Malawi Open NAP

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Authors

- **Malawi NAP Team**
  XXXX-XXXX-XXXX-XXXX · desanker · xx
  Government of Malawi

- **LDC Expert Group**
  XXXX-XXXX-XXXX-XXXX · desanker · xx
  UNFCCC

Abstract

The National Adaptation Plan for Malawi has been developed under the Open NAP Initiative based a country-driven and country-owned approach involve a wide-range of stakeholders from different entities in Malawi, building on equally participatory outputs that exist to support the national approach for adaptation. Malawi has participated in many adaptation initiatives for the last 20 years, both under the UNFCCC as well as through bilateral and national programmes. The NAP is thus not just another planning process, but rather an umbrella adaptation programme for the country, embracing all past and on-going adaptation initiatives. A notable contribution to this NAP are the outputs of a recently formulated SPCR under the World Bank's PPCR, which followed all internationally recognized standards of participation, gender responsiveness, country ownership and basis on best available science, to name a few. The PPCR programme came to a halt for Malawi soon after the SPCR, thus making the SPCR an orphan plan/stranded plan. The five major programmes proposed under the PPCR are sufficient to comprose a NAP, however, several other systems and priorities have been considered to supplement, and produce the current NAP.

The NAP embraces an iterative approach, with updates to be incorporated as things change and new assessments warrant it. This is accomplished by creating a "living document", with continuing assessments that can be integrated into the NAP at any time, subject to approval by the National NAP governance structure. The NAP is developed based on the guidelines agreed under the UNFCCC as expanded in the NAP Technical Guidelines, and is fully responsive to all the guiding principles outlined by the UNFCCC and further reinforced in Articles of the Paris Agreement.

The NAP will serve as an umbrella national adaptation programme, and as the source of input in the update to the NDC in 2020, along with an Adaptation Communication that will also be submitted to the Paris Agreement. The priority programmes agreed to in the NAP will be integrated into the GCF 5-year Country Programme, as well as a broader implementation strategy for adaptation at the country level through national, bilateral and other sources of funding.

As an umbrella programme for adaptation for the country, the NAP will integrate assessments carried out by different actors and will present outputs that can be used and serve the needs of the actors in their subsequent work on adaptation for Malawi. These include:

- Government-led efforts including in accessing financing from the UNFCCC funds (GCF, GEF, AF, LDCF);
- Efforts supported through bilateral support to government or non-governmental entities;
- Efforts under the PPCR;
- Efforts supported through non-governmental organizations or the private sector;
- Efforts that would be part of regional and global activities;
- Efforts in updating the NDC and in preparing an adaptation communication to the Paris Agreemen.

The NAP also presents a set of adaptation goals, objectives and targets, along with iindicators, in aggregate for the country, as well as for key systems.

To continue the assessments underpinning the formulation of adaptation plans in the country, Malawi has recently accessed the GCF Readiness Support Programme to further advance the NAP process. Outputs form this project, when ready. will be integrated into updates and revisions of the NAP.

Malawi National Adaptation Plan

Introduction

The NAP is the main vehicle for adaptation planning for the country, and encompasses activities at all relevant scales and levels, from the regional (multi-country level) to the national, sectoral, sub-national and local levels, including for specific municipalities. All recent adaptation strategies and plans will thus be included in the NAP as a master plan for adaptation, indicating what is ongoing and what remains to be addressed. [S/T reporting]

As a country with limited resources, most adaptation projects will be funded through international sources, with very little dependence on national budgets, at least to begin with. During implementation, activities will need to be well aligned and integrated with sectoral activities funded by government. [Link to GCF Country Programme]

There are many reporting channels under the UNFCCC and the Paris agreement that require information on adaptation (priorities, key vulnerabilities, adaptation actions, capacity gaps and needs, etc). The work under the process of formulating and implementing the NAP will provide the central basis for adaptation assessment and prioritization, and will inform all necessary reporting on adaptation, in particular, the update of the NDCs by 2020, and future national communications/transparency reports. [NAP informing Draft NDC in 2020]

