rural communities is done for sustainable development.

The department is also making efforts to ensure that the weather information reaches the local users through support to community radio stations which transmit within a radius of 60km. In Southern province agriculture region, farmer clubs were formed to access information through drama and the department supports defining of terminologies and simplifying them into usable formats despite the challenge with language barrier which affects dissemination. Forecasts are also provided to community radios and there is an emailing list which targets ministries. However,

[11] The coordination of climate finance in Zambia, 2014

more work is required in dissemination of weather and climate information at the local level, particularly to those who may not be in possession of a radio.

The key users/sectors of weather and climate information include; aviation, Agriculture, Water resource management, Education and Research, Health, Buildings and Civil Engineering, Disaster Management, Insurance, Commerce and industry, Tourism and Sports. The products and warnings are used for planning and management purpose.

There are specific projects to enhance weather and climate information in Zambia, key is the Pilot Programme for Climate resilience (PPCR). Zambia's National Climate Change Secretariat which is the coordinating body for all climate change activities signed a Memorandum of understanding with the Disaster Management and Mitigation Unit (DMMU) to manage the PPCRs Climate Information component. The DMMU is working in collaboration with the Zambia Meteorology Department ZMD, Department of Water Affairs and Min of Agriculture in implementing this component. A programme has been underway to undertake a Social Marketing campaign in all pilot areas of the PPCR to increase awareness and encourage active involvement in implementing climate resilient options and promote two-way-early-warning systems.

The UK Department for International Development (DFID) and the Natural Envir onment Research Council (NERC) developed a research program to advance the scientific understanding of Sub Saharan African climate on decadal timescales and, working with African stakeholders, to bring this science into use to inform long term climate resilient development strategies. The new program, entitled "Future Climate for Africa" (FCFA) aims to produce and enhance the availability and accessibility, and demonstrate the use of robust and 'decision relevant' climate information products to inform climate resilient investment, policy and strategies across sub Saharan Africa, Zambia inclusive.

Gaps in generating weather and climate information

The Zambia Meteorology Department is very key in climate risk management and providing weather and climate information, however, the climate change policy and institutional framework does not include it in the key functions. This indicates the level of importance placed on climate and weather information which should be key in informing any decision making and planning for adaptation. The NCCRS 2010 in the SWOT analysis for institutional governance rightly noted that the Meteorology Department is perceived as "scientific" and is low in the government hierarchy since it's just a department, and furthermore, within a lowly-ranked ministry of Transport and Communication. It is important for the Government to engage the Meteorology Department as well as strengthening climate and weather services in the country to improve early warning and informed decision making for better climate risk management

Lack of locally generated climate change projections despite coordinated efforts to develop downscaling in Southern Africa was identified as a problem. A lack of long term, extensive, and complete observed data in the region limits the ability of statistical downscaling to be used and so most efforts are focused on the use of dynamical downscaling models. The most significant recent effort in this context is the World Climate Research Programme (WCRP) Coordinated Regional Climate Downscaling Experiment (CORDEX), which has coordinated some dynamical downscaling simulations and analyses from which data are beginning to become available. However there is

still the need to broaden this activity, to undertake comprehensive evaluations of these data sets and to understand their applicability[12].

In terms of weather equipment and data, there are Inadequate Station Network Density for country coverage and some of the meteorological and telecommunication equipment is obsolete. It was also noted that there is missing data in the climate datasets, making it difficult to predict in the long term. Inadequate facilities for effective data processing and dissemination also hamper access and utilisation of information by users, which is enhances by insufficient information on user needs so that the advisories are tailored to the needs of the communities to foster planning and decision making.

In Zambia, there is no evidence that climate science is being used directly to inform decisions relevant to longer term planning It was clear that experience of floods and droughts within the country coupled with messages received about projected future increases in these hazards should provide a basis to include future climate trends in developing strategies and plans. However there is little evidence of these being implemented, which is the point at which more detailed climate information is required. At the district or city scale, no relevant climate change information is available and the detailed implementation of measures would need to be accompanied by scientific research including the application of high resolution modelling. There is no evidence if decisions on long term timescales informed the generation of climate related research agendas, potentially revealing that one had little influence on the other (Koelle, B., et al, 2014)

Established Feedback mechanisms from the communities to the ZMD and back are lacking to ensure that the most vulnerable communities are able to access and use tailored climate and weather information. The flow of information continues to be mostly dominated by unidirectional approaches from producers to users. There is also lack of local expertise in regional climate processes and model interpretation, as well as limited access to existing climate information from external research organizations, generally increasing uncertainty among local decision makers and stakeholders. More local participation in the development and analysis of information would positively result in action to adapting to projected climate change.

There is need to start from the accurate and reliable information point then focus on integration of climate change adaptation into development informed by climate data. There is also need to support generation, packaging and interpretation and dissemination of information which is still low given the size of the country and the capacity gaps in the department.[13] Climate change has the potential to impact negatively on almost all sectors of the economy, particularly in developing countries, thereby reducing development effectiveness and impeding economic progress and development. Climate risk management through use of weather and climate information for planning and decision making will be key in keeping development on track.

[12] CDKN & **Red Cross Red Crescent Climate Centre, 2014**

[13] www.zmd.gov.zm

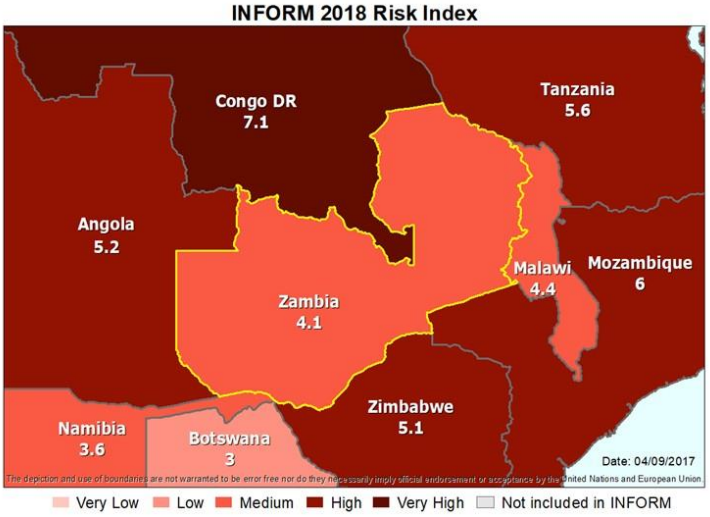
3.0. Climate Hazards, Impacts and Vulnerability

El Nino induced drought episodes are increasingly common in southern Africa. For Zambia, based on historical records of El Nino events, the southern half of the country is usually prone to drier conditions (NCCRS, 2010). The negative impacts of droughts are felt most by those dependent on climate sensitive economic activities, such as rain-fed agriculture, for their sustenance. Erratic rainfall also has significant impacts on Zambia, especially on farming and human settlements. Floods and droughts have increased in frequency over the past three decades, costing the nation an estimated 0.4% in annual economic growth[14]. Climate change impacts will have negative impacts on different sectors and increase vulnerability of the categories of the population who are already vulnerable.

3.1. Climate change and Extreme Events/Disasters

Drought, flooding, extreme temperatures and prolonged dry spells are threatening rural livelihoods through crop failures and degraded food and water security systems. In the last two decades, yields for crops such as maize have been severely affected by extreme drought, flooding and rainfall deficits (NAPA 2007). Climate variability undermines attempts to reduce poverty and food insecurity, since most of Zambia's poor population consists of rural small-scale farmers who rely on agricultural incomes.

Zambian society, with 70 per cent of the workforce dependent upon agriculture (World Bank, 2014) and a large portion of the country in the floodplains of the River Zambezi, is highly vulnerable to variability in precipitation, across multiple timescales. Floods are common and affect many sectors; droughts can also be devastating and have prolonged side effects on large populations. Both hazards have become more frequent and severe of recent. Historically, Zambia has been prone to extreme rainfall events resulting in widespread flooding. Typical impacts from floods include: collapsed houses and buildings, destruction of infrastructure (roads, sanitation facilities etc), waterlogged agricultural fields, destruction of crops, contaminated water supplies and an increase in human diseases (Koelle, et al, 2014; USAID, 2012)



According to the United Nations Office for Disaster Risk Reduction (UNISDR) Index for Risk Management (INFORM)[15] statistics for 2018, out of 191 countries, Zambia ranks as the 81st most at risk country, the 131st in terms of hazard and exposure, the 43rd in terms of vulnerability and the 54th in terms of lack of coping capacity. The INFORM model adopts the three aspects of vulnerability reflected in the UNISDR definition. The report

[14]Economic Assessment of the Impacts of Climate Change in Zambia

[15] http://www.inform-index.org/Countries/Country-profiles/iso3/BIH

shows that Zambia is more exposed to floods with low risk to droughts and conflict. Vulnerability scores are high for social economic aspects, inequality especially for vulnerable groups and effects on development. Lack of coping capacity is more pronounced for the communication, Governance, physical infrastructure and health.

Studies have identified vulnerable categories who include women-headed households, the Elderly, the disabled and those taking care of HIV/AIDS-orphans. Single or divorced male-headed households and children are also highly vulnerable due to malnutrition. When hit with floods or droughts, vulnerable households cope by reducing food or essential expenditures (health, education etc). They also increase their level of indebtedness and rely further on casual labor. However, this is mostly food-for-work which is similarly impacted by changes in weather. Many traditional coping mechanisms like indigenous early warning are no longer working due to climate and weather variability which has affected the prediction indicators. Climate change will also increase gender inequality due to the different vulnerabilities of men and women

Climate risk management and access to accurate and reliable weather and climate information will be useful to strengthen early warning and support informed decision making and planning for uncertainty so as to reduce the impact of climate related hazards and disasters.

3.2. Climate change Impacts and Vulnerability

Zambia's Socio-Economic Statistics

Population 2015[16]: 16,101,000

Total Fertility Rate 2015[17]; 5.28 children/woman

GDP per capita, PPP[18] (international $) 2016: 3,922.335

HDI 2015: 139 out of 188 [19]

Gender Inequality Index 2015; 124 out of 159 [20]

Vulnerability Rank 2015; 133 out of 178 countries[21]

Climate Risk Index (CRI)[22] 2015[23]; 66 out of 187 countries

According to the ND-GAIN Index 2016, Zambia ranks 138th out of 178 countries. The ND-GAIN Country Index summarizes a country's vulnerability to climate change and other global challenges

[16] UN World Population Prospects, 2017. https://esa.un.org/unpd/wpp/Download/Standard/Population/

[17] http://data.worldbank.org/indicator/SP.DYN.TFRT.IN

[18] World Bank Data – GDP per capita, PPP http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD

[19] UNDP 2016; Human development Index report for 2015. http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/ZMB.pdf

[20] http://hdr.undp.org/en/composite/GII

[21] ND GAIN country index - http://index.gain.org/ accessed 18/08/2017

[22] The CRI indicates a level of exposure & vulnerability to extreme events, which countries should understand as warnings in order to be prepared for more frequent and/or more severe events in the future

[23] https://germanwatch.org/en/12978

in combination with its readiness to improve resilience. It aims to help governments, businesses and communities better prioritize investments for a more efficient response to the immediate global challenges ahead. In terms of vulnerability and readiness assessment, Zambia was ranked as highly vulnerable with low readiness which calls for a great need for investment and innovations to improve readiness and a great urgency for action. Zambia is the 37th most vulnerable country and the 60th least ready country. Vulnerability measures the exposure, sensitivity, and ability to cope with climate related hazards as well as accounting for the overall status of food, water, environment, health and infrastructure within a country. From the statistics for 1996 - 2016, there is a high negative trend in terms of vulnerability in relation to food and food import dependency, population changes, projected changes in cereal yields, reduced agriculture capacity and dependency on imported energy. Readiness targets those portions of the economy, governance and society that affect the speed and efficiency of adaptation. Regarding future climate change, the Climate Risk Index may serve as a red flag for already existing vulnerability that may further increase in regions where extreme events will become more frequent or more severe due to climate change.[24] According the ND GAIN readiness statistics, Zambia has recorded worst scores in social readiness especially in the education and innovation.

