



Integrating Climate Change into Financial Planning

Climate Proofing Manual for Zambia

published by



Imprint

Published by the

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

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As at

July 2014

Design and layout

MGestaltung, Hamburg

Photo credits

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GIZ is responsible for the content of this publication.

On behalf of the

German Federal Ministry for Economic Cooperation and Development (BMZ)

Alternatively: German Federal Foreign Office

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Climate Proofing Process Flow Sheet

The Climate Proofing process consists of four steps. These four steps and how they were applied in Zambia are summarized below. They are elaborated in more detail in the following chapters.

Step 1 _Preperation

1.1 DEFINE PROCESS GOVERNANCE

- Define Process Leadership MoF has mandate to supervise planning and budgeting in Zambia.
- Set up organizational framework
- Define who will be steering the process and make decisions
- Set up a process operation plan

1.2 IDENTIFY RELEVANT STAKEHOLDERS

Identify and involve key relevant stakeholders (e.g. IICCS, Ministries, Agencies, Private Sector, NGOs)

1.3 IDENTIFY INFORMATION SOURCES AND COLLECT RELEVANT INFORMATION

Find relevant climate Change Information.

Step 2 _Risk Analysis

2.1 SELECT 'EXPOSURE UNIT'

Exposure Unit refers to a system considered to be at risk of climate change impacts and therefore needs to be climate proofed (e.g. a sector policy, a programme, natural resources, a region, a development strategy, etc.)

2.2 EVALUATE CURRENT SITUATION

Describe the current situation:

- Determine if climate change signals are apparent. (e.g. increased rainfall, temperature variations, floods compared to conditions in the recent past)

Analyze corresponding policies:

- Determine whether existing policies already take into account climate change risks

2.3 IDENTIFY CLIMATE STIMULI AND PROJECTIONS

Identify projected future climatic conditions (e.g. is temperature likely to rise, is rainfall distribution likely to change).

2.4 IDENTIFY POTENTIAL BIO-PHYSICAL IMPACTS

Identify the biophysical impacts of climate change on the selected exposure unit (e.g. biodiversity loss, floods, ecosystem shifting, livestock disease).

2.5 IDENTIFY POTENTIAL SOCIO-ECONOMIC IMPACTS

Identify the social-economic impacts that may result from the identified biophysical impacts (e.g. food loss, infrastructure loss, GDP loss, decreased tourism revenue, increased food prices).

2.6 IDENTIFY RISK LEVELS

Identify the level of risk caused by the identified biophysical and social-economic impacts using a rapid risk screening tool. The risk screening tool analyses the impacts as a function of their probability and severity, both short-term and long-term.

GRAPH: RISK ASSESSMENT TOOL

See Page 15 for more details.

2.7 IDENTIFY OPPORTUNITIES

Identify the positive Impacts that can result from climate change (e.g. increased rainfall may lead to increased water availability and consequently increased potential for hydro-electric power generation).

Step 3 _Development of Adaptation Options

3.1 IDENTIFY ADAPTATION OPTIONS

A list of adaptation measures aimed at responding to the specific impact risks identified should be developed. There are two elements involved:

- Prevention measures: measures aimed at reducing the probability that biophysical impacts will occur
- Protection measures: aimed at reducing the severity of resulting socio-economic impacts.

Adaptation measures can be classified as:

- 'Soft' adaptation measures: aimed at enhancing adaptive capacities (e.g. communication, information, capacity building etc.)
- 'Hard' adaptation measures: these are risk and vulnerability reducing technologies (e.g. dams, infrastructure re-enforcement etc.)

3.2 DEVELOP PRIORITIZATION CRITERIA

Define criteria for selecting adaptation options for integration into planning and budgeting processes. Examples of prioritization criteria include:

- Strategic relevance: does the option respond to particular vulnerable regions? Or does the option have reliable long-term impact or risk reduction?
- Emergency: are there indications that the projected climate changes are already perceptible or will occur soon?
- No regret: option generates positive impacts whether or not climate change impacts occur
- Flexibility: the adaptation option can easily be changed
- Mitigation co- benefits
- Political and social acceptability

3.3 SCREEN, PRIORITIZE AND SELECT ADAPTATION OPTIONS

Assign weights to each of the identified criteria by determining the level of importance. Then work out an adaptation decision matrix by scoring all adaptation options against the prioritization criteria.

Criteria	Adaptation Options (Score 1-5)		
	Adaptation Option 1	Adaptation Option 2	Adaptation Option 3
Relevance?	2	4	1
Economic (cheap)?	4	1	3
Impact on poverty?	4	2	3
Emergency?	2	5	1
No regret?	2	4	3
Total Score	14	16	11
Ranking	2	1	3

Criteria	Criteria Weight (1-3)	Adaptation Options (Score 1-5)		
		Adaptation Option 1	Adaptation Option 2	Adaptation Option 3
Relevance?	2	2x2=4	4x2=8	1x2=2
Economic (cheap)?	3	4x3=12	1x3=3	3x3=9
Impact on poverty?	3	4x3=12	2x3=6	3x3=9
Emergency?	3	2x3=6	5x3=15	1x3=3
No regret?	2	2x2=4	4x2=8	3x2=6
Total Score		34	33	31
Ranking		1	2	3

Step 4 _Integration into Budgeting and Planning

4.1 IDENTIFY POSSIBILITIES FOR INTEGRATING ADAPTATION OPTIONS INTO PLANNING AND BUDGETING

Find an Entry Point to integrate the identified adaptation option into the budgeting and planning process.

4.2 INVESTIGATE FINANCE OPTIONS

Identified measures may be covered by the national budget or resources from a horizontal fund for adaptation.

4.3 SET UP A MONITORING AND EVALUATION SYSTEM

- Define the purpose of M&E
- Specify what to monitor and formulate indicators
- Operationalise the M&E system

1. Introduction

1.1 Global climate change: a short overview

In its Fifth Assessment Report (AR5), the Intergovernmental Panel on Climate Change (IPCC) concludes that “warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased.”¹

According to IPCC, each of the last three decades has been successively warmer than any preceding decade since 1850. Thereby, human influence on the Earth’s climate system is evident, from the increasing greenhouse gas concentrations in the atmosphere, positive radiative forcing, observed warming, and understanding of the climate system. Since the last Assessment Report (AR4), climate models have improved considerably and reproduce both observed continental-scale surface temperature patterns and trends over many decades. It is clear that continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system.

Depending on the emission scenario global surface temperature at the end of the 21st century will likely rise by 2°C.² Warming will continue to exhibit interannual-to-decadal variability and will not be regionally uniform.

IPCC specifies it “is virtually certain that there will be more frequent hot and fewer cold temperature extremes over most land areas on daily and seasonal timescales as global mean temperatures increase. It is very likely that heat waves will occur with a higher frequency and duration. Occasional cold winter extremes will also continue to occur.”³

As consequence of the warming over the 21st century, changes will occur in the global water cycle but they will not be uniform. The differences in precipitation will increase between wet and dry regions as well as between wet and dry seasons; however there may be regional exceptions.

Since the global ocean will continue to warm during the 21st century and because of the cumulative nature of carbon emissions, most aspects of climate change will persist for many centuries even if emissions of CO₂ are stopped. Depending on the scenario, about 15 to 40% of emitted CO₂ will actually remain in the atmosphere longer than 1,000 years.

Africa is highly vulnerable to climate change and climate variability. According to OECD⁴, Africa has “more climate-sensitive economies than any other continent with 50% of its population living in dryland areas that are drought-prone. In addition, its agricultural sector contributes an average 21% of GDP in many countries, ranging from 10% to 70%”.

Potential impacts of climate change in Africa include⁵:

- Agricultural production, including access to food, will be severely compromised and the area suitable for agriculture, the length of growing seasons and yield potential, particularly along margins of semi-arid and arid areas, are expected to decrease.
- By 2020, crop yields from rain-fed agriculture may be reduced substantially.
- By 2020, between 75 and 250-million people are projected to be exposed to increased water stress due to climate change.
- By 2050, between 350 and 600-million people are projected to be at risk of water stress. There will be a significant increase in the number of people experiencing water stress in northern and southern Africa.
- By 2050, production of many crops in Egypt will be reduced by up to 11% for rice and by 28% for soybeans.
- Sea-level rise will have significant impacts on coastal areas. By 2050, in Guinea, between 130 and 235 km² of rice fields (17% and 30% of existing rice field area) could be lost as a result of permanent flooding due to sea-level rise.
- By 2050, a large part of the western Sahel and much of southern-central Africa are likely to become unsuitable for malaria transmission. Meanwhile, previously malaria-free highland areas in Ethiopia, Kenya, Rwanda and Burundi could experience modest incursions of malaria.

According to OECD “Climate change will exacerbate impacts such as droughts, floods, extreme weather events and sea level rise, which may contribute to food shortages, infrastructure damage and the degradation of natural resources upon which livelihoods are based. This may also jeopardise development gains achieved through development co-operation and make it more difficult to reach the development objectives including

1 https://www.ipcc.ch/report/ar5/wg1/docs/WGIAR5_SPM_brochure_en.pdf , p.2

2 IPCC AR5: Global surface temperature change for the end of the 21st century is likely to exceed 1.5°C relative to 1850 to 1900 for all RCP scenarios except RCP2.6. It is likely to exceed 2°C for RCP6.0 and RCP8.5, and more likely than not to exceed 2°C for RCP4.5. Warming will continue beyond 2100 under all RCP scenarios except RCP2.6.

3 https://www.ipcc.ch/report/ar5/wg1/docs/WGIAR5_SPM_brochure_en.pdf , p.18

4 OECD: Integrating climate change adaptation into development co-operation: Policy guidance (2009)

5 OECD: Integrating climate change adaptation into development co-operation: Policy guidance (2009)

the Millennium Development Goals. Adapting to the impacts of climate change is therefore critical. It is not just an environmental issue but also affects the economic and social dimensions of sustainable development”.

The most recent IPCC Assessment Report (AR5) gives an overview about key risks and adaptation potentials for the Africa region (see Figure 1).

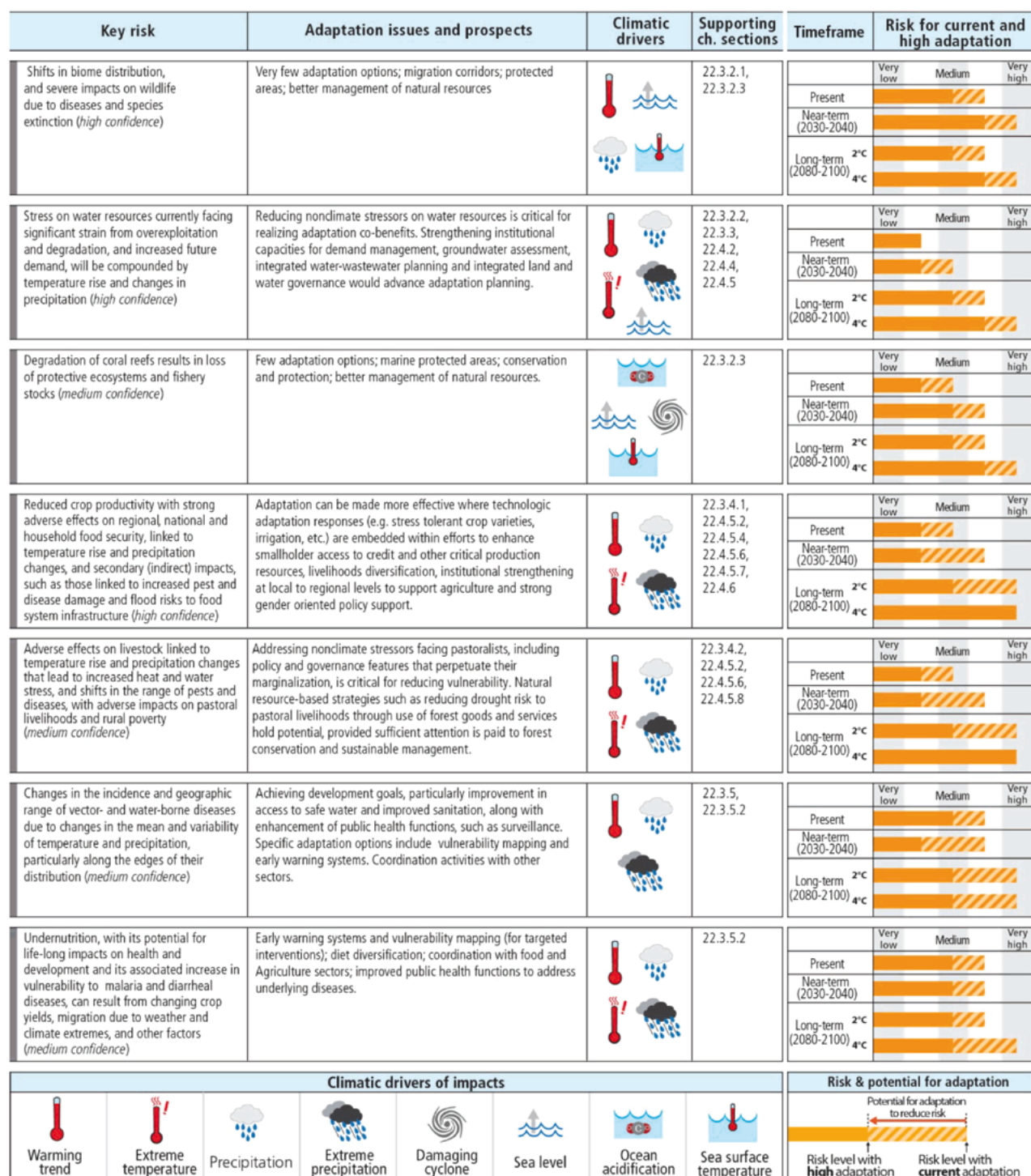


Figure 1: Key climate change risks and adaptation potentials for the Africa region⁶

6 IPCC 5th Assessment Report, Working Group II, Chapter 22, p. 105
http://ipcc-wg2.gov/AR5/images/uploads/WGIIAR5-Chap22_FGDall.pdf

Zambia has a strong commitment to contribute to the global efforts of fighting climate change. The country is signatory to relevant regional and international protocols and agreements on climatic and environmental sustainability, such as the Kyoto Protocol, NEPAD, Comesa and SADC initiatives.

Zambia's decision makers are aware of the need to systematically integrate climate change related risks in development planning at all levels, in particular National Development Plans, sector strategies, policies and programmes in order to enhance climate resilience. Only if public expenditure programmes take account of climate change can the financing of these activities be ensured, be it through the national spending or international support such as from international climate funds, including the Green Climate Fund.

1.2 Climate change in Zambia

Zambia is characterised by a **subtropical climate** with a rainy summer and a dry winter season. Due to the elevation of the country, which lies between 1000 and 1300 m, temperatures are moderate and lower than for typical areas of the same latitude. The rainfall is extremely variable from year to year with an annual mean precipitation between 600 mm in the south and 1400 mm in the north of the country.

According to the Germany based Climate Service Center (CSC), "mean annual **temperature** has slightly increased by approximately 0.6 °C since the beginning of the 20th century. For the future, temperature **projections** from global climate models suggest a strong increase in temperature. For the end of the century a warming in the range of 2.4 to 4.3 °C (compared to the reference period from 1961 to 1990) is likely. Furthermore, a strong increase in the duration of heat waves as well as a strong reduction in cold spell length are projected."

Regarding precipitation patterns, the CSC specifies that "for annual total rainfall no clear region wide trend has been observed in the past. Also for the future, climate models do not project a clear trend in precipitation amounts. For the end of the century a change in annual total precipitation in the range of -6 to +5 per cent (compared to the reference period from 1961 to 1990) is likely. Furthermore, projections suggest a tendency towards more intense and more frequently heavy rainfall events as well as a substantial elongation of dry spells. For the climatic water balance also no clear trend is projected for the future. However, the projection of change in the water balance is affected by a large spread and therefore deemed to be not very robust."⁷

Climate change in Zambia may have negative impacts on several sectors, including water, forestry, wildlife resources, tourism,

mining, energy, transport and telecommunication infrastructure, social infrastructure and in particular on agriculture⁸.