The NAP road map for Malawi includes all activities that contribute to adaptation planning and the NAP in particular since the advent of the NAP decisions in 2010/11, and this is designed to be the guiding rail for all adaptation activities for the country and is the basis for support being received by all those in a position to do so. The recently funded NAP formulation proposal under the GCF Readiness Support is naturally a major form of financial support and will be used to continue the work of analysis, assessment, implementation and further planning. Support from others continues to be very critical for the success of adaptation efforts for the country. [Road Map]

The office of the UNFCCC Focal Point, housed in the Environmental Affairs Department, is the current custodian of work on the NAP and will continue to work with all relevant ministries, organizations and actors as necessary, maintaining and running the continuing process of adaptation monitoring, assessment and planning, the support the periodic production of NAPs. [National mandate, CC policy/law, Data Policy, coherence with other MEAs]

The NAP is a living document and will continue to be updated as the need arises, with a view to producing a formal updated version every 5 years. By the same vein, all intermediate outputs (stocktaking report, road map, assessment reports, framework document, monitoring and evaluation plans, climate investment strategy, etc) will remain living documents and will be updated as new information and new insights arise. [Wiki collection of documents for easy update, later morph into a DIVA – dynamic impacts, vuln and adaptation system]

The NAP follows the UNFCCC technical guidelines for the NAP process, and the collection of supplements to these guidelines as developed by different organizations and available on NAP Central.

Applies the NAP-SDG iFrame to manage multiple entry points and coherence with various frameworks being addressed including the SDGs, Sendai Framework, New Urban Agenda, Africa 2063, and relevant national strategies.

There are several major assessments conducted in the last 5 years, and the approach taken is not to promote yet another vulnerability and risk assessment, rather to build on available information and identify any obvious gaps if any. The concept of risk is adapted, following good examples from countries and organizations that have developed recent guidelines, including New Zealand, and OECD.

The traditional approach of arriving at projects as the main outcome of these assessments is improved upon by identifying appropriate methods and metrics that in fact support a risk-based approach.

Building on the unfunded PPCR/SPCR

There are several ongoing projects and programmes that address adaptation to climate change in Malawi, as well as main development objectives. The NAP will build on these projects and scale up efforts as appropriate.

One approach to make progress on the NAP would be to build on the PPCR/SPCR that was produced in November 2017, but for which CIF/PPCR funding dried up and is now left to find alternative funding sources. The PPCR/SPCR focused on three important sectors of agriculture, fisheries and water resources, and presents five priority programmes to implement proposed adaptation activities. The process of developing the SPCR are similar to that of the NAP and follow good practice in ensuring full participation of stakeholders, gender responsiveness, and builds on national development priorities.

Approach

The formulation of the NAP follows the guiding principles and technical guidelines as outlined in UNFCCC COP decision 5/CP.17. It embraces the country-driven, country-owned and iterative approach. The latest technical guidance from the NAP Technical Working Group is followed, based on the NAP-SDG iFrame toolkit.

Key Risks and Vulnerabilities

Baseline period 1961 to 1990 and trends to the present

Observations since 1960

- Temperature increases of approximately 0.9°C, with the most rapid increase in summer months (Dec–Feb), between 1960 and 2006.
- Increase in the number of days (+30 days) and nights (+41 days) considered “hot.”
- Highly variable year-to-year rainfall totals with no statistically significant trends.
- Increased length of dry spells during the rainy season.
- Increased intensity, frequency and magnitude of floods and droughts.

Projected climate for the next 20, 50, 100 years

- Higher average temperatures of 1–3°C by 2050, with largest increases in early summer months.
- Increase in the number of days and nights considered “hot” by 2060.
- Overall increases or decreases in rainfall difficult to project.
- Later onset/earlier cessation of rainy season.
- Increase in average monthly rainfall from Dec–Jan and a decrease from Feb–April.
- Increases in the proportion of rainfall during extreme events of up to 19 percent annually by 2090.