The DARA Vulnerability Index (2010) places Zambia in the 'acute' category in terms of multi-dimensional climate vulnerability, and indicates that this is increasing. Zambia sits in the bottom quintile in terms of risk preparation, and also among the countries with the highest poverty risk in 2030 (World Bank, 2013). This assessment is based on the Index of Risk Preparation developed for the 'Managing Risk for Development', World Development Report 2014; and on a Poverty Risk measure developed by ODI (ODI, 2013).

3.2.1. Climate change Impacts on Agriculture, Food security and Nutrition

Agriculture

According to the 7NDP 2017-2021, agriculture sector is the fourth largest contributor to GDP (8.7 percent) and the largest contributor to employment. The sector is critical for achieving diversification, economic growth and poverty reduction in Zambia. The majority of farmers almost 98% can be classified as small scale farmers whose agricultural activities are almost 100% dependent on rainfall. This makes the agriculture sector extremely vulnerable to rain fall patterns which have become more unpredictable under climate change (NAPA 2007; Phiri et al 2013). Agriculture annual GDP growth rate has been reduced by at least 1 percentage, and by over 2 percentage during the worst rainfall scenario. This will greatly reduce Zambia's chances of achieving the national development goal of strengthening agricultural and rural income growth.[25] In the absence of adaptation, rainfall variability alone could keep an additional 300,000 people below the poverty line over the next decade.[26]

Climate change related losses in agriculture are expected to amount to US$ 2,200– 3,130 million over the next 10-20 years. Increases in rainfall may result in waterlogged agricultural fields, destruction of crops (in both pre- and post-harvest), contaminated water supplies and increases in incidence of crop and livestock disease. Reductions in rainfall are likely to reduce water availability for both crops and livestock and also affect the quantity and quality of pastures. In places where rainfall quantity does not change significantly, there may still be changes in season onset and cessation that could negatively affect the production of key crops, including maize, cassava and

[24] German Watch, 2016
[25] IFPRI, 2009. The Impact of Climate Variability and Change on Economic Growth and Poverty in Zambia
[26] ttps://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR%208%20SPCR%20Zambia.pdf

millet. The International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT) was used to further analyse the effects of climate change on agriculture in Zambia over the period 2020-2050[27]. Another assessment took into account three parameters, namely net trade, crop area (or livestock numbers), and yields, for scenarios with and without climate change.[28] Results suggest that Zambia may become more dependent on imports of major agricultural commodities, with the exception of cotton and groundnut, whose exports are expected to increase in the period up to 2050. Exports are expected to be lower and imports higher for almost all crops under the climate change scenario than under the no climate change scenario.

Livestock production also largely dependents on rainfall. The country's high rainfall variability and limited irrigation capacity make the sector vulnerable to climate change. The rising frequency of drought and shorter rainy seasons as well as high temperatures may also degrade grazing land and lead to loss of livestock, with negative consequences for food security, loss of income and loss of livestock. Cattle, for instance, have reduced in numbers due to the increased temperatures and the lack of food and water. The reduced cattle population will also directly affect the farmers that depend on them for productivity[29]. The impacts of climate change on animal numbers is anticipated to vary with animal type, but are not expected to be significantly different under both the climate change and no climate change scenarios. Poultry and lamb production are projected to be less by 0.17% and 0.28% under climate change, compared to a no climate change scenario. Pig production is projected to increase by 0.26% under the climate change scenario. Projections indicate that cattle and milk production will not be substantially affected.[30]

The 7th National development plan notes the increasing demand for livestock products, which provides the opportunity for diversification within the agriculture sector. Diversification within the agriculture sector will be central in improving productivity, providing inputs to agro-processing and the manufacturing sector, for increased contribution to foreign exchange earnings and resilience to emerging challenges, as rains become more erratic and less predictable due to climate change

While Zambia has been considered a leader in promoting CA in Sub-Saharan Africa, adoption of the practice by smallholders has been generally low and characterized by partial adoption as well as high dis-adoption rates of up to 95% of farmers in some locations. The use of low and laborious technologies (such as hand hoes), limited availability of labour-saving equipment and limited knowledge and capacity of farmers to maintain the practices after initial support, are some of the drivers of low adoption and high dis-adoption rates. Additionally, farmers usually have to wait for multiple seasons to reap the benefits of the practice, and in some land holdings, crop residues are valued more for animal feed rather than for soil cover, making the investment less attractive to smallholders[31]. Zambia's farmers also lack the capacity, resources and financial assistance to adapt to and overcome worsening climatic conditions. Majority of the small holder farmers depend on less than two hectares of land. With very little infrastructure for water collection, many farms lack irrigation systems and rely solely on rain-fed agriculture, rendering them particularly vulnerable to variations in climatic conditions and to predicted climate change. To further aggravate the situation, poverty is endemic among small-scale farmers, with an incidence of 84% (UNDP and GoZ, 2010). Small holder farmers will therefore be more vulnerable to food insecurity, malnutrition and economic losses.

[27] The International Model for Policy Analysis of Agricultural Commodities and Trade (IMPACT): IFPRI Discussion Paper, International Food Policy Research Institute

[28] Rural Agricultural Livelihoods Survey 2015.

[29] IFPRI discussion paper 2009

[30] CIAT and World Bank, 2017. Climate-Smart Agriculture in Zambia

[31] The conundrum of conservation agriculture and livelihoods in Southern Africa. African Journal of Agricultural Research 6(24), pp. 5520-5528

Integrating climate smart techniques is necessary to buffer against natural shocks, such as droughts and the weakening of seed and animal varieties due to the impact of climate change. Agro-diversification and development will thus be based on comparative and competitive advantages in line with the Government's Green Revolution agenda. In an effort to adapt and mitigate the effects of climate change on the agriculture sector, the Government is focusing on promoting the adoption of agricultural environment-friendly practices (climate smart and organic techniques,) such as conservation farming, crop rotation, less use of chemical fertiliser and creating public awareness on the adverse effects of climate change. Furthermore, since climate change has increased the frequency and intensity of disasters, the 7NDP has proposed strategies and programmes to aid communities to adapt to its effects through climate proofing their livelihoods, production and assets.

Food Security and Nutrition

National food security in Zambia is reliant on a few staple crops, particularly maize. This crop is produced mostly by smallholders under rain fed conditions which make households and national food security vulnerable to weather variability and climate change related hazards such as temperature increases, changes in rainfall patterns and drought. Zambia is fairly stable in terms of national food security status, particularly in reference to availability and access to staple grains such as maize. The country has experienced excess production of grain in the past five years, being a net exporter of maize to surrounding countries and selling some to organizations who buy the grain to support their emergency food assistance programs in sub-Saharan Africa, such as the World Food Programme (WFP).

Source; *CIAT and World Bank, 2017*

However, there are still geographical and socioeconomic pockets of people who suffer from food insecurity and malnutrition. According to the World Bank, 2017, nearly half of the population (48.9%) is undernourished, while 15% and 6% of children under age of five are underweight and stunted, respectively. Food insecurity remains particularly high in southern parts of the country, which have been affected by prolonged droughts and poor agricultural production in 2016. According to the FAO 2017 country brief, factors contributing to food insecurity include price volatility (driven by inflation) and input and output markets. HIV/AIDS prevalence also contributes to a reduction in household productivity and income.

3.2.2. Climate Change Impacts on Health

Impacts of climate change are also affecting the health of vulnerable populations in Zambia. Climate changes are predicted to increase mortality levels associated with climate-sensitive diseases. Health in general will also be affected by climate hazards in terms of heat stress caused by the rising temperatures, increase in water borne diseases and malnutrition due to insufficient

food. Climate-sensitive diseases that have persistently increased mortality and morbidity rates in urban and rural Zambia include malaria, diarrhea, cholera, and respiratory infections, with malaria having the highest rate of incidence. In light of increases in heavy rainfall events and rising temperatures, both of which facilitate mosquito breeding, the spread of malaria is of particular concern. Increases and changes in geographic coverage and survival of mosquito populations may expose more of the Zambian population, including some that previously may not have been exposed to the disease. Floods are expected to have effects as water recedes and stagnates, causing favourable environments for mosquitoes, which will in turn transmit more diseases. Floods also became an important factor leading to water contamination, due to the increased pit-latrines collapses and other similar hazards leading to cholera outbreaks (USAID, 2012; ODI, 2013).

The outbreak in water borne diseases (cholera and dysentery) is a result of Zambians' dependence on surface water for drinking; these sources may become contaminated after a flood. This is a particular concern in areas where pit latrines are commonplace. An example of a recent disaster is the April 2010 floods, which hit Lusaka, resulting in 3,381 cases of cholera and 87 deaths (IFRC, 2010). A recent study on cholera in Lusaka, Zambia found that outbreaks were strongly associated with the quantity of precipitation, with increased precipitation linked to greater occurrence of cholera. Poor drainage systems, contaminated water, and lack of access to potable water also contribute to cholera and diarrhea outbreaks. Non-climate stresses, such as inadequate health care facilities and providers, high poverty levels, poor water supply and sanitation, food insecurity, and poor nutrition, exacerbate the impacts of climate change on public health. Zambia's high rate of HIV/AIDS places further strain on individual health and livelihoods, the provision of public health services, and food demand, as the disease raises the nutritional requirements of those affected, increasing the need for food, even as climate change impacts increase pressure on crop yields and livestock[32]

3.2.3. Climate change Impacts Natural Resources

Water resources

In terms of water resources, Zambia has a relatively abundant supply of surface water and groundwater. However, surface water is unevenly distributed throughout the country, and the southern region often experiences water shortages. During drought periods and following declines in precipitation, there have been reductions in the flow and volume of rivers, streams, and lakes, which have affected the accessibility and availability of surface water and groundwater for drinking, agriculture, livestock rearing, other human activities, and fisheries. Reduced access and availability of water resources also impact hydroelectric power in Zambia.

With rising temperatures, the rate of evapotranspiration - the transfer of water from the earth's surface into the atmosphere can increase. In addition, Zambia has experienced increases in heavy rainfall and flooding events in recent years, which can increase siltation of water sources, and carry pollutants such as fertilizer and chemicals, contaminating water sources and exacerbating health and sanitation problems. Non-climate stresses affecting water resources include pollution from mining, industries, and households; inadequate sanitation facilities, particularly in cities; and increased demand for water sources for household, agricultural, and industrial use.

