

REPUBLIC OF RWANDA



*Guidelines for Mainstreaming Climate Change
Adaptation and Mitigation in the Health Sector*

(FINAL DRAFT)

**Building Climate Resilience for a
Healthy Rwanda and Planet**

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Foreword

Rwanda has come a long way on its Vision towards a medium income country by 2020, with major achievements made in all sectors. However, climate change, a major global phenomenon with serious local implications, threatens to undermine the achievements. Although Rwanda in particular and Africa in general, have contributed very little to global warming, they will be disproportionately impacted by climate change. Rwanda's health sector is particularly vulnerable to climate change, given the country's susceptibility to diverse tropical diseases, limited social safety nets and weak health care system. We must think about how to minimize the negative impacts of the changing climate and on how to best prepare for these changes. Thankfully, investing in adaptation measures can reduce the country's vulnerability and significantly lower the costs of responding to climate change.

Rwanda Environment Management Authority (REMA) has been leading the national response to climate change, working with stakeholders to build adaptive capacity at all levels. Indeed, these guidelines are part of on-going efforts to build national resilience and capacity to mitigate and adapt to climate change. The guidelines complement existing tools, and are informed by recent work on climate change, environmental mainstreaming and preventive health care.

These guidelines are intended for use by policy makers, planners, technocrats and analysts in the public health sector, especially those involved in the conception, formulation, financing, implementation, monitoring, evaluation and reporting of policies, strategies, plans, projects, budget, and activities for health service delivery. While REMA continues to play its statutory role of coordination, regulation and support, the Ministry of Health will be the lead agency in the integration of climate change concerns in health policy processes, working with Local Governments, other relevant state and non state institutions. This is why REMA has prepared sector-specific guidelines to facilitate the process.

Finally, I would like to recognise the team from the Centre for Resource Analysis (CRA), who assisted us in preparing these guidelines. I also applaud the staff of REMA, especially those associated with the Integrated Management of Critical Ecosystems (IMCE) project which made the production of these guidelines possible and the World Bank which provided the financing. Other national institutions and stakeholders who contributed to developing these guidelines are gratefully acknowledged.

Finally, I argue the relevant institutions and individuals to make use of this document to climate-proof Rwanda's health sector, so as assure sustainable development in Rwanda.

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Director General, REMA

Acronyms and Abbreviations

AfDB	African Development Bank
CCMA	Climate Change Mitigation and Adaptation
CDM	Clean Development Mechanism
CPAF	Common Performance Assessment Framework
DDPs	District Development Plans
DHS	Demographic and Health Survey
EAC	East African Community
EDPRS	Economic Development and Poverty Reduction Strategy
ENR	Environment and Natural Resources
EU	European Union
GDP	Gross Domestic Product
GHG	Green House Gases
GoR	Government of Rwanda
GTZ	German Technical Cooperation
ITN	Insecticide-Treated Nets
MINAGRI	Ministry of Agriculture and Animal Resources
MINELA	Ministry of Environment and Lands
MININFRA	Ministry of Infrastructures
MINECOFIN	Ministry of Finance and Economic Planning
MoH	Ministry of Health
NAFA	National Forestry Authority
NAPA	National Adaptation Plan of Action
NBI	Nile Basin Initiative
NELSAP	Nile Equatorial Lakes Subsidiary Action Programme
NRM	Natural Resources Management
NUR	National University of Rwanda
OECD	Organization of Economic Cooperation and Development
OGMR	Rwanda Geology and Mining Agency (French acronym)
RBC	Rwanda Biomedical Centre
RECO	Rwanda Electricity Company
REMA	Rwanda Environment Management Authority
RURA	Rwanda Utilities Regulatory Authority
RWASCO	Rwanda Water Supply Company
SIDA	Swedish International Development Cooperation Agency
SLM	Sustainable Land Management
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNEP	United Nations Environment Programme
WATSAN	Water and Sanitation
WHO	World Health Organisation

1. Introduction

1.1 General Overview

In 2000, Rwanda elaborated the Vision 2020, a plan expected to transform the country from a low to medium-income country with a healthy and productive population. Half-way to the Vision 2020, tremendous progress has been made in all sectors. Economic growth has doubled from a per capita gross domestic product of US\$ 250 to more than US \$510 by 2010. Rwanda has reduced total fertility rates from 6.1 children per woman in 2005 to 4.6 in 2010; under-fives mortality rates declined from 133 per 1000 in 2006 to 76 in 2010; and maternal health improved significantly with 69% of babies delivered at a health facility compared to 52% in 2007 (RDHS, 2010; IDHS, 2008). Climate change, however, could reverse the gains made in health and other development domains, unless efforts are made to develop sufficient adaptive capacity.

Climate change was defined by the United Nations Framework Convention on Climate Change (UNFCCC) 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.*"

Green House Gas (GHG) emissions, which are the main causes of climate change, arise principally from anthropogenic factors (human activities) although natural factors contribute too. The types of activities also determine the kinds of GHGs emitted. Thus there is need to: (i) mitigate climate change by undertaking actions that reduce GHG emissions; and (ii) implement adaptation measures to protect the population from climate change effects.

Climate change has adverse impact on economies and public health, and poor countries like Rwanda will suffer the greatest impact (MINELA, 2010). In its 4th Assessment Report, the Inter-Governmental Panel on Climate Change (IPCC) concluded that Africa was likely to experience more warming than the rest of the Planet (WHO, 2010). This implies that Africa should adapt perhaps more quickly than other regions.

The Government of Rwanda (GoR) has undertaken a number of measures to address climate change, beginning with ratification of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, developing a National Adaptation Action Plan (NAPA) in 2000, and climate change and low carbon growth strategies in 2010.

1.2 Objectives and Scope of the Guidelines

These guidelines are designed to provide basic and flexible guidance on how to:

- i) conduct impact and vulnerability assessments in the health sector;
- ii) identify opportunities and entry points for integration of climate change mitigation and adaptation (CCMA) measures;
- iii) identify, analyse and integrate options for CCMA into the health policy formulation, financing, implementation and evaluation at national, local and community levels.