Source: For the summary, USAID 2017. Climate change risk profile Malawi.Fact Sheet.

Key climate hazards

- Prolonged Drought/dry spells
- Global and regional drought spells
- Torrential rainfall/Change (increase) in frequency and intensity of heavy rainfall events

- Local storm events
- Global and regional storm events
- Lightning
- Hot spells/temperature extremes
- Shifting (rainfall/growing) seasons
- Increase in temperatures
- Non-normal annual weather
- Pests and diseases outbreaks associated with climate events
- Disruption of national, regional and global food supply chains
- Wildfire

Systems at Risk

Crop production: Maize

System name: Crop Production: Maize

Brief description:

This is the basic system of growing crops, choice of which would be based on standard parameters of weather patterns, general site suitability (soil, land quality), mainly based on rainfall patterns, and subject to regular pests and diseases. Main crops are subsistence crops, and choice is sometimes based on market conditions. System model/analytical model: Well-developed analytical model exists based on the IIASA/FAO Agroecological Zoning (AEZ) system, and it has been parameterized to run for the whole globe, covering all major crops. Nationally specific models exist such as for Kenya (original developed of the AEZ methodology), China and Thailand. The Global AEZ system is available online and has been applied to various global questions.

Current constraints (factors of production etc):

- Rainfall patterns
- Quality of inputs (fertilizer, mechanization, extension services)
- Quality and suitability of seed (provenance) for changing conditions

Risks now and in the future (CC and others):

- Risk of crop failing due to changing growing season weather conditions (floods, drought/aridity, changed patterns affecting phenological development, etc)
- Risk of low yield due to poor inputs (limited fertilizer input)
- Risk of crop failure due to pest outbreaks, such as locust, fall army worms, etc

Adaptation options to address the CC risks:

- Changing crop types and provenances (to crops maturing in a shorter growth season, drought-tolerant varieties) – these may require new breeding programmes
- Improve water management through irrigation, damming, etc. to reduce dependence on rain-fed production
- Managing the full range of risks with a combination of actions and insurance at the local or national level
- Dealing with extreme temperatures to avoid frost damage, and desiccation

Required other actions to ensure adaptation is successful (e.g. baseline development investments, etc):

- Data driven crop production system that utilizes best available climate information services
- National insurance through ARC to manage risk of major crop failure and avoid food insecurity disaster
- Crop breeding, data collection and monitoring to support extension services and support to farmers, manage pests and diseases

Adaptation potential rating:

- Medium to high

System name: Maize as a commodity

Brief description:

Maize is the main staple food for Malawi, and its production is shared between subsistence farmers, small-scale (commercial) farmers and a few big estates. Maize import/export is strictly controlled by government, in order to manage the price of maize on the market, given the heavy reliance of most rural inhabitants on their maize production for livelihood (food, income, employment). Maize is sold at local markets and also through state-run ADMARC centers. Private business owners also deal in maize, buying and selling at opportune times. Government buys maize at a fixed price through the ADMARC centers and subsidizes sale of the maize during times of shortage. The national strategic food reserve holds an inventory of maize and would release maize into the market in times of shortage to help manage the overall price of maize. The annual cycle of maize marketing is described in a paper by JICA ...XXX

Current constraints (factors of production etc):

- Rainfall patterns/growing season characteristics and quality
- Quality of inputs (fertilizer, mechanization, extension services)
- Quality and suitability of seed (provenance) for changing conditions

Risks now and in the future (CC and others):

- Risk of crop failing due to changing growing season weather conditions (floods, drought/aridity, changed patterns affecting phenological development, etc)
- Risk of low yield due to poor inputs (limited fertilizer input)
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Required other actions to ensure adaptation is successful:

- Data driven crop production system that utilizes best available climate information services
- National insurance through ARC to manage risk of major crop failure and avoid food insecurity disaster

- Crop breeding, data collection and monitoring to support extension services and support to farmers, manage pests and diseases

Adaptation potential rating

- Medium to high

Food security

SYSTEM: National Strategic Grain Reserve

System name: National grain reserves management

Brief description:

Malawi established a National Food Reserve Agency (NFRA) in 1999. The NFRA is responsible for food price stabilization, export and import of food on behalf of government. Climate change is expected to impact food production, reserves and security through different feedback loops which requires a deeper and a complex managerial consideration to ensure ex-ante response.

Current constraints (factors of production etc):

- increasing production input cost: supply constraints, energy costs and transport costs;

Risks now and in the future (CC and others):

- xx

Adaptation options to address the CC risks:

- xx

Required other actions to ensure adaptation is successful (e.. baseline development investments, etc):

Adaptation potential rating

Urban water supply

System name: Urban water system for [Lilongwe]

Brief description:

Water supply to residents of the City of Lilongwe is the responsibility of the Lilongwe Water Board. Water is sourced from several sources and pumped to several processing points before being piped to users. There is no system to recycle water. System model/analytical model: The standard model of an urban water system such as for California, represents a typical urban water system (water source point dynamics, distribution infrastructure (clean water, recycling, waste)) Network of water supply system and withdrawals

Current constraints (factors of production etc):

- Rainfall amounts for the basin and resultant flow in main river outlets (e.g. Malingunde river/dams) (drought conditions, etc)
- Quality of the water dams as affected by land degradation in the basin resulting in siltation
- Old infrastructure for conveyance of the water to processing plants and to users
- Electricity supply for water pumps

Risks now and in the future (CC and others):

- Risk of water shortages in the source dams due to low rainfall, heat wave or drought
- Risk of water shortages to satisfy increasing demand due to expanding city/increasing population
- Risk of interruption in water supply due to equipment failure (pumps, pipelines, etc)
- Risk of interrupted water supply due to disruptions in power supply

Adaptation options to address the CC risks:

- Expand options for source water to address projected needs in the medium- and long-term, such as building a pipeline from alternative sources (e.g. Lake Malawi) or expand use of belowground aquifers

Required other actions to ensure adaptation is successful

- Establish water use controls, policies, including for periods of limited water supply
- Develop contingency plans to deal with severe water shortages or disrupted service (cf. India's Chennai and water by rail; water tankers; bans on water use for gardening, carwash)
- Citizen participation in water saving strategies (lessons from Cape Town)
- Use of automated monitoring systems to identify water leakages and reduce waste

Adaptation potential rating:

- Medium to high?

Supporting geospatial infrastructure and models:

Resources:

- Relevant regional/global networks and programmes

Commonly used models:

- Xx

Case studies

- Cape Town
- CA water System
- Cyprus – pipeline from Turkey
- Chennai, India
- Bolivia
- Sao Paulo

Hydroelectricity generation and energy security:

MEGASYSTEM: Energy security

SYSTEM: Hydroelectric generation

Brief description:

Malawi has abundant largely untapped hydro resources. The country's current energy installed generation capacity is 365MW, of which 98 percent is from hydropower resources and the remainder from diesel power. All major power stations are located in the southern region along the Shire river. One small hydro station, the 4.5MW Wovwe plant, operates in the north of the country. The hydro-potential of the Shire River alone is estimated at about 600 MW, and another 400 megawatts of potential exists on smaller rivers. Indiscriminate human activities along the river Shire basins and the smaller rivers could reduce the potential capacity to generate hydro power. Future increases in temperature could allow accelerate the drying up of these water resource which could plunge Malawi into total darkness.

Current constraints (factors of production etc):

- Encroachment of hydroelectric dams through activities sand winning threaten the stability of the dams.
- Reduction in water levels as a result limited rainfall prevent dams from producing to capacity.
- High cost of maintenance especially replacing obsolete equipment.
- Operational losses especially power theft results in financial problems.