According to the World Bank report, 2016[33], firms across the country have suffered higher costs of production in 2015, linked to the onset of the power crisis. The cause of the power crisis was the reduction in hydroelectric generation due to low water levels at the country's main reservoirs.

[32] https://www.climatelinks.org/sites/default/files/asset/document/zambia_adaptation_fact_sheet_feb2012.pdf
[33] World Bank, 2016. Powering the Zambian Economy

To reduce the adverse impact of the power deficit on the economy, the government started importing expensive emergency power in the latter part of 2015. The 2015 power crisis continues to cast its shadow over the wider economy, with the sector declining by more than 16% in 2016. The power situation is only expected to significantly improve from mid-2019 once water in the main reservoirs has been replenished and the Kafue Gorge Lower Dam is completed in 2021.

The 7NDP acknowledges the negative effects of climate on Zambia's water resources availability, mainly due to inadequate water resources infrastructure and notes that the country's national water resources reservoir storage capacity is far much lower compared to other countries in the region. As a result of low water resources storage capacity, the country continues to experience low water levels causing load shedding of electricity, consequently adversely affecting production. According to a report by the Indaba Agricultural Policy Research Institute, economy-wide annual losses due to load shedding in Zambia amount to K32.5 billion (representing 18.8 percent of GDP) while losses to the agriculture sector are estimated at K2.83 billion (representing 1.6 percent of GDP). These losses are likely to stifle future economic growth. Furthermore, increasing water resources reservoir storage capacity plays a critical role in flood control and disaster management. In 2005, flash floods affected the Kafue Gorge power station disrupting power generation for over two weeks, thereby affecting economic growth. The 7NDP 2017-2021 has put in place strategies to manage the challenges with a view to increasing availability of water resources. These include; developing water resources infrastructure through construction of small, medium to large dams to meet various water needs particularly for domestic, agriculture and hydropower generation. Increasing water resources availability through increased storage will in the long run mitigate the impact of climate change and help to build resilience. These initiatives will also serve rural communities, thus supporting productive use of water and livelihoods and increasing resilience to the adverse effects of climate change, such as floods and droughts.

Impacts on Energy

Zambia has been negatively affected by droughts and floods. Due to the dependency of the water and energy sector on hydro-electricity power (e.g. Kariba dam and Kafue gorge), the droughts led to reduction in hydropower generation with significant economic reduction in the power potential.[34]Similarly, the country has been negatively affected by floods, primarily impacting infrastructure. In 2005, a mudslide event caused $1.66 million (USD) in losses to the Kafue Gorge Upper plant, including: loss of power revenue of $1.0 million USD and labor, civil works costs, and electrical and mechanical materials (IFC, 2011)

Zambia's demand for electricity stood at 1,949 megawatts (MW) in 2015. However, the sector was only able to produce 1,281 MW thus giving a deficit of 668 MW. This situation resulted from limited investment over the years, which was also compounded by non-cost-reflective tariffs. Further, the deficit was exacerbated by the effects of climate change on the availability of water, considering that Zambia was highly dependent on hydro-power. The current projections indicate that growth in demand will increase by 150 MW to 200 MW per annum. The peak demand for electricity in the country is projected at 3,000 MW by 2020. Government commits to promote protection and improvement of catchment areas, to protect recharge zones and river sources.[35] However, in the short term, challenges of meeting the energy needs remain.

Government's recent response to reduce the power deficit, was to import expensive emergency power in the latter part of 2015 which helped boost the supply of electricity, but in turn increased the level of the government subsidy to the power sector, as power tariffs have not been increased

[34] https://www.esmap.org/sites/esmap.org/files/DocumentLibrary/O1_Country_Dashboard_Zambia.pdf
[35] Africa Economic Outlook 2017 – Zambia

to reflect the increased cost, and hence placed greater pressure on the budget. With no increase in tariffs and the need to pay for emergency power, the government's electricity subsidy has increased since mid-2015. It is estimated that Zambia Electricity Supply Corporation (ZESCO) faced a shortfall of at least US$300 million in 2016 in order to meet the cost of emergency power imports and generation by independent power producers in Zambia who are expected to commission a plant in 2017. While late rains in the 2015-16 season have helped replenish reservoirs, it is likely that power will need to be imported into 2017 (World Back 2016; Engbo, et al, 2017).

According to the Climate Change and Energy Vulnerability Country dashboard 2012, Zambia's energy system has the greatest adaptation urgency due to the combination of high physical vulnerability to climate change through reliance on water, need for supply efficiency, and contribution to hydropower supply. The country has a strong need for assistance to build adaptive capacity, define and implement adaptation measures to reduce vulnerability to climate change impacts, and exploit opportunities within the country's energy system. Currently the country is challenged by low levels of investment, low energy assets and infrastructure, strong reliance on one form of power generation, low availability of good quality data on observed climate, climate-related hazards among other challenges.

Forestry

Climate change poses a significant threat to the forestry sector within Zambia. Forests account for approximately 16 percent of the country's land area and they provide habitats for the nation's extensive wildlife, which are an important attraction for foreign tourists. For example, the regeneration of the Miombo Woodland, which usually occurs relatively rapidly, has already been hampered by drought and excessive temperatures. Over 80% of Zambian households rely on the Miombo Woodland for charcoal and fuel wood and it is vital that their use of the woodlands is rapidly curtailed in order to manage for lower precipitation levels and to avoid unsustainable harvesting of the woodlands[36]. The negative effects of climate change within Zambia will be will worsen the current unsustainable land-use practises including the clearing of forests for agriculture and charcoal production amongst other practises.

Zambia's grasslands and forests are of ecological, economic, and social importance, especially for rural populations. Predicted warmer temperatures, drought, and declines in precipitation may lead to a loss of vegetation and soil degradation, higher incidence of forest fires, and introduction of a range of pests and pathogens which can impact tree growth and survival. More intense rainfall and flooding events also lead to increased soil erosion[37]. Non-climate stresses that further exacerbate the effects of climate change on forests and grasslands include increasing demand for fuel wood and charcoal for cooking, clearing of forest land for agricultural expansion, greater demand for timber, and unsustainable land use practices.

3.2.4. Economic Impacts of Climate change

Generally climate change will affect economic growth of Zambia. The findings from the economy wide modelling assessment suggest that climate variability has a pronounced negative effect on economic growth. It is estimated that, on average, climate variability reduces Zambia's GDP growth rate by 0.4 percentage points per year, which costs the country US$4.3 billion over a 10-year period. These losses reach as high as US$7.1 billion under Zambia's worst rainfall scenario. Negative impacts of climate change are observed on key economic sectors including water,

[36] Zambia National Adaptation Programme of Action, September 2007.
[37] IFPRI, 2009; Discussion Paper

agriculture, forestry, wildlife, tourism, mining, energy, infrastructure and health. The aggregated estimated total GDP loss by sector was in the range of USD 4,330-5,440 million with the following sector GDP losses: Agriculture (2,200 – 3,130), Energy related (270 – 450), Health (460), and Natural Resources (1,400).

Over the last three decades, floods and droughts cost Zambia more than US$13.8 billion in disaster losses, which is equivalent to a 0.4 percent loss in annual economic growth. Currently, apart from emergency response to disasters and promoting integrated early warning strategies, disaster risk reduction is being enhanced through partnerships with key stakeholders who have contributed in reducing the impact of disasters. The issue of food security is important and the threats of floods, drought, cattle diseases, low agricultural technologies, refugees and internally displaced persons will be reduced through mainstreaming of disaster risk reduction in all key sectors of the economy. Furthermore, since climate change has increased the frequency and intensity of disasters, the 7NDP commits to put in place strategies that aid affected communities to adapt to its effects through climate proofing their livelihoods, production and assets.[38]

According to the World Bank 2016 economic report, the agricultural sector declined by 7.7% in 2015 compared to a growth of 8.0% in 2014, harming rural households' income. This was on account of low and poorly distributed rains during the 2014-15 season. Maize production fell by 21.9% in 2015, contributing to increased food inflation of 26.5% in April 2016 (year-on-year), up from 8.1% in September 2015. The situation was expected to improve in 2016 but subject to favourable weather conditions. Food inflation has been the key driver of the sharp increase in overall inflation since October 2015. Food inflation has continued to rise due to multiple factors including weather conditions which impact crop production and the supply of food, especially maize meal (the staple food). The other factor, which is also applicable to maize, are price controls (the Food Reserve Agency buys, stocks and sells maize to selected millers) and another factor is the increase in exports due to increase in food prices in the region. The cost of food has also been attributes to the increase in the use of generators during the power crisis and often their rent is indexed to the US$, which has therefore increased as the kwacha has lost value. There have also been large shifts in the prices of particular food items and goods. The CSO[39] reports that between April 2015 and April 2016, national average prices for the following goods have increased by over 30%: Roller mealie meal (30%); maize grain (35%); tomatoes (114%); onions (38%); dried beans (30%); sugar (35%); table salt (37%); and hammer mill charges (45%). Climate change will continue to impact agriculture and food prices if measures are not put in place to address climate risks across sectors of the economy.

3.2.5. Climate change and Gender inequality

According to Zambia's Human Development report for 2016, the Gender Inequality Index (GII) value for 2015 was 0.526, ranking it 124 out of 159 countries. The GII can be interpreted as the loss in human development due to inequality between female and male achievements in the three GII dimensions of reproductive health, empowerment, and economic activity. Zambia's low ranking of 124/159 is because only 12.7 per cent of parliamentary seats in Zambia are held by women, and that only 25.8 per cent of adult women have achieved some level of secondary schooling – compared with 44.0 per cent of their male counterparts. Moreover, for every 100,000 live births, 280 women die from pregnancy related causes, while the adolescent birth rate is 125.4 births per 1000 live births. Female participation in the labour market is also lower among women (73.1 per cent) compared to men (85.6 per cent). Arising from these factors, Zambia has a higher

[38] 7NDP, 2017-2021
[39] Central Statistical Office (2016), 'Monthly Bulletin', April 2016.

gender inequality than the average in Sub- Saharan Africa and other medium human development countries. Despite an improvement in this index over the decade, it is obvious that Zambia remains highly inequitable in its gender-based achievements (UNDP, 2016). Climate change is likely to worsen inequalities, given that the impacts are not gender neutral, and women are already projected as vulnerable.