The guidelines will assist to improve the resilience of Rwanda's health care delivery system to climate change effects.

1.3 Why Mainstream Climate Change into the Health Sector Policy Processes?

With climate change, every sector and everyone is potentially vulnerable. The resilience of the health systems (including infrastructure, policies and programmes) to climate risks will depend on the extent to which they incorporate flexibility and adaptive management (WHO, 2010). The National health policies, programmes and infrastructure, are designed on the basis of stable climatic conditions. These and the institutional structures, systems and tools used in the health sector need to be adapted to the risks associated with extreme weather conditions, disrupted seasonal trends and accelerating climate variability. The ability to respond adequately, quickly and effectively to potential climate-related hazards is of critical importance to programme success, as failure to adapt will result in huge costs.

2. Climate Change and Development: Risks and Vulnerabilities

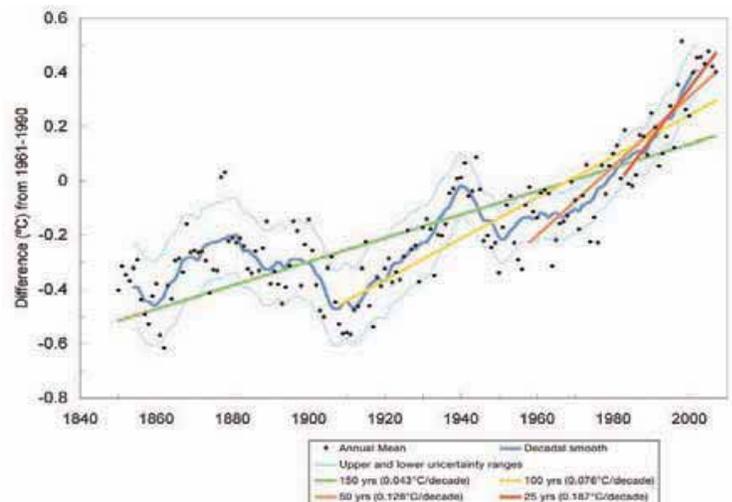
“Many of the major killer diseases transmitted by water and contaminated food and by insect vectors are highly sensitive to climatic conditions and weather extremes. Climate change threatens to slow, halt or reverse current progress against many of these infections” WHO, 2010.

2.1 Climate Change: A Global phenomenon with Local Effects

In 1997, the Inter-governmental Panel on Climate Change (IPCC) confirmed that there was unequivocal change in global climate. Since then, average air temperatures have increased, there is widespread melting of snow and ice and rising sea level. The 10 warmest years since 1850, have all occurred within the last 13 years (WHO, 2009).

Figure 1: Indications of Global temperature rise (1850 – 2005)

Source: WHO (2009): Protecting Health from Climate Change.



The most important characteristics of Climate change are:

- 1) *It is happening now:* In the last 100 years, the World warmed by approximately 0.75°C (figure 1), with a much higher rate in the last 25 years (0.18°C every 10 years), partly because the rate of GHG emissions is much higher than absorption rate.
- 2) *Extreme weather events are changing in frequency and intensity:* Heat waves have reportedly become more frequent as have heavy precipitation events over many areas.
- 3) *Human activities are the main cause of climate change:* Most increases in temperature since the mid-20th century have been attributable to the increase in human activity.
- 4) *Human-induced climate change will continue for many decades, making the need to adapt, important and urgent:* The development options chosen will influence the rise in temperatures. Even with GHG emissions reduction, temperatures will still rise by over 0.6°C this century (WHO, 2009).

5) *If climate change is unabated*, temperature increases will continue and the effects will be more disastrous.

2.2 Climate Change Vulnerability in the Health Sector

Climate change affects health in a number of ways:

1. **Reducing the quality, quantity and access to basic health requirements:** i.e. clean air;

clean water for drinking, cooking and hygiene; sufficient and balanced diet food; and adequate shelter.

2. **Increasing exposure to health risks**– e.g. urban air

pollution, lack of access to clean water supply and sanitation leading to diarrhea, malnutrition and natural disasters. Extreme climatic conditions could increase levels of air pollutants, increase disease transmission through unclean water and

contaminated food, compromise public health and agricultural production.

3. **Some disease incidences** will increase and/ or change geographic range while some will disappear and new ones emerge with time.

4. **Climate change could undermine efforts to control infectious diseases:** Many killer-diseases are highly climate sensitive as regards temperature and rainfall, including cholera, meningitis, diarrheal diseases, malaria, and other vector-borne infections.

Box 1: Links between Climate Change and Health

The impacts of climate change on health could arise from the following:

- ❖ Climate change effects on ecosystems will increase the numbers of people at risk of malnutrition, the geographic range and incidence of vector borne zoonotics, food- and waterborne diseases, and prevalence of diseases related to air pollutants and aeroallergens.
- ❖ Climate change-related alterations in the frequency, intensity, and duration of extreme weather events (e.g. heat waves, floods, droughts, and windstorms) will affect people, damage public health infrastructure and cause huge economic losses.
- ❖ Climate-induced economic dislocation of people and environmental decline, as well as through development setbacks incurred by damage to public health infrastructure and livelihoods.
- ❖ Climate change will make it more difficult to control a wide range of climate-sensitive health outcomes. In this regard, health policies have to explicitly consider these risks in order to maintain and improve public health.

WHO (2010); MINELA, 2010:

3. Rwanda's Vulnerability and National Response to Climate Change

What makes a country vulnerable to climate change? The degree of populations' and economies' vulnerability to extreme climate events will depend on their coping ability. Poorer and natural resources-dependant countries like Rwanda, are the most vulnerable.

3.1 Overview of Climate Change in Rwanda

3.1.1 General

Recent events and meteorological data provide glaring evidence that climate change is happening in Rwanda and that it will have disastrous effects. The 1997 floods and prolonged drought of 2000 associated with *El Nino* and *La Nina* (MINITERE, 2006) are some of the extreme climate change events that Rwanda has suffered recently. Over the next century, annual temperatures in Rwanda are projected to be 1.0 °C to 2.0° C higher (MINELA, 2010).