Risks now and in the future (CC and others):

- Risk of over dams collapsing.
- Risk of rivers dry out mainly due climate change.
- Risk of dams' spillage submerging nearby settlement.
- Risk of dams flooding farms.
- Risk of dams disrupting flows, degrading water quality, blocking the movement of a river's vital nutrients and sediment, destroying fish and wildlife habitat, impeding migration of fish and other aquatic species, and eliminate recreational opportunities.

Adaptation options to address the CC risks:

- Relocation of settlement areas demarcated for dam construction (e.g. relocation of the people of Tuyen Quang in Vietnam and 46 households were affected by Binh Dien hydropower plant and dam).
- Resettlement of displaced people resulting from dam spillage (e.g. construction of James Bay in Quebec Canada).
- Planting of tree around dams to help store water in the dam reservoir.

Required other actions to ensure adaptation is successful (e.g. baseline development investments, etc):

- Existing dams must be able to comply with all existing environmental laws and regulations.

Adaptation potential rating:

- High

Supporting geospatial infrastructure and models:

- Xx

SYSTEM: Electricity distribution infrastructure (grid system)

Brief description:

infrastructure for distributing electricity in Malawi include the four power generating stations situated along the Shire River and the transmission lines. These infrastructures are able to distribute power to only 10% of Malawians population with majority of the people having no access to hydro energy. In events of high storm existing infrastructure for distributing electricity could be stressed.

Current constraints (factors of production etc):

- Limited distribution capacity
- Poor transmission infrastructure
- Wildfire burning high tension transmission poles in the forest.
- Wind storm pulling down transmission lines cutting electricity supply to communities.
- Bushfire causing the explosion of transformers in the Bush.
- Frequent blackout due climate change extreme events (hurricanes, floods, wildfires).
- Increasing cost of generation, transmission and maintenance.
- Increased air temperatures reduced carrying capacity of lines and transformers
- Increased air temperatures increased losses in lines and transformers.

Risks now and in the future (CC and others):

- Risk of transformers exploding as a result of wildfire.
- Risk of interruption in power supply as a result of broken-down transmission grid.
- Risk of transformer catching fire mainly due to thunder strike.

Adaptation options to address the CC risks:

- Creation of fire belt to prevent wildfire from burning high tension transmission lines.
- Adoption of renewable energy to augment other generation (e.g. Canada Electricity Association is adopting renewable source).

Required other actions to ensure adaptation is successful (e.g. baseline development investments, etc):

- Rigorous implementation of climate resilience electricity infrastructure.

Adaptation potential rating:

- Xx
- Xx

Urban flooding

System name: Urban flooding management system

Brief description:

The design of cities takes into account some measures for drainage of rainwater, often in open or underground spillovers that carry water to natural waterways/rivers, or some cases, into sewer lines. As climate is changing and when rainfall becomes more intense, drainage systems are often inadequate resulting in urban flooding.

Current constraints (factors of production etc):

- Drainage channels designed with a maximum flow in mind
- In some cases, no consideration was given to drainage of excess rainwater, especially in unplanned settled areas
- Densely settled areas make it hard or impossible to install or modify drainage channels
- Old drainage systems expensive to upgrade or repair

Risks now and in the future (CC and others):

- Risk of flooding locally during heavy rainstorms
- Risk of failure of older drainage lines/blockages leaving to backflows and flooding
- Risk of levees failing and causing flooding
- Risk of dams failing and causing flooding downriver/dams overflowing and gates having to be reopened urgently, leaving to flooding
- Risk of loss of life when people unfamiliar with flood waters take chances in crossing overflowing bridges, etc
- Risk of flooding in human settlements/houses and business areas
- Risk of drainage system failure contaminating drinking water systems
- For cities at mouth of major river systems (coastal cities), risk of heavy rain in any arts of the watershed leaving to flooding downriver in the city