Climate change impacts are not evenly distributed because vulnerable groups are likely to be worst affected as they have the least means to stand against climate change challenges and to reduce their vulnerability. There is evidence that women, children and female headed households are particularly more vulnerable to climate change impacts due to limited access to resources, including physical resources like land, social resources such as networks, and financial resources like income-generating work and credit. In addition, the differences in the social roles, responsibilities, skills, knowledge and benefits of men and women, boys and girls in the society also determine their vulnerability. Zambian women have fewer decision-making positions compared to men at all levels and remain the worst victims of the country's high unemployment and poverty. Women also have differentiated access to credit, technology, land and extension services, which constrain agricultural productivity and other economic activities (GoZ[40], 2010; 7NDP, 2017-2021; Nelson, 2011)

Most Vulnerable Categories in Zambia

- Small-to-medium scale subsistence farmers
- Urban low-cost households
- Female headed households
- Poor Women
- Older household heads above the age of 65
- Large household size
- Unemployed and unpaid family workers
- Children, adolescents and youth
- Migrants and refugees

UN- Zambia Country Analysis (2015)

The 7NDP 2017-2021 commits to promote gender equality by facilitating organisational transformation to enhance responsiveness in all dimensions. To achieve this, the Government will enhance capacity for gender mainstreaming and engender policies, plans, programmes, projects, activities and budgets by coordinating and monitoring implementation of the National Gender Policy. In line with SDG 5, the 7NDP commits to provide women and girls with equal access to education, health care, decent work and representation in political and economic decision-making processes and will focus on collaboration and use of a holistic multi-sectoral approach in tackling the problem of the inequality gap by scaling-up women's economic empowerment programmes as well as affirmative action for women, gender mainstreaming and promotion of girl-child education. Despite the policy commitments, it is yet to be seen how gender equality will be achieved in practice.

Generally, gender inequalities exist in all societies and shape the ways in which climate change impacts are distributed. Recognizing the capacities and vulnerabilities of women and men, boys and girls will result in different adaptation options tailored to their needs. Women tend to be more reliant on climate sensitive resources and have lesser adaptive capacity because of the gendered nature of resource entitlements and benefits, but they also have invaluable indigenous knowledge on their environment which can be harnessed to increase their adaptive capacity. It is important to focus on poor women and men as agents of change rather than victims.

[40] Zambia's National Climate Change Response Strategy (NCCRS) 2010

4.0 Zambia's Climate Change Policy Framework

Zambia has put in place climate relevant policies and strategies which include the National Adaptation Plan of Action (NAPA) 2007, Intended Nationally Determined Contribution (INDC), 2015, National climate change response strategy, 2010 and the national policy on climate change 2016. There are other policies and sectoral strategies that contribute to environment, climate change adaptation and mitigation, including the National Policy on Environment (NPE, 2007); National Forestry Policy of 2014; National Energy Policy of 2008, The National Agriculture Policy of 2014 and Transport Policy of 2002; National Strategy for Reducing Emissions from Deforestation and Forest Degradation (REDD+, 2015); Second National Biodiversity Strategy and Action Plan (NBSAP2); Technology Needs Assessment (TNA, 2013); Nationally Appropriate Mitigation Actions (NAMAs, 2014); Second National Communication (SNC, 2015). However some of the additional policies focus more on environment leaning towards mitigation and less on adaptation. This is despite the fact that adaptation is a key developmental issue/challenge for a developing country such as Zambia. There are still policy gaps at sectoral level to enable integration of climate change adaptation as a cross cutting issue.

4.1. Key Climate change policy priorities

Policy Name	Policy Priorities
National policy on climate change 2016	Vision a "prosperous and climate resilient economy by 2030" Focuses on the principle of resilience building as an integral part of the development process Policy objectives; • Strengthening implementation of adaptation and DRR measures to reduce vulnerability to CC • Promote and implement sustainable land use management practices – reducing GHGs from land use and land use change and Forestry • Mainstreaming of climate change into policies, plans and strategies – assessment of risks and opportunities in decision making and implementation • Strengthening institutional and HR capacity – efficiency and effectiveness at all levels • To promote communication and dissemination of climate change information to enhance awareness and understanding of its impacts • Promote Investment in climate resilient and low carbon development pathways • Foster research and development for informed decision making in regard to CC response • To engender climate change programmes and activities to enhance gender equality and equity in the implementation of climate change programmes • Develop and promote appropriate technologies & build national capacity to benefit from CC technology transfer
Nationally Determined Contribution 2015	**Mitigation;** Sustainable Forest Management, Sustainable Agriculture and Renewable Energy and Energy Efficiency. **Adaptation;** Adaptation of strategic productive systems (agriculture, forests, wildlife and water); Adaptation of strategic infrastructure and health systems; and Enhanced capacity building, research, technology transfer and finance. The NDC has a 2030 focus with the budget estimated at $50B for both mitigation (USD 35 billion for domestic efforts with substantial International support) and adaptation (USD 20 billion) actions across the programs up to 2030. Of this, USD

	15 billion will be unconditional support provided by the Zambian Government and USD 35 billion will be conditional support to be sourced externally The government is in the process of preparing an implementation plan. CDKN is doing capacity building for NDC. Zambia has also applied to join the NDC partnership and are in the process of being approved
National Climate Change Response Strategy (NCCRS), 2010	**Adaptation and Disaster Risk Reduction-** Priority sectors for adaptation based on their economic vulnerability and national development priorities include; Agriculture, food security, fisheries, water, forestry, wildlife, health, mining, tourism, human settlements, and physical infrastructure. **Mitigation and Low Carbon Development -** mitigation actions are implemented in the most GHG-intensive sectors &using low carbon pathways – land use, energy, transport & mining sectors **Cross- Cutting Issues -** capacity building; research & development; technology development and transfer; climate change communication, education and awareness; Gender and HIV Aids., **Governance of Climate Change;** climate change activities' coordinating institutions, policy formulation **Finance and Investment Framework;** additional financial resources to implement the proposed actions.
The National Adaptation Programme of Action (NAPA) 2007	The NAPA identified four sectors are the most vulnerable to climate change impacts which include; Agriculture, Water and energy, Natural Resources (forests and wildlife); and Human health. Key activities include; -Improving Early Warning System to facilitate timely dissemination of weather information -Promoting better land and critical habitat management. - Diversifying crops and livestock to improve nutrition and food Security. - Promoting alternative sources of livelihood to reduce Vulnerability to climate change - Enhancing water management to withstand erratic rains through water harvesting, water conservation, and small-scale irrigation. - Renovating and rehabilitating existing health infrastructure. - Climate-proofing sanitation in urban areas.

4.1.1. NDC Implementation progress

Zambia's first NDC includes both adaptation and mitigation actions with a goal of achieving its contribution by 2030. A total emission reduction of 47% against a 2010 base year is targeted. Like many other countries, Zambia is now faced with the challenge of implementing the NDC. CDKN and its partners – Ricardo and Africa Development and Investment (ADI) – are providing technical support to enable the country to move towards implementation. The NDC Quick-Start Guide has therefore been used to guide the development of an NDC Implementation Plan to support implementation of the Paris Agreement. The NDC Quick-Start Guide has three steps: Preparatory Work; Developing the NDC implementation plan; and Delivering the NDC implementation plan. These steps are supported by five modules: Mitigation, Adaptation, Governance, Finance and Measurement, Reporting and Verification (MRV).

4.1.2. Progress on National Adaption Plan (NAP)

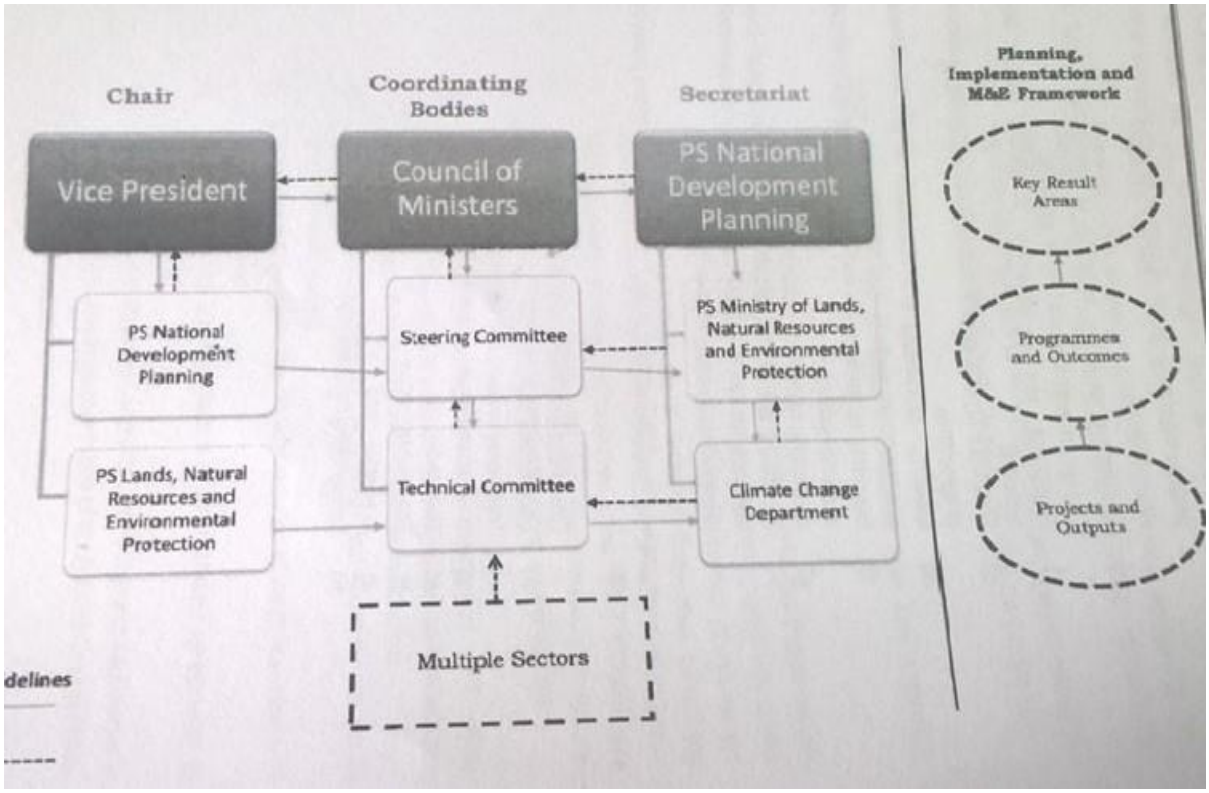
The Government of Zambia has not yet developed the NAP, though an initial stakeholder engagement to introduce the NAP has been conducted. The government has approached the Global water partnership and UNDP to support access to the readiness fund. However, the ministries of health and agriculture are working on their sectoral NAPs, with support from UNDP. There is also a plan to initiate NAPS for water and energy, which will all inform the National NAP when the funds are available to start on the national process

4.2. Institutional Coordination for climate change in Zambia

The United Nations Framework Convention on Climate Change (UNFCCC) has described institutional arrangements with regard to adaptation as the 'structures, approaches, practices, or rules, set in place by stakeholders at all levels to steer adaptation action including for: assessing impacts, vulnerability and risks, planning for adaptation, implementation of adaptation measures, and monitoring and evaluation' (UNFCCC Adaptation Committee, 2014).