Analysis of the mean annual temperatures of Kigali Airport Station (1971-2007) in Kigali city and Kamembe in the Western Province (figure 2) reveals consistent temperature increase. For Kigali, the average temperature rise of 1.2°C from 19.8°C in 1971 to 21.0°C in 2009 is worrisome as it exceeds the 0.8°C reported to have been caused by global warming over a period of 150 years.

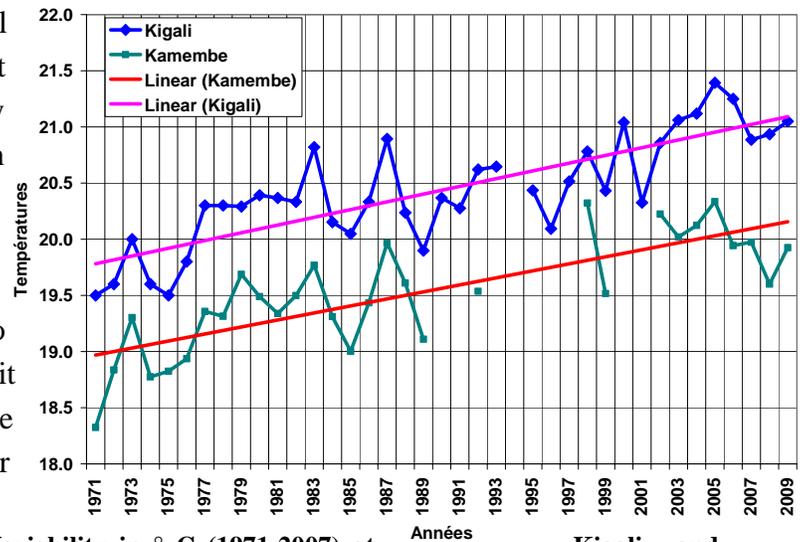


Figure 2: Mean Annual Temperature Variability in ° C (1971-2007) at Kigali and Kamembe Stations.

Data Source: Mutabazi (2010). Assessment of Operational Framework related to Climate Change.

3.1.2. GHG Emissions and underlying Causes of Climate Change in Rwanda

A recent GHG emissions study in 5 sectors (energy, industrial processes, agriculture, land use, land use change and forestry) and wastes) indicate that the main GHGs were Co2 which comprised 87% of all GHGs; Methane (CH4) accounting for 11.5% and nitrogene hemioxide (N2O) which accounted for 2% of GHGs. The main sources of GHGs are: agriculture (which contributed 78%), energy (17.8% 8%), industrial processes (3%), wastes (0.9%) and land use

change and forestry (0.2%). The recent records indicate that Rwanda's total GHG emissions were 5,010.4Gg carbon equivalents and total absorption was -8545Ggr. With a net national balance of -3534.6Ggr, Rwanda is a net sink.

3.2 Climate Change Impacts on Rwanda's Health Sector

Extreme weather events (high temperatures, drought, floods, heavy erratic rains, humidity) will affect Rwanda's health system in a number of ways. The main health concerns are summarized in Box 2 and discussed under 3 groups.

1. Climate change is increasing people's exposure to health hazards: Frequent floods and landslides have already exposed many areas to water-related diseases. The SNC concluded that vector-transmissible diseases will be more frequent and geographically widespread as a

result of global warming (MINELA, 2010). Scenario analysis indicates that potential increase in water-related epidemics could range from 12 to 27% for malaria and 11 to

Box 2: Major Health Concerns related to Climate Change

- ❖ Injuries, disability, drowning
- ❖ Heat and cold stress
- ❖ Water and food-borne diseases
- ❖ Malnutrition
- ❖ Malaria and other vector-borne diseases;
- ❖ Swine flu, bird flu, SARS, Eborra
- ❖ Psychological stress.

Source: MINELA (2010): WHO (2010): Essential Public Health Package to Enhance Climate Change Resilience in Developing Countries.

17% for Schistosomiasis. Infectious diseases will increase as temperature and humidity increase. The consequences of climate change for Rwanda's health manifest in the following:

- *Malaria incidences:* A 2009 study by the Stockholm Environment Institute (SEI) estimated that the rural population at risk of malaria could increase by 150% by the 2050s. As a result, significant increase in disease burden and economic costs exceeding US\$ 50 million annually are expected.
- *Efforts to combat HIV/AIDS could suffer setbacks if patients are exposed to food shortage and malnutrition.* Cases of patients discontinuing antiretroviral treatment (ART) on account of not having enough food have been reported.
- *Respiratory tract infections, cholera and dysentery outbreaks are increasing,* especially among children under-five and women. A recent mapping of infectious diseases revealed that 65% of Rwandans suffer from intestinal worms. TRAC reports suggest that recorded cholera incidences increased from 338 cases in 2006 to 894 in 2007, with 20 deaths in 2008 (MoH/TRAC, 2008) due large to extreme weather events.
- *Some climate-sensitive ailments (e.g. tick-borne ailments) may be wiped out or intensify* depending on changes in temperature and humidity.

2. The capacity of Government and development partners to deliver on health outcomes in MDGs and Vision 2020 will be undermined: increased disease prevalence – both in

frequency and diversity- could strain the health system. Extreme weather events will affect the economy, thereby reducing health budget and ability to deliver on health targets.

3 Climate change will increase social vulnerability of poor households: As a result of displacement, loss of economic assets and food insecurity, more people could be exposed to health challenges and inability to meet social security needs like health insurance. Table 1 illustrates the implications of climate change on human health.