Adaptation options to address the CC risks:

- Upgrade old drainage systems and expand capacity
- Build underground storm water storage areas (e.g. water storage under the Washington Mall, in Washington DC, USA; Bangkok City) and optionally pumps to redirect water to alternative outlets (e.g. Tokyo example)
- Upgrade flow channels to re-direct storm water to parks in the city (e.g. Copenhagen)
- Redirect river flows towards coastal cities to alternative channels into the sea to reduce flooding (e.g. Nadi, Fiji)
- Slow down river flows with dams or other structures along the river, to reduce flooding in coastal cities
- Build levees
- Build walls around important infrastructure (e.g. around a museum)
- Builds walls around coastal cities (NY – xxx)

Required other actions to ensure adaptation is successful (e.g. baseline development investments, etc):

- Enforce zoning laws for city dwellings to avoid flooding damage of houses
- Develop evacuation plans and conduct drills
- Plan cities to include soakways, directed drainage channels, etc

Adaptation potential rating:

- Medium?

Lake Malawi and its many functions

(Biodiversity, Fisheries, hydropower generation, greenbelt irrigation initiative, tourism)

System name: Lake Malawi

Brief description:

- Unique biodiversity: Lake Malawi is special to all Malawians and globally for a number of reasons. It is a center of biodiversity endemism and is home to unique fish species. It boosts the Lake Malawi National Park, a UNESCO heritage site, an underwater nature reserve. See https://whc.unesco.org/en/list/289/. It has been a UNESCO World Heritage site since 1984, celebrated for its stunning ecosystem that is home to hundreds of fish species, Lake Malawi National Park's importance when it comes to the study of evolution is likened to that of the Galapagos Islands finches! Another key feature is that of the midges that swarm over Lake Malawi and can be seen from space.
- Lake Malawi as a major water body supplying water for irrigation and drinking water
- Lake Malawi as source of the Shire River, implications for hydroelectricity generation on the Shire
- Lake Malawi as a tourist destination

Current constraints (factors of production etc):

- The dynamics of the lake levels, lake temperatures and condition, and how it responds to various factors affecting the watershed area, are not fully understood, despite several major research projects on the lake (GEF, IGBP/PAGES, etc)
- Land degradation in the watershed area is assumed to cause siltation and changes in inflow to the lake, affecting its ecology and overall water levels
- Variability in rainfall in the watershed area is assumed to impact inflow, and ultimately the outflow.
- Inadequate data collection relating to water inputs, withdrawals, water temperatures etc, are a major constraint to a data-driven analysis of the lake and its management
- Mining activities in the watershed area are on the increase, in particular for Uranium in the north, coal and others.

Risks now and in the future (CC and others):

- Risk of water levels dropping too low for outflow through the Shire River to sustain electricity generation downriver
- Risk of changing water temperatures affecting fish breeding at different levels of the lake, severely impacting the unique fish biodiversity of the lake
- Risk of increasing land degradation in the watershed area increasing siltation and limiting river inflows into the lake
- Risk of contaminants from the uranium mine in the north of the country severely damaging fish ecology and production, and also risk of contamination of drinking water and water for major irrigation efforts along the lake and in the Shire Basin
- Risk of contamination of the lake leading to losses in tourist income
- Risk of collapse of the fish industry based on the lake, in particular for main species of tilapia/chambo, usipa, catfish and several other species.

Adaptation options to address the CC risks:

- Rehabilitation of landscapes in the watershed areas to ensure steady water inputs into the lake
- Fish genebanks to safeguard the unique biological biodiversity of the lake
- Restrictions on fishing to manage yields under changing conditions
- Construction and rehabilitation of barrages on the Shire River to manage water flows in the Shire
- Careful tradeoff in water usage between irrigation, water for Lilongwe, and water needed to outflow into the Shire River for hydroelectricity generation
- Fish breeding to sustain population of key species

Required other actions to ensure adaptation is successful:

- Establish water use controls, policies, including for periods of low water levels
- Develop contingency plans to deal with severely low water levels in terms of electricity supply for the country
- Use of automated monitoring systems to measure inflows and outflows

Adaptation potential rating:

- Low to medium?