In Zambia, there are key ministries and entities responsible for climate change coordination, policy formulation and providing over sight roles, as illustrated in the figure below;

Climate change institutional arrangements[41]



The council of Ministers

The council of misters is the supreme decision making body for overseeing climate change interventions in the country, with a similar arrangement as the council of ministers responsible for disaster management as provided for in the Disaster Management Act no. 13 of 2010. The vice

[41] National Policy on Climate Change 2016

president shall be the chair and the permanent secretary from the ministry of National Development planning shall be the secretariat for the council of ministers. Some of the roles of the council of ministers will be to; provide policy guidance on mainstreaming climate change at all levels, guidance on Monitoring and Evaluation (M&E) reports from implementing entities, guidance on resource mobilisation, guiding the steering committee and ensuring that climate change programmes are complementary and result in sustained positive impact on the national economy.

Steering committee of Permanent Secretaries (PS)

The steering committee is the main advisory body of the council of ministers on policy and programme coordination and implementation. It is chaired by the PS Ministry of National Development Planning is the chair. The committee's composition includes PSs from all ministries. The PS ministry of environment and natural resources is the secretariat to the steering committee. Key responsibilities include; overseeing development or revision of appropriate policies and legislation, oversee development of an implementation, M&E and reporting on the plan, reporting on programme progress and agreements to the council of ministers.

Ministry of lands, Natural Resources and Environment protection

This is the lead institution in overseeing implementation of the climate policy and reports to the steering committee of PSs. There is a technical committee comprised of technical staff from different ministries chaired by the PS Ministry of lands, Natural Resources and Environment protection. Key roles include; reviewing policies and legislation in line with the climate change policy, collaboration on policy implementation, M&E of policy implementation, coordinate international agreements on climate change, report to the steering committee on implementation of climate change policy

Ministry of National development Planning

The ministry will be responsible for overall coordination and oversight and mainstreaming of climate change into the national development planning processes. Key responsibilities include; facilitating mainstreaming in all sectors including private sector and not state actors, monitoring and evaluating overall implementation, supporting resource mobilisation initiative for climate change in the country oversee the implementation of the climate change mainstreaming strategy, report to the council of ministers on progress.

Ministry of finance

The ministry of finance is responsible for resource mobilisation and will provide policy guidance on the same. They will facilitate the acquisition of resources for climate change programmes through innovative financial instruments and report to the committee of PSs on progress made on resource mobilisation for the country.

Disaster Management and Mitigation Unit

The Disaster Management and Mitigation Unit (DMMU) under the Office of the Vice President will be responsible for development and implementation of climate change related disaster preparedness and response programming as well as conducting comprehensive national vulnerability assessments and risk mapping. DMMU will also ensure that there is effective institutional coordination structures and good governance on DRR and climate change and report to the steering committee of PSs of issues of DRR and climate change.

Climate change Department

A department for climate change is planned to be established and it will take over functions of interim climate change secretariat and will be under the ministry of lands and environment, charged with implementation of climate actions in collaboration with the Ministry for national Development Planning. Key roles will include; facilitating implementation of all climate change programmes, capacity building in all institutions and agencies, strengthening climate change information systems, providing technical backstopping on climate change programmes, monitoring implementation across sectors, reporting to Government and other stakeholders, facilitating climate change research, education, public awareness and will report to the technical committee on the implementation of climate change programmes.

The above institutional arrangements are new stipulated under the national Policy on Climate Change 2016 and still under implementation. However, there is a national technical committee on climate change, and the climate change adaptation committee which DMMU chairs. There is also a disaster management coordination unit with clear coordination guidelines, and a DRR platform for early warning systems coordination and news which brings together all sectors. At the sub national level, there are provincial development coordination committees, with district and satellite committees at village level. There is also concerted effort in assessment of risks and disasters, where annual contingency plans and coordination response is generated. The SADC conducts joint assessments with all stakeholders to come up with regional vulnerability synthesis reports and there are SADC vulnerability committees in place to support this process. The reports are further informed by the National Vulnerability Assessment Committee (NVAC) reports which are presented at the Regional Vulnerability Assessment and Analysis (RVAA) Annual dissemination Forums.

4.3. Policy and Institutional Gaps for Climate Change Mainstreaming

Whereas the policies are in place, climate change is not well integrated into other key national policies and programmes. The revised second 6th national development plan did not adequately integrate climate change though it was recognised as an important development issue that is affecting other sectors. It was only covered under the water sector, with an indicator on the number of climate change adaptation projects implemented and also under DRR under strengthening capacity for disaster risk reduction including climate change related disasters.

There is need to harmonise the country priorities for adaptation and mitigation across the different policies and strategies linked to the global frameworks. Discussions with the climate change coordination secretariat[42] noted the high demands for putting in place many instruments, which is a challenge given the resources constraints, capacity and planning timeframes. The UNFCCC requirements over the years including the NAPA, the NAP, the INDC, then the NDC plus other communications and reporting requirements put a strain on the constrained capacities of Government to address all the needs. There are also national priorities including the National Development Plans (NDP), Visioning documents and other sector investment plans. Also emerging are the different requirements to access global climate financing, which are most times lacking for most Least Developed Countries. The balance between these requirements and the national priorities require harmonised focus which requires strong leadership and governance in terms of planning and coordination.

[42] Irish Aid, 2017. Back to Office report

Capacity building for the coordinating and implementing entities in climate governance will be very key. Whereas efforts have been made in the past to build capacity at different levels, the established institutions, committees and different sectors engaged in implementation will require capacity building for better mainstreaming of climate change in their specific action plans, strategies and budgets from community to national level. There is also need to strengthen government capacity to access global funds including the Global Climate Change Fund[43]. UNDP is currently working with Government to access the funds, but for sustainability purposes, the Government should also be working towards getting accredited for direct access to climate finance in the long term.

The Government planning structures are important for the success of mainstreaming climate change into development planning. The Government of Zambia is still grappling with issues of decentralization but in practice, most of the operations are currently centralized. According to the Ministerial statement on the status of the preparation of the seventh National Development Plan 2017-2021[44], the bottom up approach entails consultations that start at the district level, through the district development coordination committees (DDCCs), then proceed to Provincial Development Coordination Committees (PDCCs) and subsequently reaching the Sector Advisory Groups (SAGs). The major focus of the bottom up is the identification of growth areas in the districts and key recommendations to stimulate economic growth and poverty reduction in the country and ensure ownership of the plan by the people. The views and recommendations from the districts and provincial consultations are synthesised with those of the SAGs including the NDP that all advisory groups including the national development coordinating committees are not only active but repositioned and institutions for accelerating implementation of the development programmes to be contained in the plan. However, sectoral planning still prevails and with limited implementation of plans by the sub national level structures, which affects sustainability and engagement of communities in local adaptation planning

There are efforts to mainstream climate change into some ministries and 14 pilot districts under PPCR II. Despite the efforts by the unit, it was explained that ownership of policies by different sectors is hard since most of the work is done in one department which does not have powers to compel others to comply. Integrated sectoral planning for climate change will therefore be key. The current delivery of climate change programmes is sector based and not integrated in local development processes holistically. This makes structural integration of climate change into development plans at the local level difficult and ends up creating standalone projects in different sectors, compromising sustainability across government planning[45].

Whereas there is an M&E framework for tracking the results of adaptation projects in Zambia under the PPCR, there is need for a national climate change monitoring and evaluation framework which will aid measuring of impact from the sub national to the national level across different sectors. The reporting process should inform the country on the levels of climate risk, capacity, impact and reduction in vulnerability and increases resilience of people and systems to climate impacts. The current framework is projectised and sectoral thus not able to measure national changes and contributions of climate change adaptation to resilient economic growth.

[43] Irish Aid Zambia climate change capacity needs assessment notes
[44] Minister of National Development Planning, ministerial statement of the status of 7NDP preparation, 2016
[45] Irish Aid back BTOR, May 2017

5.0. Climate change financing for Zambia[46]

Zambia has continued to mobilise both the public and private climate finance flows and other related flows for mitigation, adaptation, technology transfer, capacity building and policy development. The sources of climate change finance in Zambia are alienated into five areas: government's national budgets, sources that contribute to national budget, dependent on national decisions, sources that contribute to the national budget dependent on international agreements. A number of studies have indicated that Zambia has been successful in accessing some of the dedicated climate finance available from the public and the private portfolios. However, tracking climate finance inflows is very complicated for a number of reasons, which include poor alignment of international sources with national development objectives, fragmented policies and procedures on climate change management, knowledge management issues and oversights in the national budget process. The other feature which makes climate change finance tracking complicated are politically driven development initiatives, rationalised within the premise of the significance of locally based development but which are not objectively defined development priorities. (Mulenga, 2013; ODI, 2012)

While public climate change inflows are growing at an average rate of 2.1%, private climate change inflows have been growing at 0.4% per year in the last three years. From a macroeconomic perspective, investments policy in Zambia has been effective at raising Foreign Direct Investments (FDI), as measured by tax/GDP ratios. The 18% percent tax/GDP ratio, which has been maintained over the past three years, is among the highest rates in Southern Africa Development Cooperation (SADC) regional. Total private climate change finance inflows in the form of FDI, 2009 to 2011 amounted to US$ 2,3million, 89% of which came through FDI and 10% philanthropy. Of the entire climate finance inflows to Zambia, by far the largest source has been public inflows, with 97% of inflows.

A number of local and international NGOs, as well as government departments and agencies have received funding from philanthropic contributions. The philanthropic contributions to Zambia between 2009 and 2011 have been 0.03% of all the climate finance received, which given the number of projects supported by philanthropic contribution, the 0.03% contribution is a gross underestimation. This is because the system and methodology for capturing the philanthropic contribution are not systematic and are not well coordinated. Out of the US$ 235 million of philanthropic contribution, 1% went to government and the rest went to other organisations. In most cases very little is known about receiving organisations and purposes, be it for climate-related activities or more broadly in climate-relevant sectors. The contributions identified are directed to water and sanitation projects and the distribution of agriculture inputs in drought and flooded area of Zambia. In Zambia, there are over 200 on-going adaptation projects supported by philanthropic resource. The financing type for those contributions is purely grants.

[46] Information gathered from review of climate finance reports for Zambiathese reports; ODI, 2012. Climate Finance Readiness Report for Southern Africa; GIZ, 2013. Understanding Climate Finance Readiness Needs in Zambia; Mulenga, 2013. Tracking of Public and Private Climate Finance Inflows to Zambia

Principal institutions involved in managing climate-related investments[47]

The Office of the Vice-President (OVP); Disaster Management and Mitigation Unit (DMMU is responsible for mobilizing and managing resources for disaster response and rehabilitation. Although charged with responding to all types of disasters, those arising from climate variability make up the bulk of its work.

The Ministry of Finance (MoF) is responsible for managing the national budget process, and is the conduit for all international climate-related financial inflows. It is also the main anchoring point for the Zambia's largest donor-funded climate change programme; the PPCR. The Ministry of Finance captures records and reports on all the public climate financial inflows, Official Development Assistance and the public inflows that come into the national government. In 2004 GRZ entered in an agreement on the establishment of the Internet Based Database and Aid Management IT unit to track aid flow into the country. The Zambia Development and Assistance Database (ZDAD) is an aid management system for use in national development and reconstruction environment that strengthens the effectiveness and transparency of international assistance.