Due to their heavy reliance on climate-sensitive sectors, Zambia's poor are particularly vulnerable to climate change impacts. According to the World Bank, the "rural population along the Zambezi basin (particularly along the southern and western zones) is amongst the poorest and most vulnerable in Zambia, due to recurrent floods and droughts and socio-economic isolation. The elderly, female-headed households and single or divorced male-headed households are the most vulnerable. Their food and income sources are heavily reliant on subsistence crops, sales of livestock and natural resources, and casual labour (mostly paid for in food), making them vulnerable to climate-induced crop failure during droughts and floods, when excessive and unpredictable rainfall leads to water logging. Frost and heat stress are also increasing and as climate patterns become more erratic, water and energy resources, infrastructure and housing, and animal and human health are increasingly affected."⁹

A study on the **economic impact** of climate change on Zambia¹⁰ revealed that "over the past three decades floods and droughts have cost Zambia an estimated 13.8 billion USD - the equivalent to 0.4 % of economic growth annually. In the absence of adaptation, rainfall variability alone could keep an additional 300,000 more Zambians below the poverty line (Thurlow, 2009) and cost Zambia 4.3 billion USD in lost GDP over the next decade, reducing annual GDP growth by 0.9 % points (Yamba et al., 2010). This loss estimate is at the lower end of the range produced by the McKinsey Working Group, which found local economic losses due to climate change at 9 different locations to already be between 1 to 12 per cent of GDP annually (McKinsey, 2009)."

The analyses on each sector exhibit that "not every sector selected had a direct impact on the loss of GDP. In particular the economic impacts on the water sector and energy sector are secondary and are manifest through other sectors such as agriculture, mining, and industry". Zambia's total GDP loss for the next ten years (2011-2020) due to climate change impacts is estimated at 4.3 to 5.4 billion USD.

7 Climate-Fact-Sheet Zambia; Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung GmbH, Climate Service Center, 12.7.2013"

8 Ministry of Tourism, Environment and Natural Resources of Zambia: National Climate Change Response Strategy (NCCRS), Final Draft (2010)

9 World Bank: Project appraisal document on a proposed strategic climate fund - Pilot Program for Climate Resilience, Report No: 73982-ZM, Washington (2013)

10 Ministry of Tourism, Environment and Natural Resources of Zambia - Climate Change Facilitation Unit: Economic Assessment of the Impacts of Climate Change in Zambia ; Draft report (2010) 10 Ministry of Tourism, Environment and Natural Resources of Zambia - Climate Change Facilitation Unit: Economic Assessment of the Impacts of Climate Change in Zambia ; Draft report (2010)

To address the climate change related risks and challenges, Zambia has elaborated highly relevant strategic and national documents on climate change. The National Climate Change Response Strategy (NCCRS) is based on the 2007 National Adaptation Programme of Action (NAPA)¹¹ and provides the institutional basis for its National Climate Change and Low Carbon Development Program. Further documents include the National Policy on Climate Change (NPCC) or Zambia's Second National Communication to the UNFCCC (SNC), their final adoption and publication however is still pending.

At **institutional level**, three key Ministries (Ministry of Finance; Ministry of Lands, Natural Resources and Environmental Protection; and the National Disaster Management and Mitigation Unit under the Office of the Vice President) are main leaders of Zambia's climate change activities. Other line ministries, donor organizations, civil society organizations and private sector organizations are actively supporting Zambia in addressing climate change related issues.

In order to ensure high-level coordination of climate change related activities, the Government of Zambia established an **Interim Interministerial Climate Change Secretariat (IICCS)** under the MoF, which includes staff attached from various sectoral ministries. The mandate of the IICCS is to:

1. Facilitate activities leading to the establishment of a long-term institutional arrangement for climate change coordination in Zambia.
2. Coordinate, in the interim, the implementation of climate change activities and initiatives across sectors.
3. Carry over activities that remain outstanding under the Climate Change Facilitation Unit.

The Government of Zambia currently plans to elevate the IICCS to a National Climate Change Development Council, which would be charged with coordinating climate change issues in Zambia, including climate finance.

1.3 Planning and budgeting processes in Zambia

Zambia has a series of planning and budgeting instruments at its disposal, for instance a 5-year National Development Plan (NDP), a 3-year medium term expenditure framework (MTEF), annual budgets and plans at sector ministry level. However, the corresponding preparation, implementation, monitoring and evaluation processes are currently not underpinned by a clear statement of policy and are still characterized by a lack of



Climate Proofing Workshop

Photo: © GIZ / Josef Seitz

harmonization. Therefore, a **National Planning and Budgeting Policy** has recently been elaborated, with support from GIZ, designed to guide the processes used to plan, implement, monitor and evaluate national development plans and annual budgets. This policy document clearly defines the principles, procedures, structures, timelines and responsibilities that are to be used in formulating, implementing, monitoring and evaluating annual budgets and national development plans.

Besides these on-going efforts to harmonize planning and budgeting processes, a standard planning process document such as a manual or guidelines with well-defined process steps, to which a Climate Proofing Manual and its process steps could be aligned, is not yet being used. This current gap therefore triggers the need to have well elaborated Climate Proofing arrangements that shall ensure national ownership and sustainability of programmes and projects. Although Zambia has clearly defined planning and budgeting processes, articulating, harmonizing and linking the climate proofing strategies is paramount.

Due to the political changes in Zambia (elections and change of Government in September 2011), the current Sixth National Development Plan (SNDP) has been revised in order to comply with new political and strategic orientations. This revised version (R-SNDP) constitutes the main overarching planning document for Zambia, but has not been formally launched at the time of writing.

Sector ministry plans are expected to align with the R-SNDP, but this alignment goal has not yet been fully achieved. Though the R-SNDP has not been formally launched, the draft was used to prepare the 2014 budget.

¹¹ <http://unfccc.int/resource/docs/napa/zmb01.pdf>

2. The Climate Proofing Tool for Zambia

2.1. Introduction to the tool

2.1.1 Rationale and objective of the Climate Proofing Tool for Zambia

Even though several initiatives to integrate climate change into planning and budgeting processes have already been undertaken in Zambia, the Ministry of Finance and the sector ministries of Zambia still require further human and institutional capacity to consider the climate-relevant aspects of the national public expenditure programs, especially in terms of adaptation mainstreaming, risk assessment and project development. To ensure that national planning and budgeting procedures in Zambia fully incorporate these aspects and to facilitate the use of international climate funds (e.g. GCF), the Ministry of Finance, the GIZ Climate Finance Readiness Programme, and the GIZ Good Financial Governance Programme co-operate in implementing the following tasks:

1. Development of a Zambia-specific Climate Proofing (CP) approach for planning and budgeting of public expenditure programs;
2. Climate Proofing Training for planning and budgeting practitioners; and
3. Pilot-application of the Zambian Climate Proofing approach and support with integration in the planning and budgeting process.

The Climate Proofing Tool for Zambia is based on “Climate Proofing for Development”, a methodological approach developed by GIZ and aimed at incorporating issues of climate change into development planning. It enables development measures to be analysed with regard to the current and future challenges and opportunities presented by climate change. It can be applied at national, sectoral, local and project level, and is making development measures on these levels more efficient and resilient. Climate Proofing for Development offers a means of identifying and prioritising options for action when adapting planning to climate change and when reviewing priorities. The approach can be applied in the planning phase or when revising plans. Properly implemented, it makes a given plan or investment more “climate-proof”.

The methodology on which Climate Proofing for Development is based was originally developed in the context of climate risk assessments developed for use within German development cooperation. It has since been further modified for application in partner institutions (mainly government bodies in developing countries). It complements other risk analysis instruments, such as Strategic Environmental Assessment, and can prepare the ground for the development of comprehensive adaptation strategies. Climate Proofing for Development builds on the principles set out in OECD’s Policy Guidance “Integrating Climate Change Adaptation into Development Co-operation”.

2.1.2 Climate Proofing in the context of climate finance

In June 2013, a study¹² carried out by GIZ, ODI and the Africa Climate Finance Hub revealed that “Zambia has been successful in accessing many of the dedicated international climate funds that exist today. This includes the Pilot Programme on Climate Resilience (PPCR), the Global Environment Facility’s Fourth replenishment, the Least Developed Countries Fund, and Germany’s International Climate Initiative. In March 2013, funding approved for activities in Zambia amounted to US\$ 25 million. This finance amounts to an estimated US\$140 million in 2013 for climate change adaptation activities in Zambia. In addition many multilateral and bilateral development partners have climate programmes underway, particularly in climate change adaptation, which may not be included in this snapshot.” The study furthermore analysed Zambia’s capacities, barriers and needs for climate finance readiness at institutional, strategic and technical level.

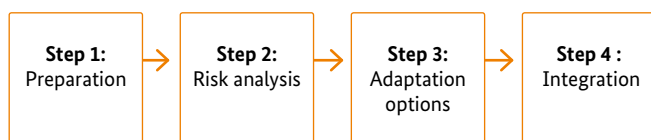
The Green Climate Fund will represent a support for Zambia in its effort to adapt to the impacts of climate change. For this, the country will have to be able to identify and structure national public expenditure programs, whose climate-relevant full and incremental costs may be covered by the GCF.

Climate Proofing enables Zambian stakeholders to integrate climate change related risks into the country’s planning and budgeting processes and to develop corresponding adaptation activities. By this, Climate Proofing contributes to enhance capacities to identify, develop and appraise bankable projects. Furthermore, CP lays the foundations for an adaptation related M&E-system, a prerequisite for successful access to climate finance.

¹² Watson, C. et al.: Understanding Climate Finance Readiness Needs in Zambia, Bonn (2013)

2.1.3 Overview of the Climate Proofing Tool for Zambia

Climate Proofing is a logical approach composed of 4 main steps:



The 1st step of the Climate Proofing approach aims at preparing the whole process, in particular by defining the process governance, identifying key stakeholders and collecting fundamental information. In a 2nd step, the risks and opportunities resulting from climate change are analysed and prioritized. The 3rd step of the Climate Proofing process consists of developing and selecting adaptation options capable to respond to the previously identified climate change related risks. In a final step, adaptation measures are integrated in the planning and budgeting processes, and a monitoring system is set up.

For each step, the methodology defines corresponding objectives and describes the activities to be carried out. Moreover, the methodology indicates where to find additional information sources.

For a detailed process flow sheet, please refer to Annex 8.

Step 1: Preparation of the process

The initial step of the Climate Proofing approach consists of preparing the whole process. Before starting analysis and integration activities, it has to be determined, who will lead the process and who has to participate at which level. As Climate Proofing is a participative approach, it is essential to have a clear picture of the participants and their respective roles. Furthermore, the process outcome heavily relies on the information available. Thus, a strong focus has to be put on forming a solid information and knowledge basis.

Objective:

The institutional and organizational framework as well as the information basis to start the process of integrating climate change in planning and budgeting processes is set up.

Activities:



Activity 1.1: Define process governance

At the outset of the Climate Proofing approach, fundamental process governance elements have to be defined:

A. Define who takes the process leadership

In Zambia, the Ministry of Finance is mandated to supervise the country's budgeting and planning processes and therefore has a leadership role. Government has mandated MoF to house the Interim Interministerial Climate Change Secretariat (IICCS) to co-ordinate climate change programmes and projects. The technical direction of the process is therefore, delegated to the IICCS (see Table 1).

B. Set up organizational framework

In order to ensure a smooth process management, an organizational framework has to be set up. Organizational entities may include:

- Steering committee (consisting of decision makers from the main ministries, in charge of strategic orientations)
- Management unit (composed of operational representatives from the main ministries, in charge of technical execution)
- Technical secretariat (in charge of administrative processes)

It is recommended not to overload the organizational settings, to avoid establishing new institutional structures and to keep the organizational units as small as possible. A Steering Committee composed of Permanent Secretaries, chaired by the Secretary to the Treasury, is already in place. In addition, Technical Committee, composed of the key sectors highly affected by climate change including representatives of the civil society and the private sector supporting the IICCS, is also in place.

C. Set up a process operation plan

The planned Climate Proofing process has to be scheduled defining at the same time the corresponding responsibilities for each process step.

Activity 1.2: Identify relevant stakeholders

Climate Proofing is a participative approach and requires the involvement of all key players. It is therefore essential to identify all relevant stakeholders for the process. The main players

at government level include Ministry of Finance, Ministry of Lands, Natural Resources and Environmental Protection, sector ministries and public institutions working on climate change or disaster risk management. The Vice-President's office, parliament and labour unions might be involved also. Further essential stakeholders include the research community, civil society and non-governmental organisations (NGOs), private-sector organisations, and last but not least bilateral and multilateral donor organizations. Depending on the geographical focus of the process, local stakeholders such as regional governments, municipalities or traditional authorities will have to be included also.

The key national policy stakeholders and their strategic area of focus are detailed in Table 1.

Annex 1 gives a more detailed overview on potential Zambian stakeholders related to climate change.

The “Southern African Science Service Centre for Climate Change and Adaptive Land Management - SASSCAL” also provides a list of Zambian stakeholders who may be included in the Climate-Proofing process (see ANNEX 1).

Activity 1.3: Identify information sources and collect information

An essential requirement for well-informed decision-making on adaptation is that it is based upon the best available information on both the current and the future climate of the country. This includes information on observed climate changes, current climate variability and extremes, projections of climate change, and assessments of impacts and vulnerabilities.

Due to the technical focus of the activity, the corresponding sector ministry or an external consultant might be best suited to carry out the following sub-activities:

National policy stakeholders	Strategic areas of focus
Vice-President's Office	<ul style="list-style-type: none"> ▪ Cross-sectoral policy coordination for Early Warning, Disaster and Climate Risk Management
Ministry of Finance	<ul style="list-style-type: none"> ▪ National policies ▪ Public finances ▪ Fiscal policy ▪ Institutional governance framework ▪ Operational capacity of government ▪ Management of government assets
Interim Interministerial Climate Change Secretariat (IICCS)	<ul style="list-style-type: none"> ▪ Coordination of climate change activities
Ministry of Lands, Natural Resources and Environmental Protection	<ul style="list-style-type: none"> ▪ Climate change policy ▪ UNFCCC Focal point
Members of Parliament	<ul style="list-style-type: none"> ▪ Regulation and standards ▪ National policies ▪ Public finances ▪ Fiscal policy
Sector ministries	<ul style="list-style-type: none"> ▪ Sector policies ▪ Climate change related activities
Research community	<ul style="list-style-type: none"> ▪ Research and development ▪ Awareness-building and lobbying
Civil society and non-governmental organisations	<ul style="list-style-type: none"> ▪ Lobbying of government and other stakeholders ▪ Awareness-building ▪ National policies ▪ Public finances ▪ Supporting communities in climate adaptation implementation
Donor agencies	<ul style="list-style-type: none"> ▪ National policies ▪ Public finances ▪ Research and development
Traditional authorities	
Authorities at provincial and local level	<ul style="list-style-type: none"> ▪ Local development policies

Table 1: Zambia's key national policy stakeholders and their strategic area of focus

A. Identify information resources

Many information sources already exist in and for Zambia. Weather and historical climate data are available from Zambia Meteorological Department (ZMD). However, the Zambian data need to be processed and digitalized. Furthermore, the existing data need to be interpreted for non-climate-specialists. Assessments of climate change impacts and vulnerabilities have also been conducted in Zambia. Moreover, valuable climate related information can be found in national strategies and policies. The Zambia Environmental Management Agency (ZEMA) is also relevant to providing climate change information. Similarly, research institutions and higher learning institutions (universities) also have some information pertaining to climate change.

Annex 2 gives an overview about Zambia specific information sources.

In addition, many international and regional organisations and initiatives have set up information platforms regarding climate change data, impacts or adaptation options, mostly easily accessible via Internet. Some of the most relevant information sources are set out in **Annex 3**.

B. Collect and assess existing documents

After identifying the information sources, the corresponding documents have to be collected and assessed; always ensuring that latest available information is being used.

C. Extract essential information

In order to be efficiently used by the different participants in the Climate Proofing process, it is necessary to extract relevant essential information from the collected documents, including:

- Current climate trends and observed climate changes
- Current climate variability and extremes
- Exposure units of the selected sector, strategy, policy or programme
- Biophysical impacts
- Socioeconomic impacts
- Identified adaptation options

Remarks:

1. If necessary and depending on the resources available, the results may be processed in a specific report. By summarizing all available information on climate change in Zambia, this report would be of great use for all subsequent steps. For this, it may also be of great interest to use a climate service collecting and providing latest information available.
2. Information sources should be traceable in order to keep information available for later use and avoid »fishing in the dark«.

How to deal with uncertainties?

While climate change might clearly pose many novel risks that lie beyond historical experience, adaptation decisions typically require much more precision on the implications of climate change for the locations, time frames and spatial scales that concern them. A key point here is that climate change projections have widely differing degrees of uncertainty associated with them. Large-scale climate projections typically have lower uncertainty than those specific to a particular location. Many adaptation decisions, however, need to be taken at a more local scale, such as a watershed or a city, where credible climate change projections are often lacking. Furthermore, certain climate variables are easier to predict than others. Projections of temperature, for example, tend to be more robust than those for rainfall. Likewise, average conditions are easier to project than changes in extremes.