Table 1: Implications of Climate-Change related risks to the health sector

	Climate-related risk/event	Likely impacts on public health and health sector management	Health policy implications
1	Prolonged drought	Reduced availability of clean water for drinking, cooking, hygiene and recreation Food security and access to adequate and balanced diet: Incidences of crop failures have been reported with direct consequence on individual and community health. Reduced incomes & livelihoods of agricultural households Poor economic performance as a result of agricultural failure Disruptions in water supply and power production. Reduced availability of water and inadequate power for health centres.	Increased morbidity & mortality to water-related diseases Increased incidences of malnutrition & related illnesses. Poor nutrition increases susceptibility to illnesses. Increased exposure to illnesses. Lower budget allocation to health sector Increased risk of water-related illnesses at health facilities; High cost of water and energy; failure or reduced performance of health systems e.g. diagnosis and immunization.
2	Intense & frequent floods	Deaths of dozens of people reported in Western Province; destroyed infrastructure and economic assets e.g. agricultural fields, and left many people homeless. Increased incidences of malaria, cholera, meningitis and other waterborne diseases.	Increased exposure to water-related ailments; Cost of health services increase as infrastructure break down.
3	Extreme weather conditions – temperatures, seasonal patterns	<i>Disease incidences & changing geographical range;</i> Changing pathogens' lifecycles will disrupt human immune systems and body behaviors. Increased ailments related to climate i.e.: lung infections (34.1%), malaria (11.3%) and poor hygiene (10.5%).	Increased morbidity- new cases of patient visits recorded in HMIS. Increased burden on the health system including staff, facilities and budget.
		<i>Reduced social and economic assets.</i> More people are likely to lose homes, property or get internally displaced by floods, storms, landslides and/ or fires.	Reduced ability to meet health needs e.g. health insurance and health care through better nutrition & hygiene.
4	Global scale disasters	<i>Reduced donor funding and direct foreign investments,</i> as development partners divert resources to meet climate-related disasters elsewhere.	Reduced health budget and ability to implement health sector activities

Policy makers, planners and development activists need to understand the potential health impacts of climate change, the effectiveness of current adaptation and mitigation policies, and the options available for addressing them.

3.3 National Response to Climate Change in Rwanda

3.3.1 Basis for Response to Climate Change and recent initiatives in Rwanda

The basis for action on climate change is enshrined in international and national legal provisions. Article 4(f) of the UNFCCC to which Rwanda is signatory argues Governments to "*take climate change considerations into account, to the extent feasible, in the social, economic and environmental policies and actions, and employ appropriate methods with a view to minimizing adverse effects on the economy, public health and the quality of the environment, of projects or measures undertaken to mitigate or adapt to climate change*".

The World Health Assembly Resolution WHA/61.R19 argued Governments to develop capacity to assess the risks of human health from climate change and to implement effective response measures.

Climate change is recognized at the highest level of Government as a potential threat to the health and livelihoods of Rwandans. As a result, the GoR has implemented a number of policy initiatives including: mechanisms to implement provisions of international climate change conventions (implementation of NAPA); reforming public institutions to include climate change management functions; and mainstreaming climate change within policy processes – the environment and natural resources, and low carbon growth strategy are recent policy strategies that reflect climate change adaptation priorities.

3.3.2 Specific climate change actions in the Health Sector

Climate change adaptation in the health sector is evolving. Recent actions include:

1) The MoH undertook the first vulnerability assessment of the health sector in 2004. It revealed that the high prevalence of cholera in Western and Northern Province was linked to contamination of drinking water by extreme rainfall, and raised signals of emerging malaria epidemic in the non endemic areas in the northern highlands. Preliminary studies were undertaken to assess the malaria risk in Rwanda due to climate change.

2) Strengthening national capacity for epidemiological surveillance and disease diagnosis. The GoR has, through Rwanda Biomedical Centre (RBC), strengthened integrated disease control and epidemiological surveillance, including response to climate-related disasters.

3) Building community resilience in the health sector: Mutual health insurance coverage had increased to 91% in 2010, contributing to increased safety nets for the poor. Other initiatives at the local level have included: i) Mass de-worming of children in Burera district and other areas; ii) provision of water treatment kits by MININFRA to improve the safety of drinking water; iii) promotion of Hand washing and access to clean water in collaboration with UNICEF; and iv) Indoor Residual spraying as a malaria prevention measure.

Implications of climate change for Key Health Indicators

Extreme weather events (especially arising from the now predictable increases in temperatures, shorter and more intense rainfall) are likely to affect Rwanda's tremendous progress in achieving health targets, notably reducing child and maternal mortality; increasing community resilience through near universal mutual health insurance coverage. The likely effects of climate change on these indicators are broadly stated in table 2.

Table 2: Potential Effects of climate change on Rwanda's Health Indicators

	Key health indicator	Indicator levels and target		How Climate change might affect performance
		2010	2012	
1	Under-fives mortality rate per 1000	76	70	A combination of inadequate access to clean water and balanced diets is likely to reverse achievements in child mortality
2	Under-fives who are anemic	38%	-	Inadequate access to food resulting from extreme weather events could increase the incidences of malnutrition in children.
3	Under-fives who are stunted	44%	27%	Could increase due to inadequate balanced diets resulting from droughts and internal displacement. In urban areas, increased cost of food could also reverse gains in childhood illnesses.
4	Proportion of under-fives who are underweight	11%	14%	Reduced access to food will increase the incidences of underweight children.
5	Incidences of diarrheal diseases	-	-	Exposure to water-related diseases and epidemics could increase as a result of intensified extreme weather conditions like floods.
6	Malaria admission in hospitals	36.8%		Could increase the malaria infection burden especially in non endemic areas; among younger children. However, older people could develop immunity;
7	Proportion of women who are anaemic	17%		Reduced food security could increase incidences of anaemia among women thereby exposing them to health.
8	Proportion of Households with at least one ITN	82%	100%	Increased temperatures could increase the populations under malaria threats thereby reducing the coverage of ITN and increase vulnerability to malaria.
9	Community health insurance coverage	91%	100%	Increased drought incidences will affect agricultural production and household incomes, hence reduce their ability to meet health insurance needs; increased climate-related disease burden will also affect households' and the economy's ability to pay for health insurance
10	Human Resources: Doctor/ patient ratio Nurse/patient ratio	1/18,000 1/1690		Reduced sector budget, as a result of climate change related shocks could result in inability to train and recruit more health workers, thereby increasing community vulnerability.