The Ministry of Lands, Natural Resources and Environmental Protection (MLNREP) is the institution responsible for natural resource management, land administration and forestry, it receives the bulk of donor support for such activities including REDD+ funding. The largest sector allocation for 'mainstreamed' climate change programmes from the national budget over the period 2007-2012 is estimated to have gone to Agriculture. In addition it has received substantial climate-related donor funding

The Ministry of Transport, Works, Supply and Communication (MTWSC) is charged with overseeing the construction and maintenance of public facilities (road, rail, air and waterway transport; public buildings such as schools, offices, health and housing; ICT and meteorological equipment), the bulk of public infrastructure finance passes through this Ministry. The high priority being accorded to infrastructure development in Zambia has resulted in MTWSC's budget allocation for 2014 rising by 37.5% relative to 2013. Important bodies falling under this Ministry are the National Road Fund Agency (NRFA), the Road Development Agency (RDA), and the Zambia Meteorological Department (ZMD).

The Ministry of Local Government and Housing (MLGH) is the lead ministry for the implementation of the Decentralisation Policy aimed at enhancing the capacity of sub-national government, and devolving responsibilities as well as budget allocations. Likely to be instrumental in enhancing access of sub-national government structures to climate finance. Responsible for the Constituency Development Fund that disburses funds to districts for rehabilitation and maintenance of such local infrastructure as secondary roads, water and sanitation facilities, and community-based health and education facilities

Financing

There are about 40 active partners and organisations supporting climate change in Zambia including development partners, bilateral donors, banks, and civil society organisations. Some of the key commitments to climate financing are as follows;[48]

[47] Information gathered from review of climate finance reports for Zambia, which include; ODI, 2012. Climate Finance Readiness Report for Southern Africa; GIZ, 2013. Understanding Climate Finance Readiness Needs in Zambia; Mulenga, 2013. Tracking of Public and Private Climate Finance Inflows to Zambia

[48] http://www.znccs.org.zm/?page_id=632 accessed on 19/05/2017

Funding agency	Projects	Amount
IBRD[49] (CIF)	The Zambia Strengthening Climate Resilience (Phase II) Project	US$37 million Expected Co-Financing ($US M): 63.1
ADB (CIF)	Strengthening Climate Resilience in the Kafue River Basin -Agriculture and landscape management	CIF Funding ($US M): 39 Expected Co-Financing ($US M): 40.0
IBRD (CIF)	Scaling Up of Renewable Energies Program (SREP)	$194 million (approved) ($1.2 billion in co-financing expected form from other sources)
DFID	Climate smart agriculture and clean energy, estimated	$ 20.0M
Germany	Integrated Hydro-Met Information System	$11.0M
CGIAR	World Fish (Fisheries and Agriculture Support through CGIAR Centres)	$12.7M
NDF	Climate-Resilient Infrastructure Standards	$15.4M
Others (bilateral, civil society, private sector)	Various projects	$5.1M
NORDIC Development Fund	Developing Of Climate-Resilient Infrastructure Standards And Codes	€4.0 million
UNDP	Supporting Zambia to integrate the agricultural sectors into National Adaptation Plans (NAPs)	USD 700,000

Zambia has benefited from the Pilot Program for Climate Resilience (PPCR) which is in the second phase. Zambia's PPCR strategic program was designed under the leadership of the government in coordination with the African Development Bank (AfDB), members of the World Bank Group (IBRD, IFC), other development partners, and key Zambian stakeholders. The strategic program is expected to leverage an additional US$115 million in public and private sector co-financing for targeted investments to enhance the resilience of key infrastructure, scale-up and sustain replicable investments at the local level, and serve as a catalyst for behavioral change and increased engagement among communities, policymakers, and the private sector[50]

5.1. Ireland's Contribution to Climate Finance

Ireland has made significant progress in delivery and tracking of climate finance for developing countries in recent years. Recently, the Adaptation Finance Transparency Gap Report published by 'Adaptation Watch' in October 2016, ranked Ireland as second among developed countries in terms of climate finance transparency in reporting to the UNFCCC. In terms of financing, the climate finance mapping exercise identified a total of €35,201,946 in bilateral climate finance disbursements in 2016, an increase of 8.43% on the 2015 total of €32,464,410. Of the total, €26,771,296 in bilateral climate finance was spent on adaptation activities in 2016 representing over 18% increase over adaptation expenditure in 2015. Mitigation relevant expenditure was €1,254,725 in bilateral support in 2016.[51]

[49] WBG,IDB,EB,ADBG

[50] https://www.climateinvestmentfunds.org/country/zambia accessed on 19/05/2017

[51] Irish Aid, 2017; UNFCCC Reporting and Climate Finance Mapping 2016-2017

Much of this expenditure was on activities that had climate adaptation benefits in the agriculture sector and building resilience in regional rural economies as well as supporting nutrition and food security. The funding, in many instances, also contributed to multiple objectives, in the areas of Biodiversity and Desertification as well as Disaster Risk Reduction, Capacity Building, Technology Transfer, and Forestry in the different key partner countries

An examination of the funding provided to Civil Society programme partners in 2016 identified approximately €19,618,479 million in expenditure on climate and environment related activities. Irish Aid contributions to multi-lateral climate change funds and specialised UN bodies in 2016 amounted to €2,169,000. Relevant contributions to other international bodies (multi-country: IIED, WRI & MRFCJ) amounted to €1,850,000. These results are set out in Section 3 of the report.

Ireland will continue to support climate mitigation and adaptation in developing countries in line with our commitments under the UNFCCC. Ireland's public climate finance will be predominantly provided through bilateral grants to Key Partner Countries through Irish Aid, Ireland's overseas development assistance programme, together with direct grant contributions to various multilateral institutions or funds, such as the GEF, GCF and LDCF. Ireland is currently exploring ways to mobilise private climate finance to support mitigation and adaptation in developing countries. A cross-departmental working group is being established to progress this work.

5.2. Ireland's Contribution to Climate Finance in Zambia

In 2016, Ireland provided a total of €1,110,000 to Zambia in climate finance through its bilateral aid programme. In addition, Ireland provided €1,249,200 in 2016 in climate finance to projects in Zambia through its civil society programme. Climate relevant expenditure provided by Irish Aid to civil society organizations in 2016 was Rio marked and accounted for systematically for the first time, in cooperation with the project partners. Projects and programmes funded by Irish Aid have a strong agricultural focus. Projects to improve livelihoods, address food insecurity and build resilience of small scale farmers continue to be undertaken in Northern Province. Civil Society partners Concern, Self Help Africa and Misean Cara are helping to build resilience to climate change by increasing smallholder skills and knowledge and engaging farmers in value chains and networks. Below is the summary of expenditure for 2016;

	Bilateral €	**Civil Society €**
Climate Finance Adaptation (UNFCCC)		1,249,200
Climate Finance Mitigation (UNFCCC)	0	0
Climate Finance Cross-cutting (UNFCCC)	1,110,000	0
Biodiversity (UNCBD	1,670,000	545,689
Desertification (UNCDD)	0	600,003
Disaster Risk Reduction (DRR)	835,000	N/A
Total Climate Finance	**1,110,000**	**1,249,200**

6.0. Donor coordination and support in Zambia

Zambia being declared a lower middle income country resulted in different responses from different donors. Some of the traditional Cooperating Partners like Netherlands and Denmark announced closure of their aid programmes in 2013 though they continued providing technical assistance during the exit period to allow time for the Government and donors to plan for the impact of reduced resources. Some have revised their country strategies, changing the working arrangements in Zambia. Official Development Assistance (ODA) overall has decreased from 5% in 2013 to 2.6% in 2015. A similar trend was recorded for sector/project budget support across different sectors.[52] Despite Zambia's sustained economic growth, at a rate of 6.0% in 2014, the country remains challenged to translate economic growth into significant poverty reduction and to improve livelihoods for the majority poor. There is also significant decline in adult mortality, maternal mortality, infant mortality and under-five mortality[53] and declining levels of inequality. All these factors will increase vulnerability to climate change impacts and affect responses

The Joint Assistance Strategy for Zambia (JASZ II) 2011−2015 is one of the frameworks that set out the Cooperating Partners' support to the Sixth national development Plan (SNDP) with a focus on economic diversification, reduction of rural poverty and inequality, human development, and provision of high-quality and cost-effective public services. The mutual Accountability Framework was signed between the donor community and the Zambian government in 2013. Monitoring of development results is however challenged by weak national data collection and monitoring systems

There is a development partners working group on environment and climate change chaired by the Embassy of Finland. The donor working group shares information and focus areas of implementation to avoid duplication. They review ToRs from Government and work together to develop joint reviews and positions on policies which are shared with Government. However, the chair reported that there is a lapse due to global impacts especially Brexit, and change of governments for example the United States and Britain. It was also noted that basket funding is not working well due to challenges with balancing interests of individual donors especially those with large funds e.g. DFID, WB compared to donors with smaller budgets. There are also issues of governance and inadequate capacity on the side of government which is a challenge amidst different demands at various levels[54].

The UN continued to provide coordinated Technical Assistance, building systems for service delivery through a core set of 6 joint UN programmes on social protection, gender, HIV/AIDS, climate change, maternal and child health, and private sector and sustainable livelihoods. Based on lessons learned from the joint programming the UN in Zambia have developed a new UN Sustainable Development Partnership Framework 2016-2021 under three broad pillars; inclusive social development, environmentally sustainable and inclusive economic development and governance and participation. Climate change is not well articulated in the new framework but different UN agencies especially UNDP, FAO, WFP among others continue to contribute substantive support for climate change adaptation and mitigation in the country

[52] Irish Aid Zambia CSP MTR Results report
[53] Zambia Demographic Health Survey (ZDHS) 2014
[54] Irish AID BTOR, 2017;

7.0 Ireland's Approach to climate change Adaptation

Ireland's policy for International Development, 'One World, One Future', and the Foreign Policy, 'The Global Island', prioritises action to address climate change for the poorest people in developing countries. Ireland places particular attention on reducing vulnerability to climate change in Least Developed Countries, recognising the importance of community based and local adaptation to climate change.

Building resilience empowers countries, communities, institutions, women and men to anticipate, absorb, adapt to, or transform, shocks and stresses

Irish Aid, 2016.

Ireland is investing in building capacity of staff in Irish Aid and in partner countries (both government and civil society organisations), to integrate climate change into development programmes and projects and to improve tracking and accountability on climate finance at the programme planning, implementation and appraisal stage. A Climate Change and Development Learning Platform was launched with the assistance of the International Institute for Environment and Development (IIED) to facilitate the sharing of information and lessons between Irish Aid staff, climate and development experts, and partners in developing countries. The Climate Learning Platform documents local experiences and uses the learning to inform countries decisions when designing programmes to address climate change, with a particular focus on integrating climate change into development planning, adopting climate-smart technologies particularly in agriculture, better targeting, social protection systems to address climate vulnerability, developing smallholder household sustainable energy systems and addressing gender equality. The Climate Learning Platform can be accessed through the Irish Aid website and via www.climatelearningplatform.org

The Climate Change and Development Learning Platform

Irish Aid in partnership with International Institute for Environment and Development (IIED) host an organised Climate Change and Development Learning Platform which focuses on research and capacity building. The initiative provides evidence and capacity for key partner countries to mainstream climate change into Irish Aid country programmes as well as publishing guidance notes and briefs on priority Irish Aid focus areas. The platform also links country level experiences to international policy frameworks. Details of the climate change work in Zambia can be accessed on https://www.climatelearningplatform.org/key-partner-countries/Zambia

The climate change development and learning platform has also supported a Climate change case study in Zambia focusing on analysing Climate Resilience through Experiential Learning by farmers and supporting institutions. The objective of the study was to pilot and learn how climate considerations are integrated into agricultural practices of smallholder farmers in Mbala and Luwingu Districts. The above programmes led to increase in the percentage of vulnerable households diversifying farming systems, improved nutrition and food security, and the proportion of vulnerable households with improved access to market for their produce also increased.