Uncertainty, however, is not a justification for inaction. What is required of decision makers is to be more aware of its exact nature and to incorporate such information in their decisions accordingly. "Climate change justified actions", might be warranted in cases where there is considerable sensitivity to climate change variables that can be predicted with sufficient reliability. For example, the increase of animal diseases is directly linked to rising temperatures, and might require near-term adaptation actions. Likewise, "climate justified" actions might also be necessary where near-term decisions might result in a long-term lock-in over which time climate change impacts might become progressively more significant. This, for example, is the case for long-lived infrastructure and land-use policies. In some other instances, however, many climate change projections – while significant – might only warrant "no" or "low" regrets adaptations or enhanced flexibility, in view of the prevailing uncertainties.

*From: OECD: Integrating climate change adaptation into development co-operation: Policy guidance – ISBN-978-92-64-05476-9 © OECD 2009¹³
(Examples adapted to the Zambian context)*

¹³ Sources: Agrawala, S. and S. Fankhauser (2008), "Putting Climate Change Adaptation in an Economic Context", *Economic Aspects of Adaptation to Climate Change*, OECD, Paris, pp. 19-28.
Agrawala, S. and M. van Aalst (2008), "Adapting Development Cooperation to Adapt Climate Change", *Climate Policy*, Vol. 8, No. 2, pp. 183-193.

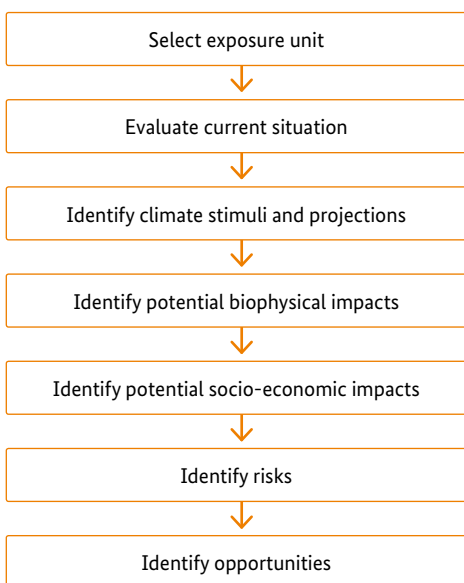
Step 2: Risk analysis

The second step of the Climate Proofing approach consists of analysing and prioritizing the risks and opportunities resulting from climate change. For this, it is necessary to organize a specific **Risk-Analysis-Workshop** involving all relevant stakeholders. Hereby, it is highly essential to select appropriate participants, as the results of the risk analysis (but also of the adaptation development step - step 3) mainly depend on the knowledge and competencies of the participants¹⁴.

Objective:

The climate change related risks and opportunities for the selected strategy, policy, plan or programme are identified and prioritized.

Activities:



Activity 2.1: Select exposure unit

IPCC defines “exposure unit” as “an activity, group, region or resource exposed to significant climatic variations.”¹⁵ For UKCIP it is “the system considered to be at risk, and may be defined in terms of geographical extent, location and distribution of a variety population of receptors at risk.”¹⁶

In the Climate Proofing approach, the exposure unit simply is the “thing we look at”, the object of the analysis. It is mostly

known from the beginning of the process, which usually starts with a specific purpose.

Examples for exposure units are:

- a national development strategy
- a sector policy or programme
- a geographical region
- a water catchment area
- a resource, such as fish, forests, livestock
- etc.

Although the object of the risk analysis (exposure unit) may be known from the beginning, there may be a need to divide the analysis in several “sub-exposure units”, and apply the Climate Proofing approach for instance on individual components of a strategy.

Activity 2.2: Evaluate current situation

After that, the workshop participants have to evaluate the current situation of the exposure unit with respect to climate change, and answer particularly the following questions:

A. Describe current situation

Are climate change signals already apparent, and if so, do they affect social and economic development? (e.g. impacts of reduced rainfall or increased rainfall variability on food production, or changes in rainfall or temperature correlated with increased incidence of climate-sensitive diseases).

B. Analyse corresponding policies

Do existing sector policies or programmes (related to the exposure unit) already take into account climate change risks or potential impacts on development?

Activity 2.3: Identify climate stimuli and projections

On the basis of information provided, the participants will then determine which climate stimuli have to be taken into account for the selected exposure unit and analyse corresponding projections¹⁷:

- Temperature
- Precipitation
- Shift of rainfall seasons
- Extreme weather events

¹⁴ Depending on the complexity of the subject and the information available, it can be necessary to contract an external consultant in order to gain additional know-how.¹⁶

¹⁵ <http://www.ipcc-data.org/guidelines/pages/definitions.html> ¹⁷ Please refer also to chapter 2.2.3: “How to deal with uncertainties”

¹⁶ <http://www.ukcip.org.uk/glossary/>

¹⁷ Please refer also to chapter 2.2.3: “How to deal with uncertainties”

Activity 2.4: Identify potential biophysical impacts

The workshop participants will then analyse, which biophysical impacts may be caused in the future by the climate stimuli. In-depth know-how regarding the selected sector is a major prerequisite in this exercise.

Examples for biophysical impacts are:

- Water stock reduction
- Soil moisture reduction
- Increased forest fire frequency
- Irrigated agricultural production loss
- Rain fed agricultural production loss
- Land-cover conversion
- Urban water supply decrease
- Livestock production decrease
- Floods
- Eco-system shifting
- Biodiversity lossetc.

Activity 2.5: Identify potential socio-economic impacts

The following analysis element consists in defining which socio-economic impacts may result from identified biophysical impacts.

Examples for socio-economic impacts include:

- Food loss
- Agricultural GDP loss
- Relocation
- Increase of water-related diseases
- Forest loss
- Migration conflicts
- Decrease of tourism revenues
- Infrastructure loss

Further information including quantified economic impact assessments is available for Zambia. For detailed economic analysis of specific risks, it may be necessary to include economy experts as workshop participants or contract external consultants.

Activity 2.6: Identify risk level

Workshop participants will then have to identify the level of risks, which are potentially caused by biophysical and socio-economic impacts. For this, a risk-assessment tool may be applied (see Figure 2) analysing the impacts in function of their probability and damages caused.

If sufficient time and resources are available, it may be considered to carry out an in-depth vulnerability assessment.

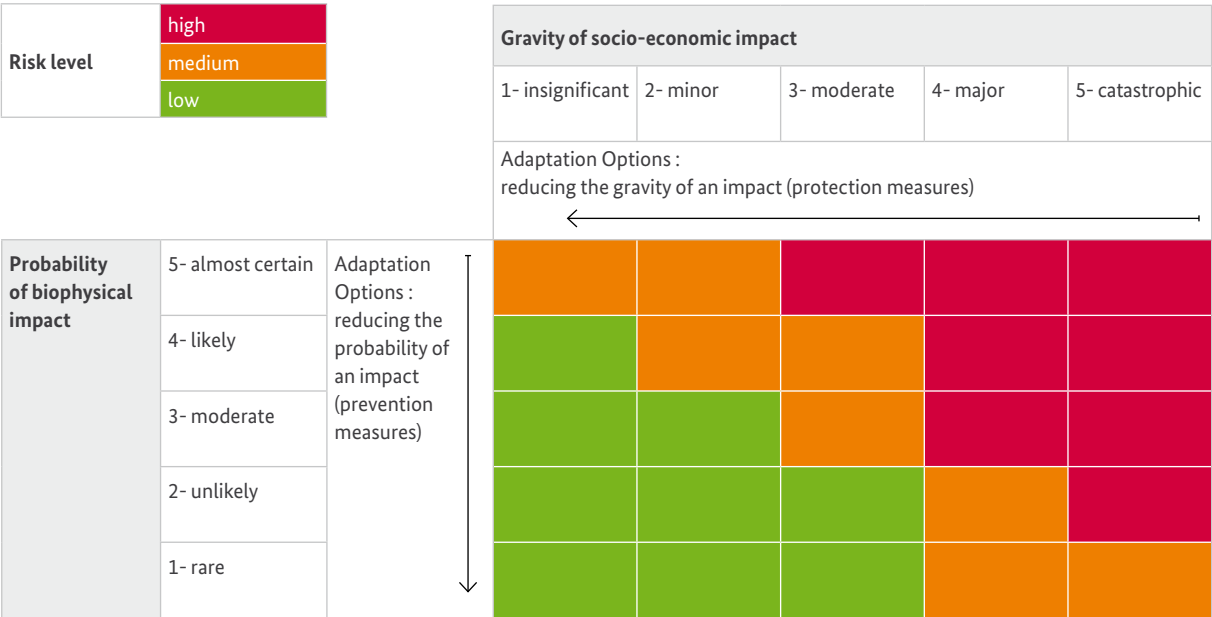


Figure 2: Risk assessment tool

Activity 2.7: Identify opportunities

Climate change may not only cause negative but also positive impacts, which should be identified by the workshop participants. For instance, increased rainfall may lead to increased water availability presenting by this the opportunity to enhance agricultural production or the potential for hydropower.

Step 3: Development of adaptation options

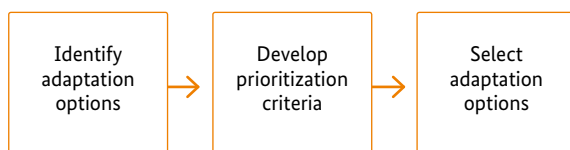
In its 5th Assessment Report, IPCC defines adaptation as “the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects”. According to OECD “Adaptation reduces the impacts of climate stresses on human and natural systems. It consists of a multitude of behavioural, structural and technological adjustments. Adaptation measures can vary in their timing (anticipatory vs. reactive; ex-ante vs. ex-post), scope (short-term vs. long-term; localised vs. regional), purposefulness (autonomous vs. planned; passive vs. active) and adapting agent (private vs. public; societies vs. natural systems). Examples of adaptation measures include changing crop varieties and altering farming practices, developing heat- and drought- resistant crops, diversifying livelihoods, building flood defences and land-use planning.”¹⁸

Developing adaptation options is a central element of the Climate Proofing process. It requires the involvement of all key stakeholders and sector specific know-how. For this, a participatory “adaptation workshop” including representatives from government, ministries, vulnerable groups and experts may be best suited.

Objective:

Adaptation options to address climate related risks and to take advantage of corresponding opportunities are developed and prioritized.

Activities:



¹⁸ OECD: Integrating climate change adaptation into development co-operation: Policy guidance (2009)

Activity 3.1: Identify adaptation options

An essential element of the Climate Proofing process consists of elaborating a list of adaptation measures aiming to respond to the specific risks, which have been identified and prioritized in step 2 of the process (though the adaptation measures may be justified even without considering these risks). In the interest of generating as full a catalogue as possible of adaptation options, it is recommended to develop these measures initially without regard to their feasibility, cost, or other limiting factors. In order to generate as many creative ideas for adaptation options as possible, it is furthermore necessary to involve a broad group of experts on the system of concern into the process.

Adaptation measures may be classified into:

- “Soft” adaptation measures, enhancing adaptive capacities (e.g. communication, information, capacity building, developing policies and strategies, institutional arrangements, etc.)
- “Hard” adaptation measures, risk and vulnerability reducing technologies (e.g. dams, piles, reinforced buildings, change of management methods, etc.)

Another methodological approach for identifying adaptation measures is based on the former used risk assessment tool (see Figure 2). Risks identified as “high-level” or “medium-level” risks may be reduced to “low-level” risks either by:

- reducing the probability of an impact (prevention measures), or by
- reducing the gravity of an impact (protection measures).

Moreover, the workshop participants may use general considerations to identify and develop adaptation options (see ANNEX 4). Furthermore, it may be of interest to develop adaptation options generating mitigation co-benefits, for instance reducing GHG-emissions through reforestation activities.

If the workshop participants require additional information or wish to have an idea of which adaptation measures have been developed in other countries or regions, they may refer to the various platforms and information sources available (see ANNEX 3).

Activity 3.2: Develop prioritization criteria

After having identified adaptation options, it is required to evaluate and select some for integration or implementation. The measures can be prioritised using various methods. An easy and popular prioritisation method is the adaptation decision matrix, which is a form of multi-criteria analysis (MCA). For this, the workshop participants must develop a list of prioritization criteria first (for examples see Table 2).

Criteria	Description
Strategic relevance	<ul style="list-style-type: none"> Option responds to particular vulnerable regions, sectors or groups Option has a reliable long-term impact on the objective (e.g. risk reduction) Option helps to prevent dramatic or irreversible damages.
Emergency	<ul style="list-style-type: none"> Climate stimuli are already perceptible or will occur soon Long-term decisions on investments or development strategies are being taken
Secondary effects	<ul style="list-style-type: none"> Option contributes to achieve other relevant objectives (sustainability, biodiversity) option has positive impacts on other fields of action (win-win solutions, climate protection, sustainable development)
No regret	<ul style="list-style-type: none"> Option generates positive impacts irrespective of whether climate change impacts will occur or not Option generates positive impacts independent of the emission scenarios used
Flexibility	<ul style="list-style-type: none"> Option may easily be modified Option is reversible
Poverty	<ul style="list-style-type: none"> Option has a positive impact on poverty reduction
Economic aspects	<ul style="list-style-type: none"> Option requires little resources Medium and long-term benefits exceed costs
Political and social acceptability	<ul style="list-style-type: none"> There is a window of opportunity for implementing the option
Mitigation co-benefits	<ul style="list-style-type: none"> Option generates mitigation co-benefits

Table 2: Examples for prioritization criteria

Activity 3.3: Screen, prioritize and select adaptation options

Once the prioritization criteria have been developed, they are used to screen and prioritize the previously identified adaptation options. For this, the workshop participants will give a score (points) to every adaptation option regarding its level of matching each of the criteria (from “score 1=does not match at all” to “score 5=matches very much”).

Criteria	Adaptation Options (Score 1-5)		
	Adaptation Option 1	Adaptation Option 2	Adaptation Option 3
Relevance?	2	4	1
Economic (cheap)?	4	1	3
Impact on poverty?	4	2	3
Emergency?	2	5	1
No regret?	2	4	3
Total Score	14	16	11
Ranking	2	1	3

Levels: Adaptation options: 1=does not match at all; 5=matches very much
Table 3: Example for an adaptation decision matrix (without criteria weighting)

The total score of points obtained leads to a ranking of the adaptation options (see example in Table 3).

In order to take into account political and strategic priorities of the country or sector it is possible to weight the criteria (levels: “1=less important”; “2=important”; “3=very important”). Consequently, the weight can influence the ranking of adaptation options (see example in Table 4).

Criteria	Criteria Weight (1-3)	Adaptation Options (Score 1-5)		
		Adaptation Option 1	Adaptation Option 2	Adaptation Option 3
Relevance?	2	2x2=4	4x2=8	1x2=2
Economic (cheap)?	3	4x3=12	1x3=3	3x3=9
Impact on poverty?	3	4x3=12	2x3=6	3x3=9
Emergency?	1	2x1=2	5x1=5	1x1=1
No regret?	2	2x2=4	4x2=8	3x2=6
Total Score		34	30	11
Ranking		1	2	3

Levels: Adaptation options: 1=does not match at all; 5=matches very much
Criteria Weight: 1=less important; 2=important; 3=very important
Table 4: Example for an adaptation decision matrix (with criteria weighting)

Economic approaches for assessing climate change adaptation

A study carried out by GIZ proposes [economic approaches for assessing climate change adaptation options under uncertainty](#), including Excel tools for cost-benefit (CBA) and multi-criteria analysis (MCA):

- [GIZ cost benefit analysis template \(Excel\)](#)
- [GIZ multi-criteria analysis template \(Excel\)](#)

Practice examples from Mexico:

- [Practice example from Mexico on cost-benefit analysis \(CBA\)](#) (for prioritising adaptation measures; including link to CBA method brief)
- [Practice example from Mexico on multi-criteria-analysis \(MCA\)](#) (for prioritising adaptation measures in three sectors: irrigated agriculture, water, forest ecosystems; including link to MCA method brief)

After having prioritized adaptation options, they will be selected to be implemented, postponed or rejected.

Note to prioritization methods:

A **multi-criteria-analysis** (MCA) is suitable when more criteria are thought to be relevant, and when quantification and valuation in monetary terms is not possible. MCA is normally used for the ranking of options. But if the “do-nothing” case is included as an alternative, it can also help to clarify whether the measure is better than simply “bearing with the situation”. Subjective judgement plays an important role in this method, making outcomes more arbitrary than with a cost-benefit-analysis.

A **cost-benefit-analysis** (CBA) can handle optimisation and prioritisation; it also provides an absolute measure of desirability, albeit judged by only one criterion: economic efficiency. CBA has comparatively heavy data requirements (and may need specific know-how in economics). When judging the costs of options, the **costs of non-action** may also be considered.