Lake Chilwa and its many functions

Degraded forest ecosystems and their services

Infrastructure at risk

Human health and well-being

Climate-related disasters

MEGASYSTEM: Disaster Risk - Human safety and well-being SYSTEM: Heat waves as a planning system**

System name: Managing heat weaves

Brief description:

In Malawi, extreme heat hazard is classified as high based on modelled heat information. The current heatwave may have been unprecedented and unexpected, but climate projections show that this occurrence will become more common in the future. Whilst currently there are around 40 days per year with temperatures exceeding 35°C, this is likely to become 50 to 100 days by the 2050s. The evidence about the risks to health from heatwaves is extensive and consistent from around the world.

Current constraints (factors of production etc):

- xx

Risks now and in the future (CC and others):

- Risk of mortality especially among the elderly and other vulnerable groups
- Risk of damage of heat sensitive crops such as tea
- xx

Adaptation options to address the CC risks:

- develop/adopt drought/heat resistant crop varieties
- Investments in water supply services and infrastructures: creating and/or repairing fountains for drinking and cooling; cooling by water spray (fountains)

Required other actions to ensure adaptation is successful (e.. baseline development investments, etc):

- Creating heat preparedness plans,
- identify vulnerable populations

Adaptation potential rating:

- Medium?

Supporting geospatial infrastructure and models:

Resources:

- Xx

Case studies to cite:

- France, other cities with a heat wave plan

SYSTEM: River bank flooding as a planning system

System name: River flood risk management

Brief description:

There is no formal flooding zoning and areas along major rivers (and some smaller ones) are subject to seasonal flooding. Flooding incidents are on the increase, especially for rivers with multiple tributaries. With extensive degradation in watershed areas, runoff is excessive, increase the likelihood of flooding. Potentially damaging and life-threatening river floods are expected to occur at least once in 10 years. National disaster risk policy supports the consideration of river flood risk management as an important part of achieving proper planning and sustainable development.

Current constraints (factors of production etc):

- Limited local government authority on physical development
- Large-scale deforestation driven by farming, urbanization

Risks now and in the future (CC and others):

- xxx

Adaptation options to address the CC risks:

- Flood zoning and related policies for settlement/lad use;
- Afforestation of river banks and localized embankment;
- Creation and restoration of storm-water drainage;
- Restoration of riparian forests;
- Develop flood protection bunds around critical infrastructure.

Required other actions to ensure adaptation is successful (e.. baseline development investments, etc):

Adaptation potential rating:

High?

Supporting geospatial infrastructure and models

3-D maps/models

- River network flow models

Resources:

- Relevant regional/global networks and programmes
- Xx

12. Human settlements

Priority Adaptation Actions

Goals, objectives and expected outcomes of adaptation

Taking a medium- to long-term approach and avoiding maladaptation

A. Governance and coordination of adaptation activities

1. National climate change adaptation programme: umbrella programme
2. xxx

B. Projects and programmes to address key risks for the country

1. Climate Resilient Integrated Watershed Management (Total: US$ 84 million, PPCR/SPCR)
2. Building Climate Change Resilience in Selected Agricultural Value Chains in Malawi (Total: US$ 26 million, PPCR/SPCR)
3. Sustainable Fisheries Sector and Fisheries Value Chain in Malawi through Improved Climate Resilient Lake Ecosystem Conservation and Management (Total: US$ 18.2 million, PPCR/SPCR)
4. Strengthening Climate Resilience of Smallholder Farmers in Malawi (Total: US$ 13.5 million, PPCR/SPCR- FAO)
5. Operationalising Malawi's Climate Services Centre (Total: US$ 17.3 million, PPCR/SPCR)
6. Forest landscape restoration programme
7. Lake Malawi Ecosystem
8. Lake Chilwa Ecosystem and Value Chains
9. National physical development planning under climate change
10. Building a resilient national food security