7.1. Irish Aid Zambia's climate change programming

Irish Aid Country Strategy Paper (CSP) 2013-2017 noted that Zambia is vulnerable to the effects of climate change because of its geographic exposure, low incomes and dependence on subsistence farming, and the fact that a significant proportion of its population depend on climate-sensitive sectors such as agriculture and natural resources. It was also noted that poverty and vulnerability in Zambia is driven by interrelated factors including food insecurity, climate change, malnutrition, insecure livelihoods and ill-health. The percentage of land covered by forests in Zambia decreased from 66% in 1990, to 55.9% in 2007. Efforts to curb deforestation and regenerate forest cover are critical to ensuring a more sustainable use of the country's rich natural resource base and resilience to climate change shocks. Therefore, climate change was considered as a cross cutting issue and was integrated in the Northern Province programme to improve rural poor livelihoods and nutrition.

Climate Change, Livelihoods, Food security and Nutrition

The Government of Ireland's international development policy statement 'One world one future' puts emphasis on reduced hunger, and building resilience to achieve sustainable development and inclusive economic growth among others. To reach these goals there are seven priority areas for action for Irish Aid, three of which: (global hunger, climate change and development, trade and economic growth), have a bearing on livelihoods and food security. Irish Aid and IIED have developed a brief to guide Climate resilience and smallholder farming, which can be accessed on; https://www.climatelearningplatform.org/guidance-note-promoting-climate-resilient-agriculture-smallholder-farming

The Irish Aid Zambia CSP 2013-2017 recognises that poverty and vulnerability in Zambia are driven by a number of interrelated factors such as food insecurity, climate change, malnutrition, insecure livelihoods and ill-health. These factors all contribute to a vicious cycle in which each re-enforces the others. The strategy focuses on improving the livelihoods, health status, food and nutrition security of poor households with a particular focus on women and vulnerable groups. This is done at national and local levels. National level efforts are directed towards supporting the 'Scaling Up Nutrition 1,000 days' programme, which has been developed by the National Food and Nutrition Commission. The programme aims to scale up selected priority interventions in different sectors for which there is a global and national evidence base of cost effectiveness in reducing child stunting. Irish Aid provides support to the programme through the pooled SUN partnership fund.

At local level in Northern Province, Irish Aid aims to improve food and nutrition security in the two districts of Mbala and Luwingu, targeting vulnerable households, particularly female headed and those affected by HIV and AIDS. This includes interventions to improve crop productivity, diversification and marketing and enhancing nutrition and health education including sanitation, hygiene education and malaria prevention and control. Research, monitoring and lesson learning have been part of the component.

Social Protection and Climate Change

Irish Aid focuses on social protection as an important policy instrument in partner countries to reduce extreme poverty. Social protection shelters the poorest and most vulnerable from natural and man-made disasters, it increases and improves the involvement of poor women and men in economic activity, and it contributes to equity and social accountability. In particular Irish Aid recognises that social protection can contribute to building resilience, improving access to essential services, unlocking productive capacity, and promoting social cohesion. Priority is also given to appropriate and sustainable social protection programmes that address inequality by focusing on the very poorest households, women and children in particular, and improving their access to basic services.[55]

Why Focus on Social Protection?

Builds and prevents eroding of assets and capacities at individual, community and national levels by stresses and inequalities.

Relevant social protection tools, in particular well designed, delivered and targeted social cash transfers, can support poor people in building their resilience to stresses and develop less risky coping mechanisms

Social protection is relevant for humanitarian crises – the countries most in need of humanitarian assistance are often the same as those with most pressing needs for social protection.

An increase in social protection spending, through easing the income constraint, can have the knock-on effect of making spending in other sectors, such as health and education, more efficient

Irish Aid, 2017

The Government of the Republic of Zambia considers Social Protection as a key strategy to support economic growth, reduce poverty, and promote equity and human rights. Evidence from the Social Cash Transfers (SCT) impact studies show that the number of poor households with access to some form of income and able to cope with poverty have increased. The number of SCT beneficiary households experiencing food insecurity significantly reduced.

There is increased budgetary commitment by Government to SCT transfer programme. There is proposed future focus on school feeding programme, cash transfer and food security pack. The focus of the SCT is on the extreme poor and the food security pack provides for inputs and school bursaries for vulnerable children. The school feeding programme also targets drought prone areas and considers other poverty parameters.

Irish Aid Zambia is providing financial and technical support to the Ministry of Community Development, Mother and Child Health in rolling out the Zambia Social Protection Expansion Programme. Irish Aid will contribute to a pooled fund for UNICEF which is helping to strengthen the Ministry's capacity in delivering the cash transfers. Irish Aid is also supporting the development and implementation of an Impact Evaluation and Management Information System for the Programme. This will provide for systematic, statistically valid, comparable, regular, comprehensive and predictable monitoring and evaluation of activities, outputs, outcomes and impact through social cash transfer schemes in Zambia. Impact evaluations will be crucial to assess what model is most cost effective and has the most impact on poverty reduction. Financial and technical support is also provided to the Social Protection Platform. The Platform provides opportunities for civil society organisations to monitor Government and Donor policies and

[55] Irish Aid, 2017. Social Protection Strategy

practices in delivering social services, strengthen the voice of citizens and mobilise vulnerable people to demand their rights.

Education and Climate Change

Climate change impacts affect most aspects of children's development directly; whether on health, nutrition, food security, education or emotional and social wellbeing. It also overlaps with other development pressures at the local and household levels, such as rising food prices, spread of diseases and illnesses, and competition over scarce natural resources. The impacts on children from poor and vulnerable households are likely to be worse than those felt by comparatively well-off households.Many children fail to complete their education, deterred by poor school quality and persistent challenges caused by deepening poverty, gender inequities, location, emergency and conflict situations, HIV and AIDS, disabilities, chronic environmental degradation and climate related hazards. The United Nations Children's Fund (UNICEF)'s climate change and environment education child friendly schools manual[56] highlights the importance of mainstreaming environment and climate change in education.

The Irish Aid Zambia CSP 2013-2017 notes that the country has done well in improving access to schooling in recent years but more attention needs to be given to improving quality. A number of core barriers still affect access and these include: distance, cost, gender inequality and poverty. The poor are particularly vulnerable and less likely to access either pre or primary education. When compared with countries in the region, learning outcomes are below the international mean of 500 as measured by the Southern African Consortium on Measuring Educational Quality (SACMEQ). Irish Aid has played a critically important role in the education sector, especially as co-lead donor. In 2010/2011, Irish Aid led on the negotiations to strengthen PFM in the Ministry of Education Science and Vocational Training and Early Education (MESVTEE).

Irish Aid supports the Ministry of Education Science, Vocational Training and Early Education to deliver the Government plan for education – the National Implementation Framework which focuses on improving access to and quality of education for all children at all levels. Irish Aid pays particular attention to primary school level interventions to ensure access to quality education for vulnerable children. Complementing this work Irish Aid provides support to three Civil Society Organisations to enhance access to quality education for vulnerable children. This work includes advocacy on a number of priority issues – increased school safety, access to school for girls, roll out of the Government's support to community schools and delivery and monitoring of HIV and AIDS education in institutions of learning.

Recognising the climate change risks to the education sector, going forward, it's important to strengthen the linkages through climate risk screening for the education programmes in Zambia to identify the nexus between climate change and education. Climate change capacity and vulnerability assessment for schools and mapping disaster risk areas and context specific climate change adaptation issues to address would be useful. Studies to assess how climate change and disasters affect access and quality of education and how vulnerability to shocks and stresses in the community affect education programmes would be useful to devise a multi sectoral approach to reducing vulnerability and improving access and quality of education.

[56] UNICEF, 2009. United Nations Children's Fund, Actions for Children Issue 5: Quality education and child friendly schools, www.unicef.org/devpro/files/Actions_for_Children

Governance and Climate Change

An understanding of climate change as a global environmental and societal challenge is the central requirement of climate change governance. Addressing political economy barriers to climate change decision-making is critical to understand the political economic power structures, relationships and incentives of different actors and institutions. Solutions in the field of mitigation and adaptation to climate change can hardly be successful without an understanding of the structure of the problem. This requires collaborative and logical actions by participating stakeholders and policy-makers who shape mitigation and adaptation actions. This context of climate change governance refers not only to environment but other sectors including health, agriculture, education, among others, focusing on the socio-scientific dimensions of climate change. Furthermore, multi-sectoral governance approaches are required in the management of cross cutting issues. The integration of mitigation and adaptation issues in different sectors and polices is a central mechanism of climate change governance (Knieling and Filho, 2013)

A recent Organisation for Economic Cooperation and Development-Development Assistance Committee (OECD-DAC) study on Aid, Accountability and Democratic Governance emphasises the need for a systematic approach to institutional strengthening, as well as strategies to promote demand for change over time. Irish Aid Zambia supports an enabling environment for democratic processes and good governance with a particular focus on accountability to citizens at national, provincial, district and local level. The advocacy role of civil society is also strengthened through the Zambia Governance Foundation pooled fund which currently provides funding to 47 partners. In addition, support to three key civil society organisations is supported through partnership with GIZ. Selected civil society partners are also supported to implement targeted activities in line with the CSP Objectives. Irish Aid along with the UK, Sweden, and Denmark worked together to support the setting up the Zambian Governance Foundation (ZGF), a joint basket fund mainly supporting advocacy civil society organisations. Climate change can be included into these governance initiatives as a cross cutting theme to reduce vulnerability and increase resilience of vulnerable communities from the climate justice perspective.

Reducing vulnerability requires actions by all development partners, government structures, civil society organisations and the community. Given the fact that Zambia structures are in practice more centralised, an integrated approach is needed that links together local expertise and innovation with strategic guidance from the National government. The NCCRS 2010 emphasises mainstreaming of climate change into sector plans, which required coordinated response. There is need therefore to identify pathway for local and national governments to effectively co-operate in addressing climate change adaptation in a more systematic way. Some of the entry points could include information sharing and awareness raising on climate change; Strengthening institutions to respond to climate change; strengthen access and dissemination of weather and climate information for planning and decision making; support planning processes to integrate climate change and including climate change in the Parliamentary interactions so that integration into social protection and education is supported through parliamentary discussions.