Given that CBA is the more objective method and can handle optimisation, it may be the most desirable option. However, this depends on the purpose and stage of the analysis. In cases where important criteria cannot be accommodated in CBA (such as sociological or cultural barriers), or when benefits cannot be quantified and valued (such as the benefits of preserving biodiversity), MCA is preferred. If desired, the outcomes of CBA can be incorporated into MCA, making the overall analysis a hybrid one.

Expert judgement is a qualitative method, which can support the prioritisation of adaptation options at project level.

Adapted from: OECD: Integrating climate change adaptation into development co-operation: Policy guidance – ISBN-978-92-64-05476-9 © OECD 2009

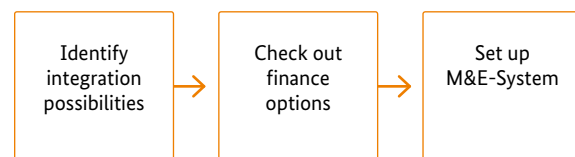
Step 4: Integrating selected adaptation options into planning and budgeting processes

The 4th step of the Climate Proofing process aims at integrating the selected adaptation options and identified opportunities into planning or budgeting documents as well as respective monitoring and evaluation processes. Furthermore, corresponding financing options have to be investigated.

Objective:

The selected strategy, policy, plan or programme takes into account climate change related risks and opportunities.

Activities:



Activity 4.1: Identify integration possibilities

The way, how adaptation options are integrated into planning and budgeting documents, highly depends on the level at which they are planned to be implemented. Accordingly, the Climate Proofing process stakeholders will define, adapt or redesign the respective planning, including planned policy or strategy formulations and/or national, sectoral, local or project development plans. They will develop recommendations to revise objectives, indicators, programmes or activities in order to get identified adaptation options integrated.

Depending on the entry point, the modifications developed by the stakeholders of the Climate Proofing process may take the form

- either of a revised “Climate Proof document” with integrated adaptation measures (for planning or budgeting documents in revision phase),
- or of a specific amendment document (for already established planning or budgeting documents, which may be difficult to change).

Activity 4.2: Investigate finance options

The identified adaptation measures and projects may either have to be covered by the national budget or by resources from a horizontal fund for adaptation¹⁹. In case of financing the adaptation options by integrating them into the national budget, related costs will have to be negotiated with the Ministry of Finance. Otherwise, an increasing number of mechanisms and initiatives within the global climate finance architecture present many opportunities to finance climate and adaptation activities. The global climate finance architecture is however complex and evolving. The Heinrich-Böll Foundation in co-operation with ODI monitors the evolution of climate funds²⁰ and provides information on the growing number of international climate finance initiatives in order to help developing countries address the challenges of climate change. According to the Böll foundation “funds flow through multi-lateral channels – both within and outside of UNFCCC financing mechanisms – and increasingly through bilateral channels, as well as in some recipient countries through national climate change funds.”

- The largest sources of approved funding for adaptation projects are currently²¹:
- Least Developed Countries Fund (LDCF) administered by the Global Environmental Facility,
- Pilot Program for Climate Resilience (PPCR) of the World Bank’s Climate Investment Funds,
- Special Climate Change Fund (SCCF), and
- Adaptation Fund (AF).

Zambia has already accessed several multilateral climate finance funds. Some of these are listed below (see Table 5).

19 A horizontal fund for adaptation is managed by a central body such as a Planning or Finance Ministry. Sectoral ministries could then draw on this fund to meet the additional costs of integration.

20 www.climatefundsupdate.org

21 Caravani A. et al. 2013) : Climate Finance Thematic Briefing: Adaptation Finance, in Climate Finance Fundamentals 3 (November 2013), Heinrich-Böll Stiftung, Washington

22 Watson, C. et al.: Understanding Climate Finance Readiness Needs in Zambia, Bonn (2013), p.17

Project	Funder	Approved Year	Approved (US\$ millions)
Adaptation to the effects of drought and climate change in Agro-ecological Zone 1 and 2 in Zambia	LDCF	2009	3.5
Preparation of the National Adaptation Programme of Action (NAPA)	LDCF	2004	0.2
Strengthening Climate Information and Early Warning Systems in Eastern and Southern Africa for Climate Resilient Development and Adaptation to Climate Change - Zambia	LDCF	2012	4
Private Sector Support to Climate Resilience in Zambia (project preparation grant)	PPCR	2012	0.4
Strengthening Climate Resilience in Kafue River Basin (AfDB) (project preparation grant)	PPCR	2011	1.4
Strengthening Climate Resilience in Zambia/Barotse (IBRD) (project preparation grant)	PPCR	2011	1.5
Design of national Strategic Programs for Climate Resilience (SPCR) (phase 1 funding)	PPCR	2010	1.5
Increased Access to Electricity Services	GEF	2010	4.5
Sustainability of the Miombo Ecoregion through the Enlargement and Improved Management of Protected Areas	Germany’s ICI	2008	3.1
UN-REDD national programme - Zambia	UN-REDD	2010	4.5
Note that this table does not capture contributions outside of dedicated climate funds and initiatives. (Source: www.climatefundsupdate.org , June 2013).			24.6

Table 5: Multilateral climate finance funds for Zambia²²

The Green Climate Fund

In future a significant part of international climate related resources will be channelled through the **Green Climate Fund** (GCF). It is widely expected to become one of the key sources of international climate finance in the future. The ambitious objective of the Fund is to promote a paradigm shift towards low-carbon and climate-resilient development.

At the time of writing final decisions on the GCF are still being made and processes to access funds are still being implemented. During its 5th Meeting in October 2013, the Board of the Fund recalled that the Green Climate Fund will have a strategic focus on climate change mitigation and adaptation while seeking at the same time to maximize sustainable development. The Board furthermore “reaffirmed that country ownership will be a core principle of the business model framework of the Fund and that countries will identify their priority result areas in line with their national strategies and plans”.

In March 2014, at its 6th meeting, the GCF-Board decided on two essential policies required for GCF capitalization. Firstly, it confirmed that the Fund will finance adaptation and mitigation measures in a 50:50 ratio. Secondly, it also reserved a minimum half of all of its adaptation spending for particularly vulnerable countries, such as LDCs and SIDS.²³

At its 7th meeting in late May 2014, the Board completed a number of essential requirements for the Fund to receive, manage and disburse financial resources, and thus laid the foundation for pledges from the donor community. Among others, it adopted a decision on accreditation processes for institutions to access the Fund, which reflect the Fund’s fiduciary principles and standards as well as environmental and social safeguards (ESS).²⁴

The Fund has already contacted Zambia and the IICCS in order to establish a focal point or National Designated Authority (NDA) for communication. For the most up to date information and decisions on the GCF, please refer to www.gcfund.org. For an indication of the key areas in which the Fund will be active, please refer to the “Initial Result Areas” of the Fund, contained in Annex 5. At this stage this might assist the project identification process in the country. In addition, find the Initial Performance Indicators of the GCF in the same Annex to help better understand the key focus of the Fund in relation to the projects and programmes it intends to support.

To access climate finance, it will be necessary to check all identified adaptation measures against the specific requirements of the various climate funds and assess if proposals for bankable projects in line with national priorities can be developed. The information used in this Climate Proofing should provide a basis for such an assessment.

Activity 4.3: Set up a monitoring and evaluation system

The Climate Proofing process does not end with the revision of planning or budgeting documents. In order to entirely integrate adaptation into planning and budgeting processes, identified and integrated adaptation measures also have to be subject to regular monitoring and evaluation procedures. The monitoring and evaluation stage consists of the assessment of progress against set targets and objectives. Monitoring and evaluation instruments include an array of reporting tools, including budget execution reports. Several sub-activities have to be carried out:

A. Develop indicators

Indicators suitable for adaptation monitoring and evaluation systems can be developed at various levels (see Figure 3):

- Climate trends and extremes
- Biophysical performance (e.g. yields)
- Climate change impact monitoring
- Socioeconomic performance (e.g. income)
- Result-based monitoring of adaptation options
- Impact evaluation of adaptation options
- Adaptation expenditure

A methodology consists of considering adaptation measures in a result chain approach and developing indicators at various levels (see example in Figure 4)²⁵:

- Input
- Activity
- Output
- Outcome

Regarding performance indicators, it is necessary to ensure a gender-differentiated perspective, by developing for instance indicators with respect to female-headed households.

B. Observe and interpret indicator values over time

In a next step, indicators will have to undergo a regular monitoring process. If climate change related topics and measures are included in National Development Plans, sector strategies and programmes, the related indicators would need to be integrated in existing M&E systems.

²³ http://us.boell.org/sites/default/files/boell_gcf_bm6_summary_report_crunchtime.pdf

²⁴ <http://germanwatch.org/en/download/9263.pdf>

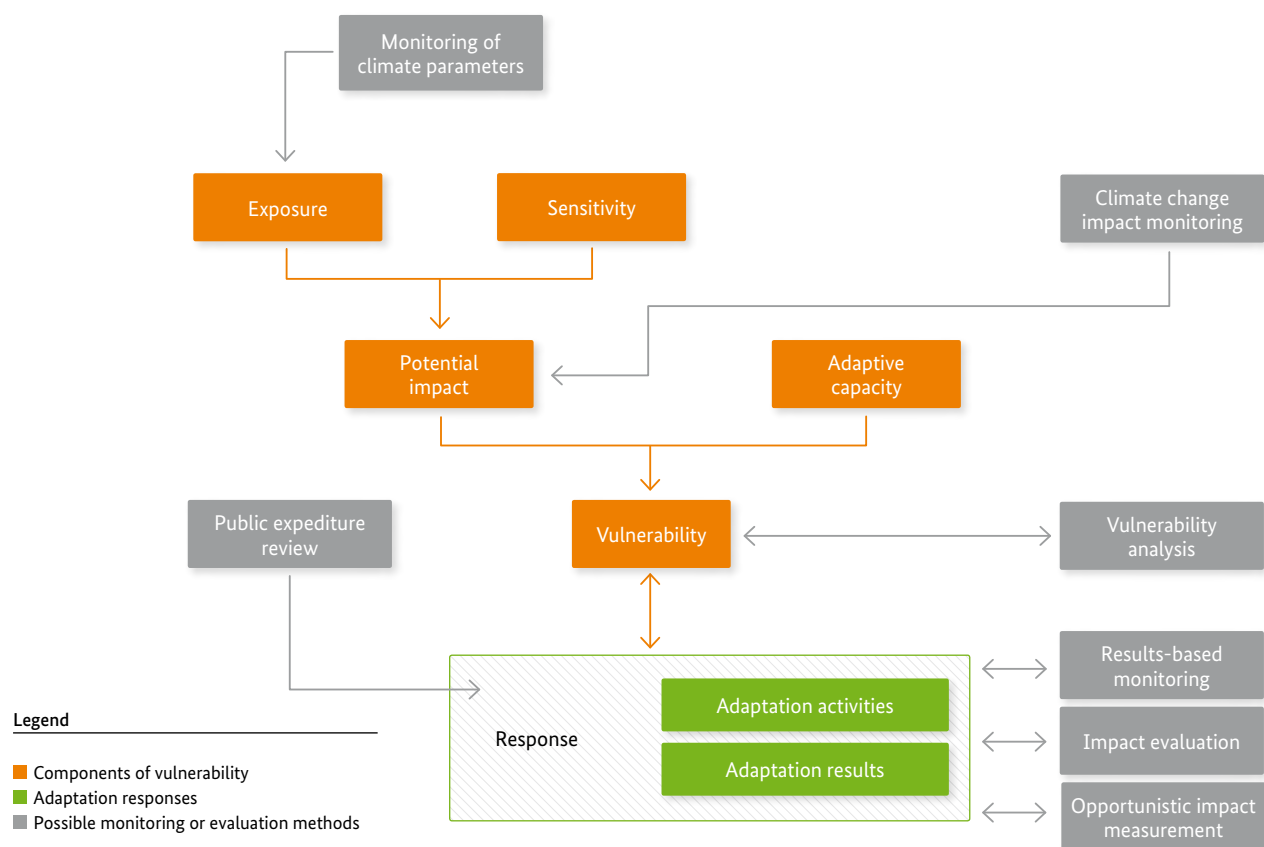


Figure 3: Potential monitoring methods²⁶

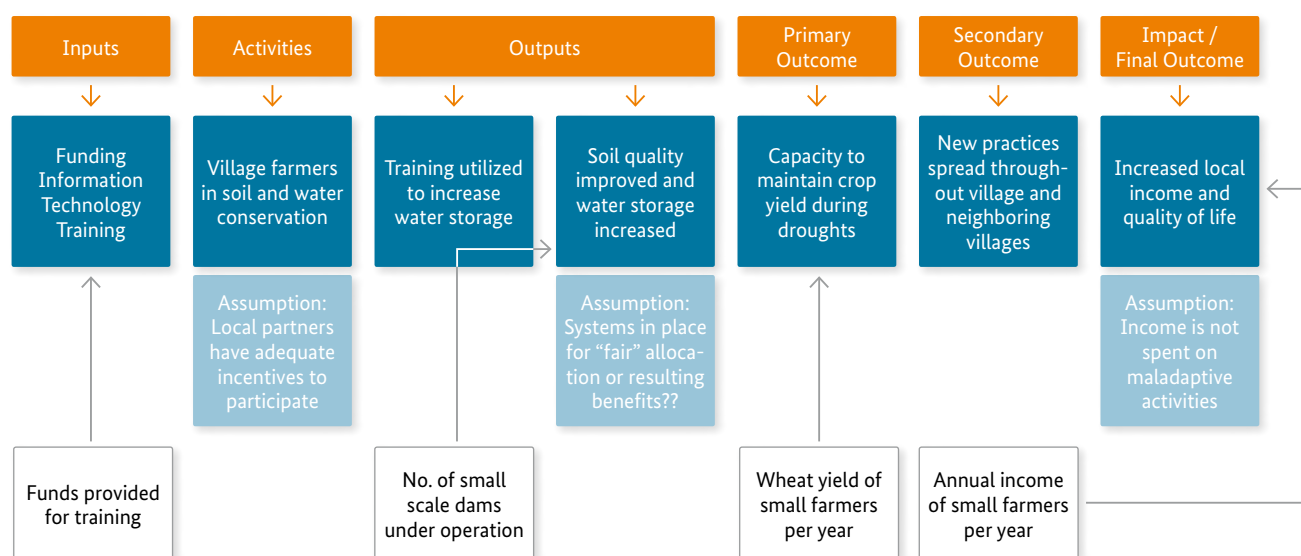


Figure 4: Example for indicators developed in a result chain approach²⁷

²⁵ For further details please see GIZ (2013): Adaptation made to measure. A guidebook to the design and results-based monitoring of climate change adaptation projects. https://gc21.giz.de/ibt/var/app/wp342deP/1443/?wpfb_dl=52

²⁶ GIZ (2013): National Monitoring and Evaluation of Climate Change Adaptation: <http://star-www.giz.de/fetch/Sp8a5X001H00gaG00Q/giz2013-0532en-climate-national-monitoring-evaluation.pdf>

²⁷ For detailed information please refer to: WRI/GIZ (2011): Making Adaptation Count. http://pdf.wri.org/making_adaptation_count.pdf

Relevance of national M&E of adaptation

With increasing volumes of adaptation finance, and growing numbers of adaptation activities and strategies at the national level the need for robust monitoring and evaluation (M&E) approaches is growing alike. So far M&E of adaptation has primarily been conducted on the project-level, often based on logframe or results-based monitoring frameworks of donor and technical cooperation organizations. However, governments need information beyond the effectiveness of stand-alone adaptation projects in order to steer and manage the process of climate resilient development. National and more strategic approaches to climate change adaptation have further gained importance in the context of the National Adaptation Plan (NAP) process, established as part of the Cancun Adaptation Framework under the UNFCCC. As national and regional adaptation strategies and plans are moving from the planning to the implementation phase monitoring systems need to be established providing answers to questions like:

- How does climate change evolve? Which climate change impacts require most attention?
- Which adaptation activities are being implemented in our country? Who does what?
- Are these activities in line with our national adaptation and development goals?
- How much money is being spent on adaptation activities and is it spent effectively?
- Which sectors, regions and social groups benefit from these adaptation activities?
- Are we on the right track in order to achieve national adaptation and development goals?
- Do adaptation interventions actually reduce vulnerability of climate-sensitive sectors and highly vulnerable groups?
- Which adaptation approaches work and which do not? Under which conditions and why?

Depending on the objective and complexity of the national M&E system it can help with ...