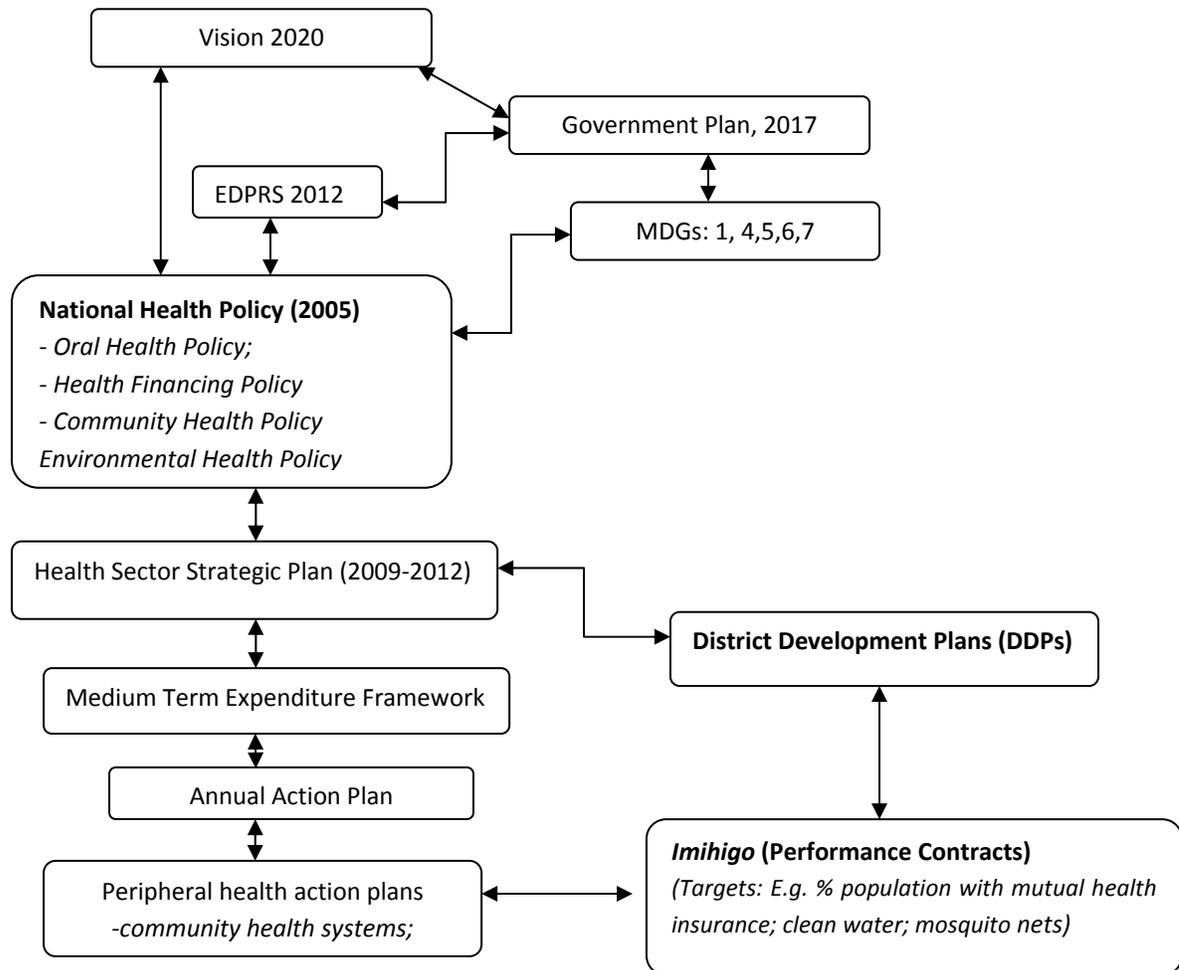
Data Source: NISR (2010): Rwanda Demographic and Health Survey (DHS) 2010; MoH (2009) HSSP II 2009-2012.

4. Opportunities and Entry Points for Mainstreaming Climate Change Adaptation in the Health Sector

4.1 Overview of Rwanda’s Health Policy Process

Rwanda’s health sector is structured in a decentralized framework that comprises of 3 levels: the central administrative and planning level; the referral level (3 National Referral Hospitals); and the peripheral level (that includes the district hospitals, dispensaries and frontline service providers).

An important area to consider is the Local Performance Contracts (*Imihigo*). Rwanda’s policy process is initiated through a complex interaction of national aspirations, international commitments and local health challenges. The policy process and various instruments are outlined in figure 3.



The National Health Policy, 2005 focuses on 8 priorities, all of which have implications for climate change.

4.2 Opportunities and Entry Points for CCMA Mainstreaming in the Health Sector

Opportunities for mainstreaming climate change concerns within the health policy processes are summarized in table 3. Within policy priorities, the entry points for CCMA mainstreaming are summarized in table 4.

Table 3: Opportunities for climate change mainstreaming within the Policy process

Policy Cycle Stage	National level	Sector level	Implementation level
Conception & formulation: <i>Recognize & consider climate risks</i>	Long-term Vision; National Policies & Strategies	Sector policies & strategies	Formulation of local actions (<i>e.g. Ubudege, CDCs, Health Posts</i>);
Planning	Multi-year development plans	Short & medium-term sectoral plans	Priority setting & incorporation into implementation action plans
Resource Allocation (National budget)	<i>Allocate funding for climate-specific actions</i> Include climate-related programmes/projects (sectoral and cross-sectoral)	Incorporate climate-related activities and include climate considerations in project selection criteria; Relocate funds to vulnerable sectors or regions;	Priority setting & budget reallocations at local level or Health unit
Programming & Implementation	Sector-level development plans and budgets	Sector programming	Local actions

Modified from UNDP (2010)

Opportunities for CCMA mainstreaming within the health policy formulation and implementation process exist in a number of levels:

- 1) **The Policy formulation and Strategic Planning Process:** the policy objectives are translated into results through subsidiary policies and the Health Sector Strategic Plan. MoH need to consider climate change threats and consult leading climate change management institutions (notably those with policy responsibility for food standards, water, environment, housing), in the initiation and formulation of Health Policies.
- 2) **Policy Implementation:** Rwanda's health policy implementation entails a number of strategic actions. There are opportunities to mainstream CCMA at all levels:
 - i) **Budgeting, resource mobilization and public expenditure allocation:** Climate-sensitive health threats are more likely to cause health emergencies but climate change

considerations have low chances of being allocated budgets in an environment of budget constraints. It is important to integrate climate change response among the criteria for resource allocation; flag climate change threats in resource mobilization, and demonstrate the need for adequate financing for CCMA mainstreaming in the health sector.

ii) Implementation plans, activities and personnel: Action plans must be linked to seasons and weather variabilities. It is important to ensure that the peripheral level of the health care delivery system – which is responsible for implementation under decentralisation – has not only adequate budgets, but skilled personnel to collect data, predict and integrate into planning and activity implementation. Health emergencies might arise as climate change intensifies, but disaster preparedness will reduce the negative impacts, and enhance ability to realise sectoral targets. Ensure that all health staff are trained and sufficiently tooled to detect and address climate-related issues.

iii) Monitoring and evaluation of health outcomes: The health sector M&E system should make use of climate data and develop an analytical framework. Health performance targets, monitoring and reporting schedules and data collection systems, must include key climate change information and its links to health outcomes. All reporting centres need to share information on how they are addressing climate change. This requires investment in data and research (already a key Health Policy objective), and partnership with climate-related institutions. Climate change- health information should be widely shared using platforms such as the Joint Sector Reviews (JSRs) and *Imihigo* presentations.

Table 4: Matrix of Issues and Opportunities for CCMA in the Health Policy Process

	Policy Objective/ Aspect	Key elements of the policy outcome	Opportunities & Actions for CCMA Mainstreaming
1	Human Resources	Increasing numbers & skills of health professionals	<ul style="list-style-type: none"> ● Sensitise and train all Health Professionals & practitioners in Climate change issues and how to mainstream CCMA; ● Provide information to health professionals on climate & health; ● Integrate climate change issues in the public health & biomedical education & training;
2	Drugs, Vaccines & consumables	<ul style="list-style-type: none"> ● Improve the availability of quality drugs, vaccines & consumables, particularly essential drugs, routine vaccines & family planning products; ● Ensure drugs, vaccines and consumables are available, accessible, affordable; ● Disseminate pharmaceutical information to encourage rational and sensible drugs use; ● Implement quality assurance system and ensure that new drugs & medical consumables pass registration procedures. 	<ul style="list-style-type: none"> ● Ensure that drugs and vaccines of climate-related ailments; ● Strengthen climate change awareness of pharmaceutical operators & Drug & Vaccine Quality Assurance monitoring teams so that they can detect and deal with the effects of weather; ● Reinforce the contents, packaging, storage and transportation and handling of drugs & vaccines to tolerate extreme weather variability and climate change effects;
3	Expand geographical accessibility of health services	<ul style="list-style-type: none"> ● Expand infrastructure & providing adequate medical equipment; use health services maps to plan health services. 	<ul style="list-style-type: none"> ● Redesign infrastructure to include changing climate conditions; ● Ensure that all facilities (e.g. laboratories are climate-proofed and climate factors are incorporated in procurement specifications; ● Integrate vulnerability maps into the spatial

	Policy Objective/ Aspect	Key elements of the policy outcome	Opportunities & Actions for CCMA Mainstreaming
			information guides for health planning, so that areas with higher vulnerability Indices get priority.
4	Community- led health services development	Empowering communities and community leaders to mobilize and educate citizens about primary health care, enrolment in <i>mutuelles des santé</i> , and take charge of community health including referrals.	<ul style="list-style-type: none"> ● Integrate climate change issues into the Community Health Workers’ training; awareness raising about climate-sensitive health problems; ● Provide skills and information about health emergencies.
5	Financial accessibility of health services	Extending health insurance coverage to the poor and vulnerable groups;	<ul style="list-style-type: none"> ● Include climate-sensitive health challenges in financing criteria; ● Provide an emergency fund to deal with climate-related health emergencies to increase access to vulnerable people; ● Provide for financing gaps arising from climate vulnerability e.g. disasters.
6	Improve the quality and demand for health services	Mobilize communities to use health services; Improve the quality of health care at all health centres.	<ul style="list-style-type: none"> ● Include climate information in the CHW training & communication kits; include climate change issues in medical procurement & supplies; ● Ensure that each health unit has an emergency health kit & vulnerability information/maps.
7	Strengthen national referral hospitals, research & treatment	-technical & logistical capacity of the 3 National Referral Hospitals to undertake research; effectively diagnose and monitor diseases; and training of health professionals.	<ul style="list-style-type: none"> ● Integrate climate-response issues into the research, infrastructure and capacity development for the referral system and climate-related research; ● Increase disease surveillance in vulnerable communities.
8	Strengthen institutional capacity for service delivery	Skilled health staff & robust institutional systems; Coordination & partnerships through SWAp that facilitate integration & cross-sectoral planning; financing;	<ul style="list-style-type: none"> ● Include REMA among participating partners; integrate CCMA targets in each programme; ● Ensure that sector planning processes use information from other sectors, including water, agriculture, infrastructure & environment.

4.3 Key Areas for Climate Change Adaptation in the health service delivery

A number of climate-sensitive issues must be considered in health sector adaptation:

1. *Health infrastructure design and facilities* should be adjusted for climate variability, to enable them cope with extreme weather events. Scenario analysis for appropriate infrastructure designs will have to be made based on local climatic conditions. Simple factors as airflow, natural light and heat retention have to be considered.
2. *Energy*: energy use contributes to GHG emissions. Climate change will also affect power reliability, which is critical for lighting, communication, storage of vaccines and medicines, and operation of health equipment. Alternative energy sources need to be considered.
3. *Water use efficiency*: At community level, water use and conservation will become important tools to fight against climate-sensitive diseases, especially those related to food, water and hygiene. Also, health centres should invest in water use efficiency measures.
4. *Waste management*: management of medical wastes including toxic and infectious wastes; liquid waste and solid materials affect air quality, pollute water and spread infections. Incineration techniques that reduce GHG emissions and energy use should be considered.