Gender and climate change

The Government of Zambia has a gender policy framework in place; the anti-Gender Based Violence Act, the Gender Equality Bill that has been drafted and the gender policy which was revised and launched in 2014. Despite the existence of the policies, gender equality challenges such as feminisation of poverty, high drop out of girls in schools especially at secondary level and significant absence of women in key decision making positions remain. In addition, GBV rates

have remained high, at 43%, increasing the vulnerability of women[57]. Despite the drop in HIV prevalence rates, women remain disproportionately more affected than men.

Ireland's policy priority areas are mainstreamed throughout the programme and gender inequality issues are addressed by focusing on activities that strengthen women's participation in development processes, promote equal access to education, and ensure greater social protection. Addressing good governance also focus on strengthening the role of civil society advocacy for pro-poor policy, improved access to services and greater accountability. Irish Aid also monitors Public Financial Management reform closely. Gender results based planning continues to be integrated within the programme to help improve women's participation in decision making and accountability processes. Irish Aid also supports women's economic empowerment by working with smallholder women farmers especially female headed households. Irish Aid will commit to support one UN Joint programme with focus on addressing Gender Based Violence.

Gender Mainstreaming – what does it involve?

- Understanding the policy environment – what is the legislative and institutional context?
- Consulting men and women, boys and girls; special care must be taken to ensure that women's and girls' needs are articulated
- Assessing gender differences and inequalities in roles, responsibilities, needs, constraints and access to opportunities and resources.
- Disaggregating data by sex
- Setting explicit gender equality objectives
- Developing gender equality indicators to measure progress
- Supporting gender sensitive monitoring and evaluation systems
- Drawing together good practice and lessons learned and sharing these with partners
- Building alliances with likeminded partners and encouraging coordination
- Promoting positive images of women and men and avoiding stereotypes
- Using gender sensitive language in all communications

Irish Aid, 2004

The 5th Assessment Report of the Intergovernmental Panel on Climate Change cited robust evidence for increased or heightened gender inequality as a result of weather events and climate-related disasters intertwined with socioeconomic, institutional, cultural, and political drivers that perpetuate differential vulnerabilities (UNFCCC, 2016). It will be important therefore for the mission to assess climate responsiveness for the Strategy objectives and linkages with gender equality and plan to conduct a gender analysis and assess the political economic, social and institutional landscape to reduce vulnerability of women and men, boys and girls to the impacts of climate change across the programmes.

[57] Irish Aid Zambia MRT results report 2015

8.0 Climate Change Implications for Country Development Programming

- ✓ Likelihood of increases in the intensity and frequency of disasters (droughts, floods) due to projected climate variability reinforced by El nino conditions. Focus on the nexus between climate change, disaster risk reduction, humanitarian response and development will be key in reducing vulnerability and building resilience and sustainable development.

- ✓ GDP losses due to climate change is likely to increase thus reversing economic development gains. There is need to therefore focus on inclusive economic models that can increase incomes for the poor.

- ✓ Decrease in agriculture production and productivity will lead to serious negative impacts on food security and nutrition which is already a challenge. Climate risk management and strengthening of food systems approaches will be important across all development programmes to improve food security, nutrition, but also enhance economic development for the poor.

- ✓ Poverty and Inequality will most likely increase. Poor and vulnerable households will become more vulnerable, food insecure and will continue spending their little incomes on buying food and managing risks and shocks. Integration of climate change, disaster risk reduction and social protection mechanisms into development programmes will be important to make sure that the impacts of climate change and disasters is reduced on the vulnerable communities

- ✓ The numbers of people that will require humanitarian assistance if disaster resilience is not strengthened in the medium and long term will increase. Humanitarian response should take into consideration long term mitigation actions to reduce impacts than just reacting to emergencies

- ✓ Gender disparities will increase with shifting gender roles and vulnerabilities enhanced by climate change impacts. Gender equality and climate justice should be a key focus. Gender analysis should be done across all programmes and policies to understand the different capacities and vulnerabilities of women and men, boys and girls

- ✓ Capacity building and strengthening of civil society partners and Government structures at national and sub national levels in climate change will be key to improve sustainable development, climate governance, planning for uncertainties, managing risks and reducing vulnerabilities resulting from climate change and disaster impacts.

- ✓ Investment in generating and disseminating accurate, timely and reliable weather and climate information will be important to inform different sector adaptation and climate risk management plans and decisions regarding changes in climate

- ✓ Strengthening integrated water resources management is important for Zambia, given the impacts of energy supply which is already costing the country. Climate variability and change will continue to affect water resources, it will be important therefore to explore innovative and climate sensitive approaches to improve and protect water catchment areas

References

Beazley, B. & Ludovico, C. 2013; Assessment of the Zambia Social Protection Expansion Programme Targeting Mechanisms

Dillinger, W and Fay, M. 2010; From Centralized to Decentralized Governance – IMF Finance and development magazine

Engbo, P., Zamba, C., Chirwa, E., 2017. Africa Economic Outlook – Zambia

FAO, 2017. Food security country brief. Rome: FAO. Available at: http://www.fao.org/

Finland, 2013 - Country Strategy for Development Cooperation with Zambia: 2013–2016, Ministry for Foreign Affairs of Finland

Gannon, C., Kandy, D., Turner, J., Kumar, I.,Pilli-Sihvola, K., and Chanda, F.S., 2014. Near-term climate change in Zambia; what the research tells us

GIZ, 2013. Understanding Climate Finance Readiness Needs in Zambia

Government of Ireland (2013a) '"One World, One Future": Ireland's Policy for International Development'.

Government of Ireland (2013b) 'Framework for Action for "One World, One Future"'.

https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/PPCR%20Zambia%20Phase%202%20-%20Final%20PID.pdf(DATE)

IAPRI, 2016. Rural Agricultural Livelihoods Survey 2015. Lusaka: Indaba Agriculture Policy Research Institute (IAPRI).

IIED, 2014. The coordination of climate finance in Zambia

Intergovernmental Panel on Climate Change (IPCC), 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Summary for Policymakers. Fifth Assessment Report (WGII AR5).

International Finance Cooperation (IFC). 2011. Climate Risk and Business: Hydropower. Kafue Gorge Lower, Zambia.

Ireland Development Cooperation Division, Department of Foreign Affairs and Trade, 2004. Gender Equality Policy

Irish Aid, 2017. Social Protection Strategy

Irish Aid and IIED, 2017. Social Protection Strategy

Irish Aid Zambia Country Strategy Paper 2013-2017

Irish Aid, 2015. Zambia MTR results report

Jack, C., Wolski,P., Pinto, I., Indasi, V., 2016. Africa's Climate; Helping Decision Makers make sense of climate information

Kalantary, C., 2010. Climate Change in Zambia: Impacts and Adaptation. Global Majority E-Journal, Vol. 1, No. 2

Knieling, J., and Filho, L.W., 2013. Climate Change Governance, Climate Change Management, DOI: 10.1007/978-3-642-29831-8_2, © Springer-Verlag Berlin Heidelberg

Koelle, B., Bachofen, C., Suarez,P.,Jones, R.,Coughlan, E.,Mudenda, W.,2014. Future Climate for Africa; technical report. CDKN and Red Cross Red Crescent Climate Centre

McSweeney, C., New, M. & Lizcano, G. 2010. UNDP Climate Change Country Profiles: Zambia. Available: http://www.geog.ox.ac.uk/research/climate/projects/undp-cp/index.html?country=Zambia&d1=Reports [Accessed 10 May 2017].

McSweeney, C., New, M. and Lizcano, G. 2008. *UNDP* Climate Change Country Profiles: Zambia, Available at http://country-profiles.geog.ox.ac.uk/index.html?country=Zambia&d1=Reports

Ministry of Lands, natural resources and Environment protection, 2015. Nationally Determined Contribution

Ministry of Lands, natural resources and Environment protection, 2016. National Policy on Climate Change

Ministry of Tourism, Environment & Natural Resources, 2007. National Adaptation Programme of Action

Ministry of Tourism, Environment & Natural Resources, 2010. National Climate change Response Strategy

Mulenga, C., 2013. Tracking of Public and Private Climate Finance Inflows to Zambia

Ministry of Tourism, Environment & Natural Resources, 2007. The National Adaptation Programme of Action

Nelson, V., 2011. Gender, Generations, Social Protection & Climate Change

ODI, 2012. Climate Finance Readiness Report for Southern Africa

Phiri, S. et al, 2013. Adaptation of Zambian Agriculture to Climate Change- a comprehensive review of the utilisation of the agro-ecological regions.Prepared for the Climate Change Expert Group (CCXG) Global Forum2

Shepherd, A., T. Mitchell, K. Lewis, A. Lenhardt, L. Jones, L. Scott and R. Muir-Wood, R.M., 201. The geography of poverty, disasters and climate extremes in 2030". ODI, 2013, Met Office Hadley Center, RMS Publication. Exeter

Sishekanu, M.N. 2013. Overview of the Zambian Climate Change Programme (Presented at the Stakeholder Meeting on Integrated Landscape Management in the Luangwa Valley)

Smith, G., 2016. Zambia economic brief: beating the slowdown - making every kwacha count. Zambia economic brief; no. 7. Washington, D.C. : World Bank Group. http://documents.worldbank.org/curated/en/804591467989562427/Zambia-economic-brief-beating-the-slowdown-making-every-kwacha-count

The World Bank, 2010. The Zambezi River Basin: A Multi- sector Investment Opportunities Analysis. Water Resources Management, Africa Region (editor). Washington, D.C., USA, 2010

Thurlow, J. et al, 2009. The Impact of Climate Variability and Change on Economic Growth and Poverty in Zambia. International Food Policy Research Institute

Thurlow, J., Zhu, T., Diao, X., 2009. The Impact of Climate Variability and Change on Economic Growth and Poverty in Zambia. IFPRI Discussion Paper 00890 August 2009

UNDP and Government of the Republic of Zambia, 2012. Adaptation to the effects of drought and climate change in Agro-ecological Regions I and II in Zambia

UNDP, 2016. Zambia Human Development Report

UNICEF, 2009. United Nations Children's Fund, Actions for Children Issue 5: Quality education and child friendly schools, www.unicef.org/devpro/files/Actions_for_Children

United Nations Framework Convention on Climate Change, 2007. Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries
UN-OHRLLS, 2014. State of the Least Developed Countries; Extreme Poverty Eradication in the Least Developed Countries and the Post-2015 Development Agenda

USAID, 2012. Climate Change Adaptation in Zambia

World Bank, 2013. Building Resilience: Integrating climate and disaster risk into development. Lessons from World Bank Group experience

World Bank, 2017. World Development Indicators: Zambia. Washington, D.C.: World Bank (WB). Available at: http://data.worldbank.org/data-catalog/world-development-indicators

World Bank. 2012. Zambia poverty assessment: stagnant poverty and inequality in a natural resource-based economy. World Bank Africa region Poverty reduction and economic management. Washington DC ; World Bank. http://documents.worldbank.org/curated/en/495301468170959601/Zambia-poverty-assessment-stagnant-poverty-and-inequality-in-a-natural-resource-based-economy

Zambia Country Analysis (2015). This is a summary of a country analysis prepared by an independent consultant for the United Nations Country Team in Zambia.

Zambia Demographic Health Survey (ZDHS) 2014

Zambia United Nations Sustainable Development Partnership Framework 2016-2021