- increasing knowledge on climate change impacts and climate vulnerabilities as a basis for planning and decision making;
- ensuring an effective resource allocation to the most vulnerable sectors, regions and social groups;
- tracking, steering and revising adaptation plans and activities, e.g. in the context of NAPAs and NAPs;
- improving accountability and reporting on adaptation and its effectiveness to domestic and international stakeholders, e.g. as part of the National Communication to the UNFCCC;
- promoting evidence-based national and international learning on adaptation.

From: GIZ/BMZ: National Monitoring and Evaluation (M&E) of Climate Change Adaptation, Eschborn (July 2013)

A recent study by IISD and GIZ (2013) compares ten national adaptation M&E systems and provides recommendations for setting up such systems²⁸.

If capacities regarding adaptation monitoring are lacking, capacity development measures have to be considered²⁹.

3. Application and entry points for Climate Proofing in Zambia³⁰

This chapter describes potential Climate Proofing applications and entry points at the national, sectoral and local levels in Zambia. It identifies points of intervention in Zambian planning and budgeting processes to enable the consideration of climate change risks and the integration of adaptation to climate change.

3.1 National level

Adaptation to climate change constitutes a major development challenge and needs therefore to be mainstreamed into the national governance organisation and processes. Adaptation at the national level requires adjustments to the national governance framework to make it responsive to the potential impacts caused by climate change. Policies and investment decisions have to be adapted in order to mitigate the risks posed and opportunities offered by the changing climate.

Policy formulation stage

Zambia has established several key processes at the policy formulation stage including a long-term vision and national development strategies, which provide the overarching framework for the development of operational plans and resource allocation.

Zambia's Vision 2030 is Zambia's first ever written long-term plan, expressing Zambians' aspirations to become "a prosper-

28 IISD & GIZ (2013): Monitoring and Evaluating Adaptation at Aggregated Levels: A comparative analysis of ten systems: https://gc21.giz.de/ibt/var/app/wp342deP/1443/?wpfb_dl=163

29 For example, the GIZ Training on Monitoring and Evaluating Adaptation: <https://gc21.giz.de/ibt/var/app/wp342deP/1443/index.php/knowledge/monitoring-evaluation/tools-and-training-material/>

30 For detailed information please refer to : OECD: Integrating climate change adaptation into development co-operation: Policy guidance, chapters 6-13



ous middle-income nation by 2030". It articulates possible long-term alternative development policy scenarios at different points, which would contribute to the attainment of the desirable social economic indicators by the year 2030. Elaborated in 2006, the Vision 2030 is a result of a nation-wide consultative process involving various stakeholders who included among others traditional leaders, civil society, government departments, cooperating partners and ordinary citizens. Although representing Zambia's key long-term plan, the Vision 2030 does not take into account climate change related risks and opportunities.

The Vision is being operationalized through five-year development plans starting with the Fifth National Development Plan (2006 2010) and annual budgets. This marks a departure from past practice of preparing and implementing medium-term plans that were not anchored on a national vision. Due to the political changes in Zambia (elections and change of Government in September 2011), the Sixth National Development Plan (SNDP), which covers the period 2011 – 2015, has been revised in order to comply with new political and strategic orientations. This revised version (R-SNDP), adapted to the period 2013 – 2016, constitutes the main overarching planning document for Zambia.

Climate Proofing processes have already been applied to the SNDP (August 2010) and the R-SNDP (July 2013) identifying climate risks and opportunities and proposing adaptation options.

Planning stage – multi-year development plans

The planning stage comprises the **formulation and costing** of multi-year development plans based on top-down input from national policies and bottom-up input from sector-level development plans. This translates higher-level policy objectives into operational action plans and budgets.

Zambia's national development plans usually cover a five-year period (except for the current Revised Sixth National Development Plan (SNDP) adapted to the 2013 - 2016 period). They set out development objectives and targets, define performance indicators and detail sectoral plans for achieving them. These plans are linked to the annual budget and the medium-term expenditure framework (MTEF).

As the planning stage has very concrete impacts on shaping downstream plans and programmes at the sectoral and other levels, it constitutes an excellent entry point for a Climate Proofing process.

Resource allocation – medium-term expenditure frameworks and national budgets

The resource allocation stage corresponds to the transcription of operational action plans into budgets. In Zambia, the medium-term expenditure framework (**MTEF**) and the annual national budget represent the main instruments at this level. Zambia's MTEF covers the first three years of the NDP. The **annual budget** determines the budget envelope that each sector has at its disposal to implement its sector-level development plans.

The Climate Proofing approach may be applied both at Zambia's annual budget and at its MTEF. A first Climate Proofing application has already been carried out for the 2014 budget.

3.2 Sector level

Policy decisions taken at the sector level directly affect activities within this sector, and potentially other sectors indirectly. As vulnerability and response options are highly sector-specific, integration of adaptation to climate change at sector level is essential.

In its National Policy on Climate Change, Zambia defines its **priority sectors and sub-sectors** regarding adaptation to climate change:

- Water
- Agriculture
- Forestry
- Energy
- Tourism and Wildlife
- Health
- Social Infrastructure and Human Settlements
- Physical Infrastructure

Zambia has developed and is implementing a series of sector policies and plans, which should be subjected to a Climate Proofing process.

Regarding the implementation of investments and activities, sectoral policy formulation, planning and programming are key steps.

Policy formulation stage

The policy formulation stage at sector level sets out the objectives to be attained in the sector and the associated policies to be implemented. At this stage, national policy targets are translated into **sector-specific policy options**, which then provide the basis for designing operational plans and the mobilisation of resources to implement them.

The policy formulation stage at sector level constitutes a key entry point for adaptation to climate change. Zambian sector ministries, donor organizations and other relevant stakeholders operating at the sector level need to ensure that:

- climate change adaptation priorities established at the national level are operationalized at the sector level, and that
- sector-specific information, experiences and challenges are taken into account while developing such priorities.

Planning stage

The **sector plan** translates the sector strategy into a set of concrete actions by specifying the various investments and activities to be implemented over a given time period in order to reach the objectives of the sector policy.

Sectoral plans provide an excellent entry point for integrating concrete climate change adaptation actions.

Resource allocation and sector programming stage

The sector programming stage includes the precise identification and costing of investments, activities or projects to be implemented in a sector within a given time horizon. In Zambia, sector-level budget envelopes are derived from and influence the national budget. Thereby, the volume of the sector plan depends on the availability of resources available in the national budget.

Compared to sector policies and plans, sector investment programmes are subject to more frequent revisions and adjustments, which presents an excellent entry point for the integration of adaptation activities.

3.3 Regional and local level

With respect to integrating adaptation to climate change risks, the local level is essential for three reasons:

1. climate change impacts are manifested locally, affecting local livelihood activities;
2. vulnerability and adaptive capacity are determined by local conditions;
3. adaptation activities are often best observed at the local level.

In Zambia, regional government institutions incorporate local development plans into regional development plans. Therefore, this chapter refers to both regional and local level.

Several key processes at regional and local level constitute potential entry points for Integrating climate change adaptation:

- Regional Development planning processes
- Local Development planning processes
 - Rural development plans
 - City development plans or strategies
- Adjusting local regulatory and
- Service provision frameworks
- Private sector development processes
- Civil society development processes

Pilot Case Application

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4. Pilot Case Application

4.1 Background

Objectives

The pilot case application aims at applying the Climate-Proofing methodology to a Zambian pilot program in order to illustrate its practical application. By this, the applicability of the manual can be tested and feedback gathered from its users. Furthermore, the practical application of the Climate-Proofing manual aims at developing capacities of Zambian institutions regarding the integration of climate related risks into planning processes.

Scope

The pilot case represents an exemplary application of the Climate-Proofing Manual in the Zambia specific context. It is meant to illustrate its applicability on a Zambian example. As time and resources allocated to the pilot application were limited, all single aspects of the pilot program could not be assessed and its results are therefore of restricted validity. Although the outcome of the pilot application may certainly be used to integrate climate related risk into the selected Zambian pilot program.

Methodology

The pilot case application was conducted

- by using the Zambia Climate Proofing Manual
- in a participative approach
- with technical support from Global21 Consulting
- under joint coordination between the GIZ Good Financial Governance Programme and the GIZ Climate Finance Readiness Programme (CF Ready).

It was carried out in several phases:

	Phase	Step
March 2014	Phase 1	Preparation
March 2014	Phase 2	Workshop 1: • Risk analysis • Identification of adaptation options
May 2014	Phase 3	Prioritization of adaptation options
May 2014	Phase 4	Workshop 2: • Integration

4.2 Climate Proofing the Zambian Livestock Programme

Step 1: Preparation of the process

Process governance

Based on discussions between Ministry of Finance, sector ministries and GIZ, the Zambian livestock program was chosen for the Climate-Proofing pilot application.

MoF was appointed by the workshop participants to lead the Climate-Proofing process.

Ministry of Agriculture and Livestock (MAL) assumed the technical leadership and appointed a Senior Livestock Production Officer as process manager.

Stakeholders

In order to gather a wide range of different areas of expertise and interests, MAL in cooperation with MoF and GIZ identified the most relevant public and private institutions for the process. The group of stakeholders, named by their institutions for the Climate-Proofing process of the Zambian Livestock program, was composed of 12 persons, including:

- 1 planning officer (MoF)
- 1 Engineer (MAL)
- 1 Senior Livestock Production Officer (MAL)
- 2 Principal Veterinary Officers (MAL)
- 1 Animal Health and Production Manager (Livestock Development Trust - LDT)
- 1 Chief Planner (MAL)
- 1 Senior Economist (Zambia National Farmers Union - ZNFU)
- 1 Principal Livestock Production Officer (MAL)
- 1 I.C.T Support (Livestock Development Trust - LDT)
- 1 Principal Tse-tse Control Biologist (MAL)
- 1 Livestock Research Officer (MAL)

Technical support was provided by

- GIZ Good Financial Governance Programme
- GIZ Climate Finance Readiness Programme
- Global21 Consulting

Involvement of the appropriate stakeholders is key for the success of the climate proofing process. Additional stakeholders in this process could therefore also be the ministerial focal points on climate change, as well as representatives of the IICCS.

Information sources

In order to save precious workshop preparation time, the stakeholders did not assess in detail all information sources regarding climate change and/or livestock in Zambia. The Climate-Proofing process was carried out on the basis of the participants' in-depth know-how.

For climate projections, participants used in particular the "Climate-Fact-Sheet Zambia" (Climate Service Center) by extracting relevant information regarding probable future climate developments in Zambia.

Step 2: Risk Analysis

The risk analysis step was carried out during a participative workshop, held in Lusaka from 27th to 28th of March 2014, and in accordance with step 2 of the Zambia Climate-Proofing Manual.

Exposure unit

The workshop participants confirmed the Livestock Programme as main exposure unit for the Climate-Proofing process. After intense discussions and based on their know-how, they identified three sub-exposure units:

- Cattle
- Goats
- Sheep

For the further work, it has however been decided to keep focussing on the entire livestock programme and not to carry out a Climate Proofing for each of the sub exposure units.

Current situation

According to the workshop participants' experience and know-how, climate change signals are already being experienced in Zambia, in particular:

- Temperature:
 - Temperature rise
 - Less frost

- Rainfall:
 - Shorter rain seasons
 - Longer dry spells
 - Heavier downpours
 - Patchy distribution of rainfall

Climate models clearly confirm these observed temperature trends for Zambia, but are less confident regarding observed rainfall pattern changes. The workshop participants however agreed that these changes are obviously occurring and need to be taken into account.

Climate projections

By assessing available information on climate projections, the Climate-Proofing stakeholders identified a series of climate change stimuli:

- Temperature:
 - Temperature increase between 1,9 and 4,8°C by the year 2100
 - Increase in heatwaves
 - Decrease in cold spells (may be area-specific)
- Rainfall:
 - Shorter rain seasons
 - Increase in dry spells
 - Heavier downpours
 - Increase of year-to-year variability
 - Longer dry seasons

After intense discussions, the workshop participants agreed on the following climate stimuli being the most relevant for the Zambian livestock program:

- Temperature rise
- Shorter rain seasons
- Longer dry seasons

Potential biophysical impacts

In a next step, the workshop participants analysed the biophysical impacts, which may be caused in the future by the climate stimuli on the Zambian livestock programme.

Climate Stimuli	Biophysical impact
Temperature Rise	Increase in proportion of infected TseTse flies
	Anthrax spores become vegetative
	Increased outbreaks of New Castle Disease
Shorter rain season	Shorter crop season (reduced forage / crop residues available for feed)
	Reduced dry season water stock
Longer dry season	Increase of bushfires

Potential socio-economic impacts

In a subsequent step was analysed, which socio-economic impacts may result from previously identified biophysical impacts (see table 5.1).

Risk levels

In the last risk assessment step, the workshop participants applied the risk assessment tool, in order to:

- assess the probability of the potential biophysical impact
- determine the gravity of the potential socio-economic impact
- conclude the corresponding risk levels (see table 5.2).

Climate Stimuli	Biophysical impact	Socioeconomic impact
Temperature Rise	Increase in proportion of infected TseTse flies	Decrease of livestock production
		Reduction of meat and other livestock products' quantity and quality
		Increase of meat and other livestock products' prices
		Reduction of animal draft power for crop cultivation
	Anthrax spores become vegetative	Decrease of livestock production
		Increase of human mortality
		Reduction of meat and other livestock products' quantity
		Increase of meat and other livestock products' prices
	Increased out-breaks of New Castle Disease	Reduced poultry production
		Price increase in poultry and poultry products
Shorter rain season	Shorter crop season (reduced forage / crop residues available for feed)	Decrease of livestock production
		Increase of distance to grazing ground and water points
		Conflict of interest (grazing area vs. Vegetable gardens' crop cultivation)
		Rise of prices for forage to feed
		Reduction of meat and other livestock products' quantity and quality
	Reduced dry season water stock	Decrease of livestock production
		Increase of distance to grazing ground and water points
		Migration
		Conflict of interest (grazing area vs. Vegetable gardens' crop cultivation)
		Rise of prices for forage to feed
Longer dry season	Increase of bushfires	Dry season forage losses
		Losses of housing

Table 5.1: Potential socio-economic Impacts caused by climate projections

Opportunities

As climate change may not only cause negative but also positive impacts, the workshop participants have identified the following potential opportunities for the Zambian livestock programme:

- Chicken production may increase
- Use of charcoal may be reduced
- Tick and worm infections may be reduced

These potential opportunities may eventually be developed further in a specific exercise.

Step 3: Development of adaptation options

Identification of adaptation options

Based on their know-how as experts, the workshop stakeholders elaborated in a brainstorming process a first rough list of 35 adaptation options as potential responses to the previously identified high-risk impacts. In a further step, they finetuned the list by aggregating similar measures and produced a final list reduced to 18 adaptation options:

1. Control of TseTse flies
2. Vaccination of susceptible population
3. Anthrax control measures
4. New Castle vaccinations
5. Enhance irrigation
6. Water storage dam construction
7. Boreholes drilling
8. Firebreaks/ Fire Management
9. Aerial spraying
10. Enhance extension services
11. Encourage keeping trypano-tolerant breeds (livestock)
12. Stocking and restocking exercise through livestock breeding centers in disease free area
13. Import of livestock species for stocking and restocking
14. Develop breeding strategies to improve disease tolerant strains
15. Promotion of pasture establishment and water points (or promotion of rangeland/grazing land and pasture development more broadly)
16. Creation of fodder banks
17. Develop and propagate drought resistant varieties of crops and pastures
18. Provide drugs to treat anthrax patients

Prioritization criteria

In a next step, the process stakeholders identified in internal working group meetings several criteria to prioritize the previously elaborated adaptation options:

- Relevance (taking into account the adaptation option's contribution to achieve objectives of the livestock programme)
- Poverty Reduction (as strategic priority at national level)
- No regret (as criterion dealing with uncertainty of future climate change projections)
- Cost Efficiency (taking into account Zambia's limited economic resources)
- Job creation (as strategic priority at national level).

The process stakeholders decided to attribute an equal weight to each criterion.

Screening and prioritization of adaptation options

Once the prioritization criteria have been developed, they were used to screen and prioritize the previously identified adaptation options. For this, the workshop participants gave a score (points) to every adaptation option regarding its level of matching each of the criteria (from "score 1=does not match at all" to "score 5=matches very much").

The total score of points obtained lead to a ranking of the adaptation options (see table 5.3).