5. *Skills and knowledge of health workers* will be developed through awareness raising, training and provision of climate information and knowledge management tools. Developing appropriate capacity across the public health system will help identify climate-related risks, and ensure timely response to risks (e.g. outbreak of strange and/ contagious epidemics).

6. *Awareness of the population about climate change effects* on health is critical to building resilience among communities and reducing vulnerability of individuals, households and communities. The health sector should review its environmental health and community health communication strategies to include information about health problems associated with extreme weather events and how to avoid them or minimize their effects.

The main issues, climate risks and typical adaptation measures are summarized in table 5.

Table 5: Some Adaptation Measures to Climate risks in the Health Policy Implementation

Health sector component	Associated climate risk / threats	Adaptation Measures
Institutions (including legislative & policy instruments)	Institutional systems, plans and tools not responsive to extreme weather conditions; inadequate measures to respond to climate change effects.	-Legislate for all mitigation measures in all sectors; Integrate Climate Disaster preparedness in all sectoral policies, strategies & budgets related to health.
Infrastructure & facilities	Health facilities are likely to be affected by extreme weather conditions, thereby underlining performance.	Make health facilities/ infrastructure designs climate-sensitive; ensure adequate mechanisms to prevent effects of winds, floods, storms; Install water harvesting facilities.
Transport & communication	Road networks especially in rural areas may constrain health performance; telecommunication systems may affect referral & logistical management	Establish alternative routes and telecommunication facilities; localize referral systems and strengthen medical knowledge systems at peripheral level.
Energy	Energy efficiency; resilient to power failures; alternative and cleaner power sources.	Power systems must promote efficiency; alternative energy systems –green & cleaner energy sources should be considered. Install solar equipment & energy saving systems to maintain steady power supply.
Equipment & materials	Performance failure due to climate insensitivity; shelf-life of medical equipment may be affected by change in weather conditions; materials and medicines may expire beforehand.	Climate-sensitive equipment should be considered; procurement guidelines should include climate-sensitive specifications
Knowledge & skills	Policy makers, health workers and communities have inadequate knowledge about effects of climate change on patterns of diseases and other health risks, as well as emergency responses.	<ul style="list-style-type: none"> ● Climate-sensitive medical research; ● Regular, on-the-job training and continuous learning mechanisms; ● Health information system ● Establish knowledge & Resource centres at every District Hospital – to ensure readiness to climate change; ● Provide climate change-health information kits to community health workers (<i>Abajyanama b'ubuzima</i>).
Budgets	Likely budget overshoots to cater for unanticipated emergencies;	-Include climate-risks in health sector plans; -Incorporate climate change risk analysis in MTEF preparations; Train health workers & managers to mainstream climate-change into budgets
	Budget cuts arising from poor economic	Improve efficiency in budget execution

Health sector component	Associated climate risk / threats	Adaptation Measures
	performance	

5. Guidelines and Tools for Climate Change Mainstreaming in the Health Sector

5.1 Actions to Mainstream Climate Change Adaptation in Health Sector

WHO (2010) recommends a minimum package of 6 actions to address climate change in health, viz:

- ✓ *Comprehensive assessments* of the risks posed by climate change on population health and health systems;
- ✓ Integrated environment and health surveillance;
- ✓ Delivery of interventions for the effective management of climate-sensitive public health concerns;
- ✓ Preparedness for, and response to, the public health consequences of extreme weather events, including population displacement;
- ✓ Research;
- ✓ Strengthening of human and institutional capacities and inter-sectoral coordination.

The main requirements for CCMA mainstreaming are three-fold:

- 1) **Tools and techniques** to assist in analysis and simplifying the linkages between climate change and health outcomes; to predict and respond to climate change risks and potential vulnerabilities of the population; undertake scenario building for adaptation options under different conditions; communicate and monitor CCMA processes to decision makers and stakeholders.
- 2) **Competent human resources and institutional systems:** CCMA in health will require considerable skills, knowledge and systems not currently in place. The systems will include platforms for translating climate change research into knowledge; facilitate inter-disciplinary dialogue and information dissemination.
- 3) **Budgets:** While the most appropriate and realistic way to budget for climate change response is to integrate CCMA activities and plans within the normal budgeting process, it is obvious that most climate change responses will relate to emergencies, preparedness, and capacity building, research and information management.