C. Essential cross-cutting projects/programmes

11. Creating an effective adaptation process and system (mainstreaming/integration, policies, governance, etc.)
12. Climate information services and early warnings systems, systematic observations
13. Active monitoring of key systems: crop production, water resources, ecosystems, etc
14. M&E system – individual projects and in aggregate for the country
15. Capacity development for implementation of adaptation and support to the process including data and information management, etc

Implementation Strategy

Alignment with the GCF country programme

The priorities in the NAP will form the 5-year country programme for engagement with the GCF as follows:

Year 1

Year 2

Year 3

Year 4

Year 5

References

Annexes

Database to support adaptation monitoring and planning

Database of projects under the FM entities

INDC Adaptation priorities from INDC (2015)

Sectors	Intended policy-based actions
Agriculture	Increase irrigation at smallholder level
	Increase land under irrigation through Greenbelt initiative from 20,000 to 40,0000 ha
	Expanded programme of Greenbelt initiative from 40,000 ha to 100000 ha by 2030
	Build adaptation capacity in climate resilient agronomic practices for smallholder farmers
	Promote on-farm water conservation technologies
	Support an expanded programme of constructing multipurpose dams for irrigation and aquaculture
	Develop financial mechanisms to support crop insurance targeting smallholder farmers
	Promote the growing of drought tolerant crop varieties
	Implement conservation agriculture and agroforestry practices
	Promote improved land use practices
Water	Implement integrated catchment conservation and management programme
	Promote water harvesting technologies at all levels
	Support an expanded programme of constructing multipurpose dams to enhance water storage
	Support the revision of water related policies and strategies (inc. water SWAP)
	Develop and enhance climate information and early warning systems

Sectors	Intended policy-based actions
Human health	Build capacity to diagnose, prevent and control climate-sensitive diseases such as malaria, diarrhea and malnutrition
	Enhance public awareness about water, sanitation and hygiene practices and enhance health surveillance
	Support expanded programme for preventing and controlling climate-sensitive diseases
	Construct more health centres in order to improve access to health facilities within a walking a distance of 8 km
	Support the establishment of centre of excellence for research and disease control targeting climate-sensitive diseases
Energy	Promote use of biomass briquettes as substitute for firewood and charcoal
	Promote an energy mix that moves people away from use of biomass
	Support an expanded programme of briquette production and use
	Construct storage dams for hydropower generation
	Promote solar PV and use of the energy efficient bulbs
	Promote use of bio-fuels for lighting and cooking replacing fossil-based fuel
Forestry	Support research in drought tolerant and fast-growing tree species
	Expand afforestation and forest regeneration programmes
	Promote growing of drought to tolerant and fast-growing tree species
	Support research in drought tolerant and fast-growing tree species
Wildlife	Provide watering points at strategic locations of national park/game reserve
	Implement diseases control programmes
	Support capacity building in a wildlife institution to lead in adaptation initiatives e.g. translocation and culling
Fisheries	Capacity building in aquaculture and cage culture fish farming practices
	Adopt ecosystem services approach in the management of fisheries resources
	Promote aquaculture and cage culture fish farming practices
	Protect fish spawning/breeding sites
	Maintain fingerlings for stocking lakes and rivers after severe drought episodes

Sectors	Intended policy-based actions
Gender (and vulnerable groups)	Promote gender mainstreaming in policies, programmes and projects
	Support capacity building programmes for vulnerable groups
Infrastructure	Construct infrastructure for flood control, transport etc.
	Develop and implement climate related building codes/standards
	Revise existing building standards in line with climate change
Industry	Promote research in industrial technologies

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