Climate Stimuli	Biophysical impact	Socioeconomic impact	Risk Level
Temperature Rise	Increase in proportion of infected TseTse flies (Probability=high)	Decrease of livestock production	High
		Reduction of meat and other livestock products' quantity and quality	High
		Increase of meat and other livestock products' prices	Medium
		Reduction of animal draft power for crop cultivation	High
	Anthrax spores become vegetative (Probability=high)	Decrease of livestock production	High
		Increase of human mortality	High
		Reduction of meat and other livestock products' quantity	Medium
		Increase of meat and other livestock products' prices	Medium
	Increased outbreaks of New Castle Disease (Probability=high)	Reduced poultry production	High
		Price increase in poultry and poultry products	High
Shorter rain season	Shorter crop season (reduced forage / crop residues available for feed) (Probability=high)	Decrease of livestock production	High
		Increase of distance to grazing ground and water points	High
		Conflict of interest (grazing area vs. Vegetable gardens' crop cultivation)	Medium
		Rise of prices for forage to feed	High
		Reduction of meat and other livestock products' quantity and quality	Medium
	Reduced dry season water stock (Probability=high)	Decrease of livestock production	High
		Increase of distance to grazing ground and water points	High
		Migration	Medium
		Conflict of interest (grazing area vs. Vegetable gardens' crop cultivation)	Medium
		Rise of prices for forage to feed	Medium
Longer dry season	Increase of bushfires (Probability=high)	Dry season forage losses	High
		Losses of housing	Low

Table 5.2: Risk assessment

Criteria	Adaptation Options									
	Criteria weight	Control of TseTse flies	Vaccination of susceptible population	Anthrax control measures	New Castle vaccination	Enhance irrigation	Water storage dam construction	Boreholes drilling	Firebreaks/ Fire Management	Aerial spraying
Relevance	2	2	3	4	5	5	4	4	3	3
Poverty Reduction	2	3	2	3	4	4	3	3	2	2
No regret	2	3	2	2	2	2	2	4	1	2
Cost Efficiency	2	3	2	2	3	2	3	2	2	4
Job creation	2	2	2	2	3	3	4	2	3	3
Total score		26	22	26	34	32	32	30	22	28
Rank		11	15	11	2	6	6	8	15	9

Table 5.3: prioritized adaptation options

Selection of adaptation options

The results obtained from the prioritization process were presented to political decision-makers who selected a final list of 5 adaptation measures to be implemented:

1. Stocking and restocking exercise through livestock breeding centers in disease-free areas
2. Import of livestock species for stocking and restocking
3. Promotion of pasture establishment and water points
4. Upscaling of Tsetse-flies control
5. Vaccination of susceptible population

Step 4: Integration

The final step of the Climate Proofing process aims at identifying suitable entry points for the previously selected adaptation measures, identifying and verifying potential sources for financing and developing monitoring and evaluation indicators. The integration step of the Climate Proofing process for Zambia's livestock programme was carried out in a participative workshop, held in Lusaka in May 2014.

Identify integration possibilities

Considering the sectoral focus of the livestock programme, the workshop participants agreed that the results from the Climate Proofing process should be integrated into a sector document. They agreed on **Zambia's National Agriculture Strategy**,

in particular the Livestock sub-sector section, to be most suitable for integration.

Several arguments reinforce this decision:

- Most adaptation measures selected are already ongoing activities and climate change risks represent an additional argument for their implementation.
- MAL is interested in submitting a revised strategy soon (a window of opportunity to introduce the results from the Climate Proofing process).
- Revision process is planned to take place in 2014/2015.

The revision process will be piloted by the MAL Director of Planning and based on a standardized process (CAB-MEMO). IICCS will play a major role in integrating the formerly selected adaptation measures.

Investigate finance options

In a further step, the workshop participants identified potential sources for financing the adaptation measures. Table 6 summarizes the discussion results.

Therein some of the possible international climate funds are considered. In addition, the GCF may represent a significant source of funding for the adaptation options listed, once it commences its disbursement of funds.

In a next step the different finance options will have to be investigated in more detail, in order to assess what the most

	Enhance extension services	Encourage keeping trypano-tolerant breeds (livestock)	Stocking and restocking exercise through live-stock breeding centers in disease free area	Import of livestock species for stocking and restocking	Develop breeding strategies to improve disease tolerant strains	Promotion of pasture establishment and water points	Creation of fodder banks	Develop and propagate drought resistant varieties of crops and pastures	Provide drugs to treat anthrax patients
	4	5	5	5	4	4	2	3	2
	3	4	4	4	2	3	2	3	1
	2	2	2	2	2	4	2	2	3
	1	3	2	3	1	3	1	2	2
	2	4	4	3	3	3	3	4	3
	24	36	34	34	24	34	20	28	22
	13	1	2	2	13	2	18	9	15

✓	available
○	partly available
✗	not available

		Finance options								
		National Budget	Adaptation Fund	Norway and GCCA: Conservation Agriculture (FAO)	COMESA Climate Change support to member countries	CIF / PPCR	Least Developed Countries Fund	CTI-PFAN	AfDB Livestock Investment Support Programme	Constituency Development Fund (CDF)
Adaptation measures	Stocking and restocking exercise through livestock breeding centers in disease-free areas	○	✓	✗	✓	✓	✓	✓	✗	✓
	Import of livestock species for stocking and restocking	✗	✓	✗	✓	✓	✓	✓	✗	✗
	Promotion of pasture establishment and water points	○	✓	✓	✓	✓	✓	✓	✓	✓
	Upscaling of Tsetse-flies control	✓	✓	✗	✓	✓	✓	✗	✗	✗
	Vaccination of susceptible population	✓	✓	✗	✓	✓	✓	✗	✗	✗

Table 6: Finance options for adaptation measures in Zambia's livestock program

promising sources of finance may be. Depending on the available funding source it may be possible for the full cost of the adaptation option to be covered or merely for the incremental cost, which arises from turning an investment into a climate-resilient investment. In order to coordinate the application to the funding sources liaison with the respective contact and focal points and national coordination bodies (e.g. the Designated Authority of the Adaptation Fund, or, prospectively, the National Designated Authority (NDA) of the GCF) is crucial.

Set up a monitoring and evaluation system

Finally, the workshop participants defined potential indicators at different levels in order for the options and the respective funding to be monitored and evaluated appropriately:

Climate stimuli	Biophysical impacts	Socioeconomic impacts	Outcome of adaptation measures
Temperature rise	% of infected Tsetse-flies	Human mortality due to Anthrax	Revenues of livestock farmers
Rainfall patterns	% of incidences of livestock diseases	Livestock production (number of animals)	Budget allocated to adaptation measures
	% of animals with access to water during dry season	Livestock production (tons of meat)	
	% of animals with access to water during dry season		

Table 7: Indicators for adaptation measures in Zambia's livestock program

Additionally, output indicators were defined for each adaptation measure:

Adaptation measure	Output indicator
Stocking and restocking exercise through livestock breeding centers in disease-free areas	■ Number of farmers having received livestock from breeding centers
Import of livestock species for stocking and restocking	■ Number of animals imported
Promotion of pasture establishment and water points	■ Area of pasture land established ■ Number of dams built and boreholes drilled
Upscaling of Tsetse-flies control	■ Area covered by control measures
Vaccination of susceptible population	■ Percentage of livestock vaccinated

Table 8: Output indicators for adaptation measures in Zambia's livestock program

In a further discussion, the workshop participants identified several challenges regarding the set-up of a M&E-system:

- Indicators need to be quantified
- Are baselines available?
- Will data be available?
- How to attribute output and outcome clearly to a specific adaptation measure (attribution gap)?
- In a further step, M&E must be adapted to specific requirements of climate funds
- Capacities for M&E may not be sufficient

Lessons Learned and Follow-Up

Lessons learned

During a final feedback session, the workshop participants resumed impressions and lessons learned from the pilot application of the Climate Proofing manual:

- Overall the approach was described “as very practical”, and
- The flexibility of the CP Tool was considered an advantage.
- Participants highlighted, that the Climate Proofing and respective engagement of various stakeholders “helps to justify adaptation activities and/or funding”
- In order for the process to succeed it is “necessary to create more awareness regarding climate change related risks” in general and specifically amongst the decision makers
- The wide stakeholder engagement and presentation of their respective expertise “opened the eyes” of participants that climate change is already happening and causing impacts in Zambia
- The process of bringing together people from different disciplines was considered helpful and instructive
- It was pointed out that one challenge is that “climate change adaptation is competing with other political priorities”
- Climate Proofing was a welcome opportunity to “give ideas about funding options” from a variety of backgrounds.
- Especially the importance of engaging a wide stakeholder group throughout the process and it was recognized that the process should bring in “people from civil society organisations, vulnerable groups and private sector.”
- In order to allow the focus on the Climate Proofing process it was suggested that it would be helpful to organize the respective workshops out of town

Follow-up

Furthermore, the workshop participants identified opportunities for future activities regarding Climate Proofing in Zambia:

- Climate Proofing manual will be as starting point for Climate Proofing sector guidelines currently being developed under the PPCR
- Bring Climate Proofing to the district level
- Promote Climate Proofing tool to ministries, NGO's farmers' union
- Organize a training of trainers for the Climate Proofing Manual
- Make the Climate Proofing manual available to:
 - Training institutions
 - Libraries
 - Planners
 - Academic institutions
- Set Climate Proofing manual in an attractive print layout
- Organize distribution of print copies
- The manual will be used as precedent for future Climate Proofing activities
- Ministry of Tourism is planning to apply the manual
- Climate Proofing strengthens risk management in planning

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Annex 1: Zambian stakeholders related to climate change

GOVERNMENT INSTITUTIONS AND ADMINISTRATION

- Ministry of Finance
- Ministry of Lands, Natural Resources and Environmental Protection
- Interim Climate Change Secretariat (Ministry of Finance)
- Ministry of Mines, Energy and Water Development
- Ministry of Agriculture and Livestock
- Zambia Meteorological Department (Ministry of Transport, Works, Supply and Communications)
- Disaster Management and Mitigation Unit
- Zambia Environmental Management Authority (ZEMA)
- Ministry of Commerce, Trade and Industry
- Ministry of Transport and Communications
- Ministry of Health
- Ministry of Community Development and Mother and Child Health
- National Technology Business Centre (NTBC)

BILATERAL AND MULTILATERAL PARTNER ORGANIZATIONS

- World Bank
- UNDP
- GIZ
- KfW
- FAO
- AfDB
- Finish Embassy

SCIENTIFIC INSTITUTIONS AND CONSULTING COMPANIES

- Centre for Energy Environment and Engineering (Z) LTD. (CEEEZ)
- Zambia Institute of Environmental Management
- National Institute for Scientific and Industrial Research
- Zambia Agriculture Research Institute
- Natural Resources Development College (NRDC)
- Whydah Consulting

NON-GOVERNMENTAL ORGANIZATIONS

- Zambia Civil Society Climate Change Network
- Civil Society Environment Fund
- Wildlife and Conservation Society of Zambia
- The World Wide Fund for Nature

PRIVATE SECTOR

- Zambia Association of Chamber of Commerce and Industry
- Zambia National Farmers Union
- Lloyds Financials Limited

REGIONAL INSTITUTIONS

The “Southern African Science Service Centre for Climate Change and Adaptive Land Management - SASSCAL” provides a list of Zambian stakeholders who may be included in the Climate-Proofing process:

http://www.sasscal.org/participants_sasscal.php?country_crit=ZM

Annex 2: Zambia specific information sources

STRATEGY DOCUMENTS

Republic of Zambia: National Adaptation Programme of Action (NAPA), (2007)

<http://unfccc.int/resource/docs/napa/zmb01.pdf>

Republic of Zambia/Ministry of Tourism, Environment and Natural Resources of Zambia: National Climate Change Response Strategy (NCCRS), Final Draft (2010)

<http://www.undp-alm.org/resources/naps-least-developed-countries-ldcs/zambia%E2%80%99s-national-climate-change-response-strategy-%E2%80%93>

Republic of Zambia/MLNREP: National Policy on Climate Change, (2012)

Republic of Zambia/UNDP: Enabling activities for the preparation of Zambia’s Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) Project

http://www.undp-alm.org/sites/default/files/downloads/zambia_snc_prodoc.pdf

SCIENTIFIC REFERENCES

Ministry of Tourism, Environment and Natural Resources of Zambia - Climate Change Facilitation Unit: Economic Assessment of the Impacts of Climate Change in Zambia; Draft report (2010)

Kanyanga, J. et al.: Southern African Agriculture and Climate Change - a comprehensive analysis - Zambia, IFPRI, Washington (2012)

http://www.ifpri.org/sites/default/files/publications/aaccs_zambia_note.pdf

Climate-Fact-Sheet Zambia; Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung GmbH, Climate Service Center, 12.7.2013

Thurlow et al., 2009. The impact of climate variability and change on economic growth and poverty in Zambia. International Food Policy Research Institute.

<http://www.ifpri.org/sites/default/files/publications/ifpridp00890.pdf>

SECTOR SPECIFIC INFORMATION

Agriculture:

GRZ/UNDP: PIMS No. 3942, Adaptation to the effects of drought and climate change in Agro-ecological Regions I and II in Zambia

http://www.undp.org/content/dam/undp/documents/projects/ZMB/00058205_Adaptation%20ProDoc_FINAL_.pdf

The Ministry of Agriculture and Livestock (MAL) and the Ministry of Lands, Natural Resources and Environmental Protection (MLNREP): The Harmonization of the National Agriculture Policy (NAP) and the National Policy on Climate Change (NPCC) of the Government of the Republic of Zambia, Final report (2013)

<http://www.fao.org/docrep/018/aq666e/aq666e.pdf>

Energy:

Tetra Tech: Kafue Gorge Lower Hydropower Project - Climate Change Risk Assessment, Executive Summary (2011)

http://www.ifc.org/wps/wcm/connect/1464ab804aa801b1a2f7f29e0dc67fc6/ClimateRisk_Hydro_Zambia_ExecSummary.pdf?MOD=AJPERES

ADAPTATION

Republic of Zambia: Technology Needs Assessment (TNA) for climate change adaptation - August 2012, Lusaka (2013)

http://unfccc.int/ttclear/sunsetcms/storage/contents/stored-file-20130820165024166/TechnologyNeedsAssessment-Adaptation_Zambia.pdf

World Bank: Zambia - Poverty and Vulnerability Assessment, Report No. 32573-ZM, Washington (2007)

<http://www.sarpn.org/documents/d0001457/>

World Bank: Project appraisal document on a proposed strategic climate fund - Pilot Program for Climate Resilience, Report No: 73982-ZM, Washington (2013)

http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/04/23/000442464_20130423103956/Rendered/PDF/739820PAD0P12700900IDA0R20130009901.pdf

CLIMATE FINANCE IN ZAMBIA

World Bank: Pilot Program for Climate Resilience - Phase II documents:

<http://www.worldbank.org/projects/P127254/zambia-strengthening-climate-resilience-ppcr-phase-ii?lang=en>

Watson, C. et al.: Understanding Climate Finance Readiness Needs in Zambia, Bonn (2013)

<http://www.giz.de/fachexpertise/downloads/giz2013-en-climate-finance-readiness-zambia.pdf>

Annex 3: Where can I find information on climate change and adaptation?

TOOLS

ADAPT (Assessment and Design for Adaptation to Climate Change) by the World Bank: A Prototype Tool – This multi-sector computer-based tool conducts a sensitivity analysis for specific projects, and is targeted to development practitioners.

<http://www.go.worldbank.org/AWJKT60300>

CEDRA (Climate change and Environmental Degradation Risk and Adaptation Assessment) by Tearfund. A field tool which helps agencies working in developing countries to access and understand the science of climate change and environmental degradation and compare this with local community experience of environmental change. Adaptation options are discussed and decision-making tools are provided to help with planning responses to the hazards identified. CEDRA includes integrating Disaster Risk Reduction responses as relevant existing forms of adaptation.

<http://tilz.tearfund.org/Topics/Environmental+Sustainability/CEDRA.htm>

Climate Assessment by GIZ: (Tool to assess whether project goals are affected by climate change and identify adaptation measures within the scope of the project; and identify climate-friendly way of achieving project goal. Thus, GIZ's climate assessment refers to a) Climate Proofing = systematic climate risk reduction & increase of adaptive capacity; (b) Emission Saving = systematic maximisation of contributions to GHG reductions. The tool is mandatory to all GIZ projects.

<http://star-www.giz.de/fetch/4Q0ox4X0001G0gE9d1/giz2013-0546en-environmental-climate-assessment.pdf>

CRiSTAL (Community-based Risk Screening Tool – Adaptation and Livelihoods) by IISD. Tool for community scale vulnerability assessment and adaptation planning. Specifically to (a) Understand the links between livelihoods and climate in their project areas; (b) Assess a project's impact on community-level adaptive capacity; and (c) Make project adjustments to improve its impact on adaptive capacity and reduce the vulner-

ability of communities to climate change. Users can follow this process through a Microsoft Excel interface or by reading the accompanying document (User's manual).

<http://www.cristaltool.org/content/download.aspx>

Global Adaptation Atlas by Resources for the Future, a dynamic climate change impact mapping tool. The Atlas brings together diverse sets of data on the human impacts of climate change and adaptation activities across the themes of food, water, land, health and livelihood to help researchers, policymakers, planners and citizens to establish priorities for action on adaptation.

<http://adaptationatlas.com>

SEA Toolkit by DAC Network on environment and development co-operation (ENVIRONET). Strategic environmental assessment and adaptation to Climate Change (October 2010).

Costing adaptation options:

<http://climate-adapt.eea.europa.eu/adaptation-support-tool/step-4-2>

CLIMATE PROOFING

OECD: Integrating climate change adaptation into development co-operation: Policy guidance – ISBN-978-92-64-05476-9 © OECD 2009

<http://www.oecd.org/env/cc/44887764.pdf>

OECD: Integrating climate change adaptation into development planning - A practice-oriented training based on an OECD Policy Guidance - Modules on Adaptation Monitoring and Evaluation (M&E), Training Manual, Version: November 2013

<https://gc21.giz.de/ibt/var/app/wp342deP/1443/index.php/knowledge/monitoring-evaluation/tools-and-training-material/>

GIZ: Integrating climate change adaptation into development planning - Additional Modules on Monitoring and Evaluation (M&E), Eschborn (2013)

https://gc21.giz.de/ibt/var/app/wp342deP/1443/wp-content/uploads/filebase/me/me-tools/GIZ_Adaptation_M&E_Training_Slides.pdf

GIZ: Climate Proofing for Development, Eschborn (2010)

<http://www2.gtz.de/dokumente/bib-2010/gtz2010-0714en-climate-proofing.pdf>

CLIMATE DATA

Climate Service Center (CSC): A team of natural scientists, economists, political scientists and communication-specialists are working at the Climate Service Center. Their tasks are refin-

ing the knowledge derived from climate research in a practice-orientated way and conveying the findings to decision-makers in politics, administration, economy and for the broad public.

<http://www.climate-service-center.de>

World Bank climate change data portal: Provides an entry point for access to climate related data and tools. The Portal provides access to comprehensive global and country data information related to climate change and development and intends to serve as a common platform to collect, integrate and display climate change relevant information at the global scale.

<http://sdwebx.worldbank.org/climateportal/home.cfm?page=globemap>

The **Nature Conservancy Climate Wizard** allows users to map historic climate data as well as downscaled projections for the globe (switch to global).

<http://www.climatewizard.org>

Climate Impacts: Global and Regional Adaptation Support Platform (CI:grasp) is a layered platform providing knowledge about regional climate forcings, its related impacts and systematic regional vulnerability assessments. An interactive climate diagram generator allows a comparison of temperature and rainfall projects for different time scales and climate models for any global grid cell (excluding oceans). As sound information basis for decision-makers and development experts it also provides adaptation expertise and combines top-down and bottom-up approaches

<http://www.ci-grasp.org>

IPCC Data Visualization: Part of the Data Distribution Centre (DDC) of the Intergovernmental Panel on Climate Change (IPCC). The DDC provides climate, socio-economic and environmental data, both from the past and also in scenarios projected into the future. Technical guidelines on the selection and use of different types of data and scenarios in research and assessment are also provided. The DDC is designed primarily for climate change researchers, but materials contained on the site may also be of interest to educators, governmental and non-governmental organisations and the general public.

<http://www.ipcc-data.org/maps/>

The **SADC Climate Services Centre** provides operational, regional services for monitoring and predicting extremes in climate condition. The Centre develops and disseminates meteorological, environmental and hydro-meteorological products. The Centre's products contribute to improved disaster risk management in the region, and help to ensure Member States are better prepared for weather and climate disasters, conservation and protection of natural resources.

<http://www.sadc.int/sadc-secretariat/services-centres/climate-services-centre/>

PLATFORMS

AdaptationCommunity.net is an online exchange platform for adaptation practitioners focusing particularly on four topics: climate information and services, vulnerability assessment, monitoring and evaluation and mainstreaming of adaptation. The platform provides a detailed resource database, webinar recordings and space for virtual exchange:

<http://www.adaptationcommunity.net>

Climate 1-Stop provides a single location to access climate change tools, resources and information. Users can upload and share materials:

<http://www.climate1stop.org>

Adaptation Learning Mechanism (ALM) with case studies, publications, country profiles, open to user submissions:

<http://www.adaptationlearning.net>

weAdapt is an online open space on climate adaptation issues for sharing experience and offers adaptation case studies:

www.weadapt.org

Community Based Adaptation Exchange, a platform for exchanging news, events, case studies, tools, policy resources and videos:

<http://community.eldis.org/.59b70e3d/>

UKCIP: Decision-making for adaptation / Exchanging knowledge & ideas / Creative adaptation

<http://www.ukcip.org.uk>

ci:grasp (Climate Impacts: Global and Regional Adaptation Support Platform) is a web-based information service on climate change. It aims at supporting decision makers in emerging and developing countries to prioritize adaptation needs, and plan and implement appropriate adaptation measures:

<http://cigrasp.pik-potsdam.de>

The European Climate Adaptation Platform (Climate-ADAPT): Climate-ADAPT aims to support Europe in adapting to climate change. It is an initiative of the European Commission and helps users to access and share information on:

- Expected climate change in Europe
- Current and future vulnerability of regions and sectors
- National and transnational adaptation strategies
- Adaptation case studies and potential adaptation options
- Tools that support adaptation planning

<http://climate-adapt.eea.europa.eu/web/guest>

The “Southern African Science Service Centre for Climate Change and Adaptive Land Management - SASSCAL” provides a list of

Zambian stakeholders who may be included in the Climate-Proofing process:

http://www.sasscal.org/participants_sasscal.php?country_crit=ZM

The **South African Risk and Vulnerability Atlas Electronic Spatial Portal**, an electronic spatial database, involves South African researchers and a range of South African institutions from various disciplines to continuously update the content with new research and data. The web-based electronic database provides access to a large collection of scientific data and knowledge in and about South Africa. The portal will in the future include some regional data for southern Africa. The portal is organised according to themes; including Socioeconomic, Settlements, Weather and Climate, Groundwater, Surface Water, Forestry, Biodiversity, Air Quality/Emissions. Some examples of information to be found within these themes include projections of climate change at local scales, by different models, for the 21st century; assessments of the risk of coastal flooding due to sea level rise; probabilities of drought and water shortages; population densities; economic activity and poverty levels.

<http://www.rvatlas.org>

COMESA Climate Initiative is a comprehensive approach and program initiative to address climate change within the context of its responsibilities and strategy for promotion of the Comprehensive Africa Agriculture Development Programme (CAADP). The Climate Initiative is divided in two parts, the first directed to Frameworks & Tools, the second to Applications & Learning.

http://programmes.comesa.int/index.php?option=com_content&view=article&id=80&Itemid=110

CLIMATE FINANCE

Adaptation Fund:

www.adaptation-fund.org

Climate Funds Update:

www.climatefundsupdate.org

Climate Policy Initiative: Global Landscape of Climate Finance:

<http://climatepolicyinitiative.org/publication/global-landscape-of-climate-finance-2013/>

Global Climate Change Alliance (GCCA) - How to get access to Climate Funding:

<http://www.gcca.eu/intra-acp/how-to-get-access-to-climate-funding-i-the-adaptation-fund>

Global Environment Facility:

<http://www.thegef.org/gef/node/30>

Green Climate Fund:

www.gcfund.org

Heinrich-Böll Stiftung North America - Green Climate Fund:

www.boell.org/downloads/CFF11_FR_Font_vert.pdf

International Climate Initiative (IKI):

www.international-climate-initiative.com/en/

UNFCCC: Climate Finance:

https://unfccc.int/cooperation_support/financial_mechanism/finance_portal/items/5824.php

PUBLICATIONS

Agrawala, S. et al. (2010): “Plan or React? Analysis of Adaptation Costs and Benefits Using Integrated Assessment Models”, OECD Environment Working Papers, No. 23, OECD Publishing.

<http://dx.doi.org/10.1787/5km975m3d5hb-en>

Agrawala, S. and Fankhauser, S. (2008): “Putting Climate Change Adaptation in an Economic Context”, Economic Aspects of Adaptation to Climate Change, OECD, Paris, pp. 19-28.

Agrawala, S. and van Aalst, M. (2008): “Adapting Development Cooperation to Adapt Climate Change”, Climate Policy, Vol. 8, No. 2, pp. 183-193.

Burton, I. and van Aalst, M. (2004), “Look Before You Leap: A Risk Management Approach for Incorporating Climate Change Adaptation into World Bank Operations”, World Bank, Washington.

Mediation (2010): Review of available methods for cost assessment:

<http://mediation-project.eu/output/downloads/deliverable3-1with-cover-september-2010.pdf>

UNFCCC (2009): Potential costs and benefits of adaptation options: A review of existing literature

<http://unfccc.int/resource/docs/2009/tp/02.pdf>

UNFCCC (2011): Assessing the Costs and Benefits of Adaptation Options - An overview of approaches, Bonn

Watkiss P. et al. (2010): Analysis of the Economic Costs of Climate Change Adaptation in Africa, ADAPTCost Project.

Annex 4: Adaptation categories

A broad range of adaptation measures can be implemented in response to both observed and anticipated climate change. Such measures include altering farming practices and crop varieties, building new water reservoirs, enhancing water use efficiency, changing building codes, investing in air-conditioning, and constructing sea walls. To better understand this diversity, it is possible to classify adaptation measures into the following generic options or categories (IPCC, 2001, based on Burton, 1996):

- Bear losses. All adaptation measures may be compared with the baseline response of “doing nothing” except bearing or accepting the losses. In theory, bearing loss occurs when those affected have no capacity to respond in any other ways (for example in extremely poor communities) or where the costs of adaptation measures are considered to be high in relation to the risk or the expected damages.
- Share losses. This type of adaptation response involves sharing the losses among a wider community. Such actions take place in traditional societies and in the most complex, high-tech societies. In traditional societies, many mechanisms exist to share losses among a wider community, such as extended families and village-level or similar small-scale communities. At the other end of the spectrum, large-scale societies share losses through public relief, rehabilitation, and reconstruction paid for from public funds. Sharing losses can also be achieved through insurance.
- Modify the threat. For some risks, it is possible to exercise a degree of control over the environmental threat itself. When this is a “natural” event such as a flood or a drought, possible measures include flood control works (dams, dikes, levees). For climate change, the major modification possibility is to slow the rate of climate change by reducing GHGs and eventually by stabilising GHG concentrations in the atmosphere (i.e. mitigation).
- Prevent effects. A frequently used set of adaptation measures involves steps to prevent the effects of climate change and variability. For example, in agriculture such measures include: changes in crop management practices, such as increased irrigation water, additional fertiliser use, and pest and disease control.
- Change use. Where the threat of climate change makes the continuation of an economic activity impossible or extremely risky, consideration can be given to changing the use. For example, a farmer may choose to substitute a more drought-tolerant crop or switch to varieties with lower moisture. Similarly, crop land may be returned to pasture or forest or other uses may be found such as recreation, wildlife refuges, or national parks.



Annex 5: Initial Result Areas and performance indicators of the Green Climate Fund

Initial result areas of the Fund (5th GCF Board Meeting, Annex I)

- a. Design and planning of cities to support mitigation and adaptation;
- b. Energy efficiency of buildings and appliances;
- c. Energy efficiency of industrial processes;
- d. Low-emission transport;
- e. Low-emission energy access;
- f. Small-, medium-, and large-, scale low-, emission power generation;
- g. Sustainable land use management to support mitigation and adaptation;
- h. Sustainable forest management to support mitigation and adaptation including afforestation and reduction of forest degradation;
- i. REDD+ implementation;
- j. Adaptation activities to reduce climate-,related vulnerabilities;
- k. Selected “flagship” activities1 cutting across adaptation result areas;
- l. Readiness and capacity building for adaptation and mitigation activities;
- m. Scaling up of effective community-,based adaptation (CBA) actions; and
- n. Supporting the coordination of public goods such as “knowledge hubs”.

- Change location. A more extreme response is to change the location of economic activities. There is considerable speculation, for example about relocating major crops and farming regions away from areas of increased aridity and heat to areas that are currently cooler and which may become more attractive for some crops in the future.
- Research. The process of adaptation can also be advanced by research into new technologies and new methods of adaptation.
- Encourage behavioural change through education, information and regulation. Another type of adaptation is the dissemination of knowledge through education and public information campaigns, leading to behavioural change. Such activities have been little recognised and have received low priority in the past, but are likely to assume increased importance as the need to involve more communities, sectors and regions in adaptation becomes apparent.

(From: OECD: Integrating climate change adaptation into development co-operation: Policy guidance)

PERFORMANCE INDICATORS OF THE INITIAL RESULT AREAS OF THE FUND (5TH GCF BOARD MEETING, ANNEX II)

Indicator type	Initial result areas indicators
Project and programme outputs performance indicators. Indicates the physical impact of Fund activities in terms of development and adaptation.	Mitigation <ul style="list-style-type: none"> a. Reduced emissions from buildings and appliances (tCO₂/m²); b. Increased access to transportation with low carbon fuels (tCO₂/passenger km); c. Reduced emissions from agriculture and related land use management (tCO₂/ha sequestered; tCO₂ sequestered; tN₂O emitted per hectare from fertilizer); d. tCO₂ reduced through Fund interventions; e. Deployment of low-carbon power generation technologies (tCO₂/Kwh); f. Households with access to low carbon modern technologies (Number of households served by off grid or clearly identifiable on grid renewable technologies); g. Support development of negative emissions technologies (Number of CCS projects, tons of CO₂ sequestered); h. Support phased implementation of REDD+ (Decrease in rate of deforestation tCO₂e reductions from reduced deforestation) and maintenance of afforestation, tCO₂/ha.
	Adaptation <ul style="list-style-type: none"> a. Number of people supported by, and familiar with, early warning procedures; b. Indicators would need to be selected as appropriate to the results sector, the country and to the type of activity. There is a considerable body of experience on output indicators and gradually growing experience with outcome indicators; c. Each flagship would have indicators relevant to its area of focus. For example, the ratio of women and children mortality/injury (possibly as DALYs) to that for men in climate-related events; variance in annual income of smallholder farmers post- implementation compared with estimated variance in the 10 years pre-implementation; total area under management for EbA values; d. Number of CBA scale-ups supported; e. Number of people supported by the scale-ups; f. Number of scale-ups achieving a 100 fold/1000 fold etc. more people within the activity than in the original pilot; g. Each scale-up would have its specific performance indicators depending on the activity; e.g. the reduction in the number of participant farmers experiencing income losses of more than 33 per cent; h. Number of CBA pilots supported (if Fund resources are used for pilots by a country) and the portion supported as scale-ups; i. Number of countries with effective access to a regional “Centre of Excellence” / “Regional Climate Centre”; j. Within a country, the existence of an active staff training and exchange programme with that centre and number of people trained. k. Transformative impact of Fund activities performance indicators. l. Trends in the adoption of technology/best practice/business models for low-emission and climate- resilient development pathways at the country and global levels. Captures the overall impact of the Fund on development pathways.
Transformative impact of Fund activities performance indicators. Trends in the adoption of technology/ best practice/business models for low-emission and climate- resilient development pathways at the country and global levels. Captures the overall impact of the Fund on development pathways.	Mitigation <ul style="list-style-type: none"> a. Carbon intensity of economy (tCO₂/GDP); b. Reduced energy intensity of industry (tCO₂/GDP); c. Facilitate design of sustainable cities (tCO₂/capita).
	Adaptation <ul style="list-style-type: none"> a. Decreasing number of people killed, injured and affected (e.g. from the Center for Research on the Epidemiology for Disasters database) by climate-related disasters; b. In the longer term, developed methodologies that better measure monetary and non-monetary losses as percentage of GDP from climate related events relevant to developing countries; c. In the longer term, developed pragmatic index (c.f. the Human Development Index), or indices, that capture the major elements of social vulnerability at national to community scales; d. Meanwhile, a longer list of indicators, possibly linked to the Sustainable Development Goals, might be tracked regularly by the Fund. These might include access to clean and reliable water and sanitation; access to adequate and diversified food, etc.; e. Overall, the existence of a process for identifying transformational opportunities and the number of applications of that process; the number of implementation ready transformational plans; the number plans implemented; f. Secondary indicators might include the number of vulnerability areas analysed and transformational opportunities identified; status of each of those transformational plans; g. Within each transformational plan specific indicators should be selected depending on the focus of the plan. For example; the proportion of people moving from a hazardous area, such as a coastal flood plain, and the number of people remaining there; h. Number of planning processes, public and private, that draw upon climate risk information from the centre or from staff trained by the centre.

Annex 6: Glossary

Adaptation	The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects. Incremental adaptation Adaptation actions where the central aim is to maintain the essence and integrity of a system or process at a given scale. Transformational adaptation Adaptation that changes the fundamental attributes of a system in response to climate and its effects.		
Adaptation options	The array of strategies and measures that are available and appropriate for addressing adaptation needs. They include a wide range of actions that can be categorized as structural, institutional, or social.		
Adaptive capacity	The ability of systems, institutions, humans, and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.		
Climate change	Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use. Note that the Framework Convention on Climate Change (UNFCCC), in its Article 1, defines climate change as: ‘a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods’. The UNFCCC thus makes a distinction between climate change attributable to human activities altering the atmospheric composition, and climate variability attributable to natural causes.		
Climate projection	A climate projection is the simulated response of the climate system to a scenario of future emission or concentration of greenhouse gases and aerosols, generally derived using climate models. Climate projections are distinguished from climate predictions by their dependence on the emission/concentration/radiative-forcing scenario used, which is in turn based on assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized.		
Climate scenario	A plausible and often simplified representation of the future climate, based on an internally consistent set of climatological relationships that has been constructed for explicit use in investigating the potential consequences of anthropogenic climate change, often serving as input to impact models. Climate projections often serve as the raw material for constructing climate scenarios, but climate scenarios usually require additional information such as the observed current climate.		
Co-benefits	The positive effects that a policy or measure aimed at one objective might have on other objectives, irrespective of the net effect on overall social welfare. Co-benefits are often subject to uncertainty and depend on local circumstances and implementation practices. Co-benefits are also called ancillary benefits.		
		Drought	A period of abnormally dry weather long enough to cause a serious hydrological imbalance. Drought is a relative term; therefore any discussion in terms of precipitation deficit must refer to the particular precipitation-related activity that is under discussion. For example, shortage of precipitation during the growing season impinges on crop production or ecosystem function in general (due to soil moisture drought, also termed agricultural drought), and during the runoff and percolation season primarily affects water supplies (hydrological drought). Storage changes in soil moisture and groundwater are also affected by increases in actual evapotranspiration in addition to reductions in precipitation. A period with an abnormal precipitation deficit is defined as a meteorological drought. A megadrought is a very lengthy and pervasive drought, lasting much longer than normal, usually a decade or more.
		Exposure	The presence of people, livelihoods, species or ecosystems, environmental services and resources, infrastructure, or economic, social, or cultural assets in places that could be adversely affected
		Exposure unit	An activity, group, region or resource exposed to significant climatic variations
		Extreme weather event	An extreme weather event is an event that is rare at a particular place and time of year. Definitions of rare vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile of a probability density function estimated from observations. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense. When a pattern of extreme weather persists for some time, such as a season, it may be classed as an extreme climate event, especially if it yields an average or total that is itself extreme (e.g., drought or heavy rainfall over a season).
		Flood	The overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas not normally submerged. Floods include river (fluvial) floods, flash floods, urban floods, pluvial floods, sewer floods, coastal floods, and glacial lake outburst floods.
		Greenhouse gas (GHG)	Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of terrestrial radiation emitted by the Earth’s surface, the atmosphere itself, and clouds. This property causes the greenhouse effect. Water vapor (H ₂ O), carbon dioxide (CO ₂), nitrous oxide (N ₂ O), methane (CH ₄), and ozone (O ₃) are the primary greenhouse gases in the Earth’s atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine-containing substances, dealt with under the Montreal Protocol. Beside CO ₂ , N ₂ O and

	CH ₄ , the Kyoto Protocol deals with the greenhouse gases sulfur hexafluoride (SF ₆), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).		
Impacts (Consequences, Outcomes)	Effects on natural and human systems. In this report, the term impacts is used primarily to refer to the effects on natural and human systems of extreme weather and climate events and of climate change. Impacts generally refer to effects on lives, livelihoods, health status, ecosystems, economic, social, and cultural assets, services (including environmental), and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. Impacts are also referred to as consequences and outcomes. The impacts of climate change on geophysical systems, including floods, droughts, and sea level rise, are a subset of impacts called physical impacts.		holder consultations, and do not represent fully consistent scenarios. Four RCPs produced from Integrated Assessment Models were selected from the published literature and are used in the present IPCC Assessment as a basis for the climate predictions and projections in WGI AR5 Chapters 11 to 14: RCP8.5 One high pathway for which radiative forcing reaches >8.5 W m ⁻² by 2100 and continues to rise for some amount of time (the corresponding ECP assuming constant emissions after 2100 and constant concentrations after 2250); RCP6.0 and RCP4.5 Two intermediate stabilization pathways in which radiative forcing is stabilized at approximately 6 W m ⁻² and 4.5 W m ⁻² after 2100 (the corresponding ECPs assuming constant concentrations after 2150); RCP2.6 One pathway where radiative forcing peaks at approximately 3 W m ⁻² before 2100 and then declines (the corresponding ECP assuming constant emissions after 2100). For further description of future scenarios, see WGI AR5 Box 1.2.
Mitigation (of climate change)	A human intervention to reduce the sources or enhance the sinks of greenhouse gases.		
Mitigation (of disaster risk and disaster)	The lessening of the potential adverse impacts of physical hazards (including those that are human-induced) through actions that reduce hazard, exposure, and vulnerability.	Resilience	The capacity of a social-ecological system to cope with a hazardous event or disturbance, responding or reorganizing in ways that maintain its essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.
Radiative forcing	Radiative forcing is the change in the net, downward minus upward, irradiance (expressed in W m ⁻²) at the tropopause or top of atmosphere due to a change in an external driver of climate change, such as a change in the concentration of carbon dioxide or the output of the Sun. Sometimes internal drivers are still treated as forcings even though they result from the alteration in climate, for example aerosol or greenhouse gas changes in paleoclimates. The traditional radiative forcing is computed with all tropospheric properties held fixed at their unperturbed values, and after allowing for stratospheric temperatures, if perturbed, to readjust to radiative-dynamical equilibrium. Radiative forcing is called instantaneous if no change in stratospheric temperature is accounted for. The radiative forcing once rapid adjustments are accounted for is termed the effective radiative forcing. For the purposes of this report, radiative forcing is further defined as the change relative to the year 1750 and, unless otherwise noted, refers to a global and annual average value. Radiative forcing is not to be confused with cloud radiative forcing, which describes an unrelated measure of the impact of clouds on the irradiance at the top of the atmosphere.	Risk	The potential for consequences where something of human value (including humans themselves) is at stake and where the outcome is uncertain. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the consequences if these events occur.
		Risk assessment	The qualitative and/or quantitative scientific estimation of risks.
		Risk management	The plans, actions, or policies implemented to reduce the likelihood and/or consequences of risks or to respond to consequences.
		Sensitivity	The degree to which a system or species is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea-level rise).
Representative concentration pathways (RCPs)	Scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases and aerosols and chemically active gases, as well as land use/land cover. The word representative signifies that each RCP provides only one of many possible scenarios that would lead to the specific radiative forcing characteristics. The term pathway emphasizes that not only the long-term concentration levels are of interest, but also the trajectory taken over time to reach that outcome. RCPs usually refer to the portion of the concentration pathway extending up to 2100, for which Integrated Assessment Models produced corresponding emission scenarios. Extended Concentration Pathways (ECPs) describe extensions of the RCPs from 2100 to 2500 that were calculated using simple rules generated by stake-	Uncertainty	A state of incomplete knowledge that can result from a lack of information or from disagreement about what is known or even knowable. It may have many types of sources, from imprecision in the data to ambiguously defined concepts or terminology, or uncertain projections of human behavior. Uncertainty can therefore be represented by quantitative measures (e.g., a probability density function) or by qualitative statements (e.g., reflecting the judgment of a team of experts).
		Vulnerability	The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.

Water balance (=Hydrologic budget) An accounting of the inflow to, outflow from, and storage in, a hydrologic unit, such as a drainage basin, aquifer, soil zone, lake, reservoir, or irrigation project.

Water stress Two definitions of water stress exist. The first sets a fixed physical quantity per person, setting at 1 700 cubic metres per person as the norm for water availability for all uses below which a country/region is under increasing “water stress”, reaching “scarcity” at 1 000 cubic metres per person (e.g. Northern China has only 757 cubic metres per person) and “absolute scarcity” below 500 cubic metres per person (Palestine has only 320 cubic metres per person, and the Middle East region as a whole is projected to be below 500 by 2050). A different definition of water stress uses the ratio of withdrawals to available resources, and is therefore better able to reflect different geographical, economic and cultural circumstances. The 2006 United Nations (UN) World Water Development Report (UNDP, 2006; World Bank and IMF, 2008) presents the Relative Water Stress Index (RWSI), defined as the “ratio of total water use (sum of domestic, industrial and agricultural demand) to renewable water supply – available local run-off (precipitation less evaporation) as delivered through streams, rivers and shallow groundwaters” (UNESCO, 2006). Water stress exists for ratios above 40%, while physical scarcity is reached for ratios above 75%. This definition is consistent with OECD’s indicator for water stress, based on the ratio of water withdrawal to annual water availability, which uses the following thresholds: below 10% water stress low; the 10–20% range indicates moderate stress, i.e. “water availability is becoming a constraint on development and that significant investments are needed to provide adequate supplies”; above 20% stress is medium and “both supply and demand will need to be managed and conflicts among competing uses will need to be resolved”; while above 40% stress is severe.

Sources: [IPCC 5th Assessment Report, Working Group 2, Glossary](#)
[U.S. Geological Survey](#)
[OECD: Managing water for all](#)

Annex 7: Existing activities regarding climate change integration in Zambia

Several Climate Proofing initiatives have already started in Zambia. In particular the SNDP, R-SNDP and Budget 2014 have undergone processes, mainly with a broad assistance by external consultants, to integrate climate change related aspects. By applying the Climate-Proofing Manual, the results of these activities should be taken into account and be used as information resources.

CLIMATE PROOFING OF THE SNDP

On behalf of the Ministry of Finance, the Sixth National Development Plan has been climate proofed by a team of climate change experts (Prof. F.D Yamba, Mrs. S. Jain, Dr. M. Silengo, Dr. G. Kasal).

According to the draft version (August 2010) of the report, the sectors being climate proofed include: transport infrastructure including housing, energy, water and sanitation, health, education and skills development, agriculture livestock and fisheries, mining, tourism, manufacturing, information and communication, science, technology and innovation, natural resources, local government and decentralization, and gender.

The report concludes that “climate change vulnerability, impacts and adaptation present enormous challenges and potentially negative impacts, there are also inherent opportunities for Zambia to take advantage through undertaking mitigation measures”.

TECHNOLOGY NEEDS ASSESSMENT (TNA) FOR CLIMATE CHANGE ADAPTATION IN ZAMBIA

In 2011, Zambia started the 2-year-process of a Technology Needs Assessment (TNA) for climate change adaptation. In parallel, a similar process for climate change mitigation was initiated. In a participative approach, led by the Ministry of Lands, Natural Resources and Environmental Protection, and in partnership with United Nations Environment Programme (UNEP), the Global Environment Facility, UNEP RISO Centre and ENDA, technologies for reducing the country’s vulnerability to climate change hazards were identified and prioritized.

In an Inception Workshop five sectors were initially considered: (i) Agriculture and Food Security; (ii) Human Health; (iii) Water and Energy; (iv) Natural Resources and Wildlife; and, (v) Infrastructure. These sectors were subjected to scoring and prioritization resulting in highest scores for the sectors “water and energy” and “agriculture and food security”. In the next process step, technology options were prioritized and selected for both sectors.

CLIMATE PROOFING OF THE R-SNDP

In July 2013, the Interim Inter-ministerial Climate Change Secretariat under the Ministry of Finance organized a workshop for climate experts to scope the R-SNDP, identify any gaps on the inclusiveness of climate resiliency, and make appropriate recommendations to GRZ.

The one-day-workshop brought together 20 climate experts from government, private sector and civil society who reviewed relevant chapters of the R-SNDP and made recommendations by applying the climate lens. The workshop focused on:

1. Transport and Infrastructure (including Housing)
2. Energy, Water & Sanitation and Health
3. Agriculture, Livestock and Fisheries, Land, Forestry and Environment

According to statements of several stakeholders, the recommendations proposed by the workshop participants will be integrated into the R-SNDP.

CLIMATE PROOFING THE 2014 BUDGET

Following the Climate Proofing workshop of the R-SNDP, Ministry of Finance and its Interim Inter-ministerial Climate Change Secretariat organized another one-day-event aiming at raising awareness among key staff from Ministries and mainstreaming climate change into the Zambian budget process.

The outcomes from the workshop include:

- i. identification of climate resilient and mitigation opportunities in the form of projects and programmes contained in the revised SNDP, TNA, and 2014 Budget,
- ii. actions aimed at contributing to development of bankable proposals as a final output for project implementation were recommended.

The proposed actions include:

- i. integration of renewable energy into the national grid,
- ii. decentralized energy systems for off grid electricity generation for rural areas,
- iii. energy management,
- iv. sustainable agriculture,
- v. development of standards and codes for infrastructure climate resilient design,
- vi. Climate Change Vulnerability/Impacts/Adaptation Assessments,
- vii. Enhanced conservation and protection of natural habitats.

PILOT PROGRAM FOR CLIMATE RESILIENCE -PHASE II (WORLD BANK)

The Pilot Program for Climate Resilience (PPCR) is a multi-donor Trust Fund, one of three programs under the Strategic Climate Fund of the Climate Investment Funds (CIF). Phase 1 of the PPCR (2010-2013) supported the Inter-ministerial National Climate Change Secretariat in mainstreaming, capacity building and information sharing at the national level. The current phase 2 (2013-2019) of the program is provided with a budget amounting US\$36 million and is structured in three components:

1. Strategic National Program Support
2. Support to Participatory Adaptation
3. Pilot Participatory Adaptation

Component 1 is of national scope while Components 2 and 3 focus on the Barotse sub-basin of the Zambezi, the pilot area for project activities.

Within component 1, the program aims at mainstreaming climate resilience into key national and sectoral policies, plans and programs. Therefore, the PPCR provides specialized technical assistance and organizes workshops (involving the appropriate planning units of key line Ministries) to develop screening guidelines for key sectors and thereafter apply them to screen key policies and plans for climate resilience benefits and risks. ■

Abbreviations

AF	Adaptation Fund
AR	Assessment Report
BMZ	German Federal Ministry for Economic Cooperation and Development
CBA	Cost-Benefit Analysis
CEEEZ	Centre For Energy, Environment and Engineering Zambia Ltd
CIF	Climate Investment Fund
COMESA	Common Market for Eastern and Southern Africa
CP	Climate Proofing
CSC	Climate Service Center
CTI-PFAN	Climate Technology Initiative - Private Financing Advisory Network
FAO	Food and Agriculture Organization of the United Nations
GCCA	Global Climate Change Alliance
GCF	Green Climate Fund
GCM	General Circulation Model
GDP	Gross Domestic Product
GEF	Global Environment Facility
GIZ	Gesellschaft für Internationale Zusammenarbeit
GRZ	Government of the Republic of Zambia
IICCS	Interim Interministerial Climate Change Secretariat
IPCC	Intergovernmental Panel on Climate Change
KfW	Kreditanstalt für Wiederaufbau
LDCF	Least Developed Countries Fund
M&E	Monitoring and Evaluation
MAL	Ministry of Agriculture and Livestock
MCA	Multi Criteria Analysis
MoF	Ministry of Finance
MLNREP	Ministry of Lands, Natural Resources and Environmental Protection
MTEF	Medium Term Expenditure Framework
NAIP	National Agriculture Investment Plan
NAMA	Nationally Appropriate Mitigation Action
NAP	National Adaptation Plan
NAPA	National Adaptation Plan of Action
NCCRS	National Climate Change Response Strategy
NDP	National Development Plan
NGO	Non-Governmental Organization
NISIR	National Institute for Scientific and Industrial Research
NPCC	National Policy on Climate Change
NRDC	Natural Resources Development College
NTBC	National Technology Business Centre
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development,
PPCR	Pilot Program for Climate Resilience
RCP	Representative Concentration Pathway
REDD	Reducing Emissions from Deforestation and Degradation
R-SNDP	Revised Sixth National Development Plan
SCCF	Special Climate Change Fund
SNC	Second National Communication
SNDP	Sixth National Development Plan
TNA	Technology Needs Assessment
UKCIP	United Kingdom Climate Impacts Programme
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
ZEMA	Zambia Environmental Management Authority
ZMD	Zambia Meteorological Department