5.2 Basic Steps and tools for CCMA Mainstreaming in Health Policy Process

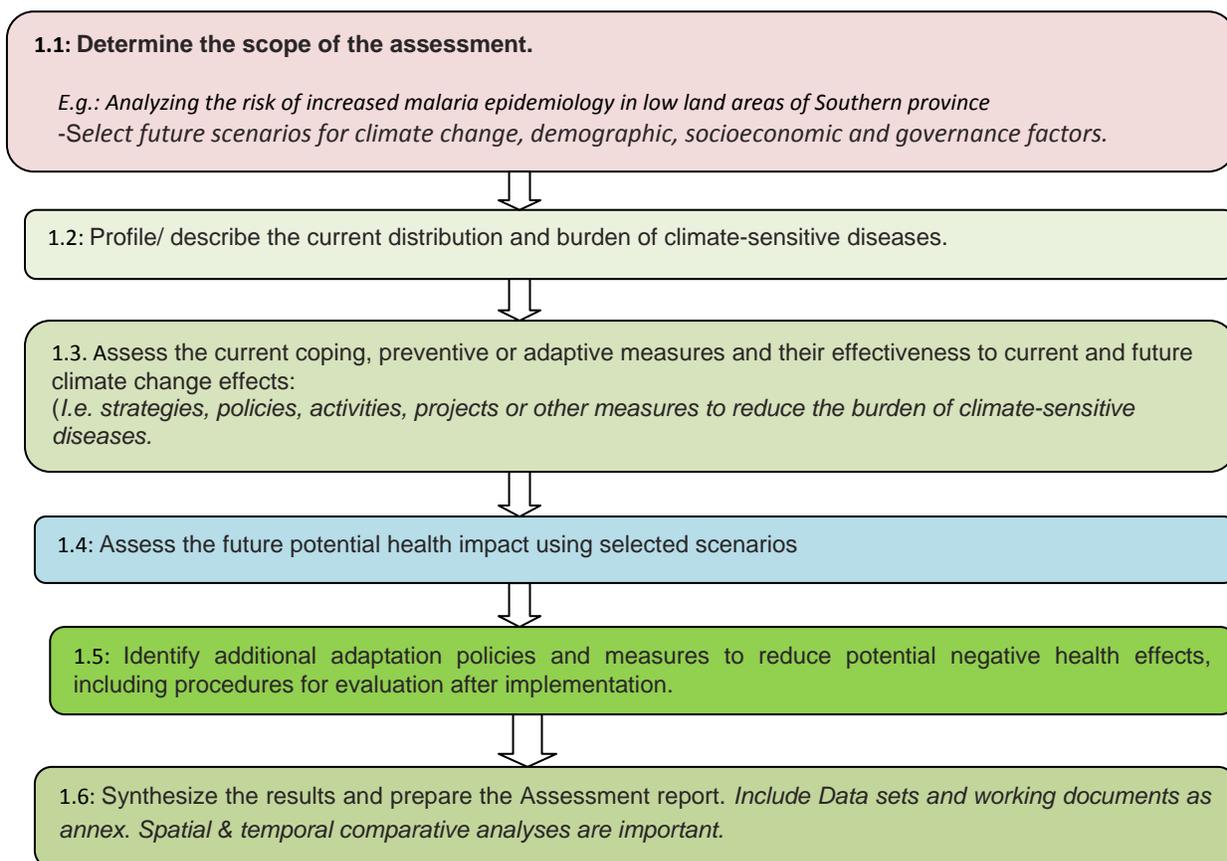
The basic steps and supportive tools for CCMA mainstreaming in the health sector, are presented here-below and summarized in figure 4.



Step 1: Conduct Climate Change Impact and Vulnerability Assessment

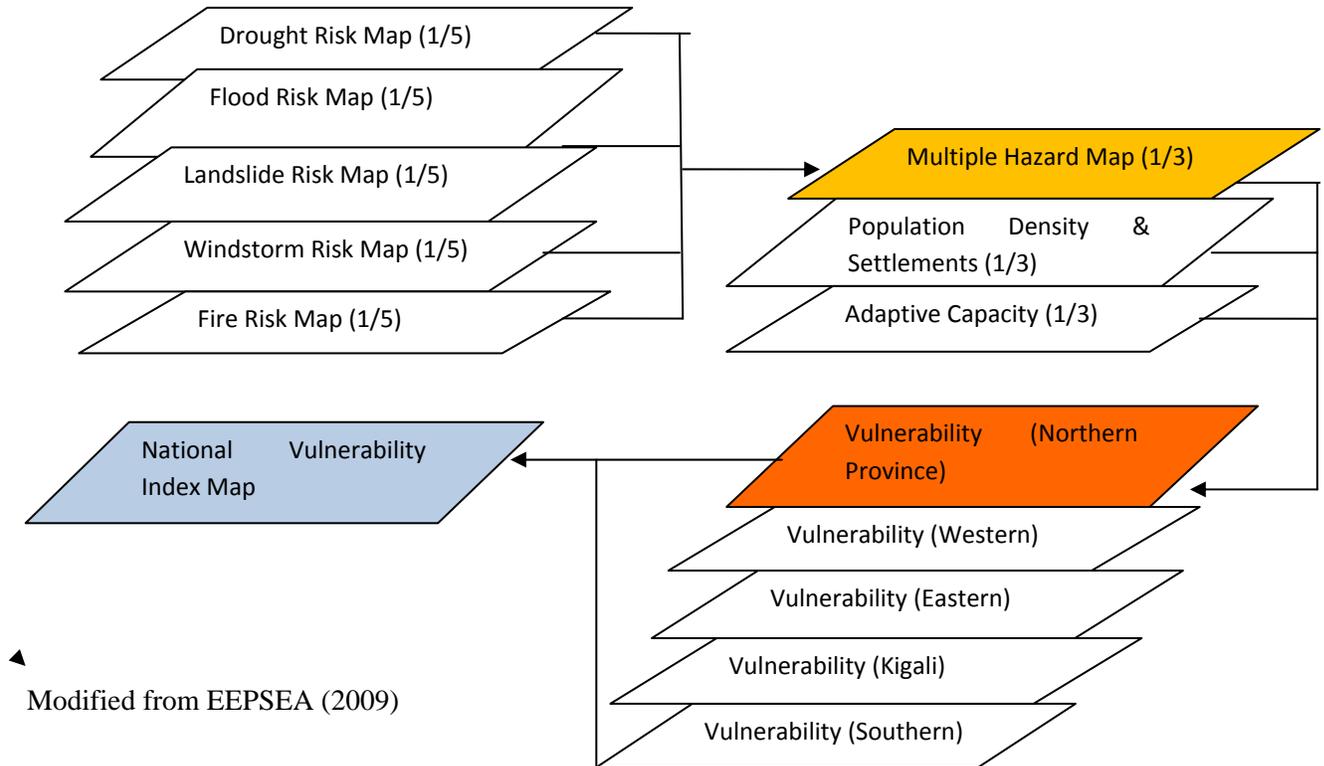
Impact and Vulnerability Assessment should be undertaken to determine the extent to which the population in different geographical locations and social strata, as well as the health systems are exposed to extreme climate variability; are susceptible to the effects of such extreme weather events; identify existing responses and determine their effectiveness. The assessment will help to understand who is at risk, where and how to respond appropriately and cost-effectively. It will help identify capacity needs; establish baseline climate conditions, potential barriers to adaptation, and opportunities, and the basis of which to set priorities for adaptation. The key steps are summarized in figure 4.

Figure 4: Basic steps in Climate Change Vulnerability Assessment.



A Vulnerability Index Map is the main output of this assessment. Figure 4 illustrates how a climate change vulnerability index map is developed.

Figure 5: Developing a Climate Change Risk and Vulnerability Index for the health sector

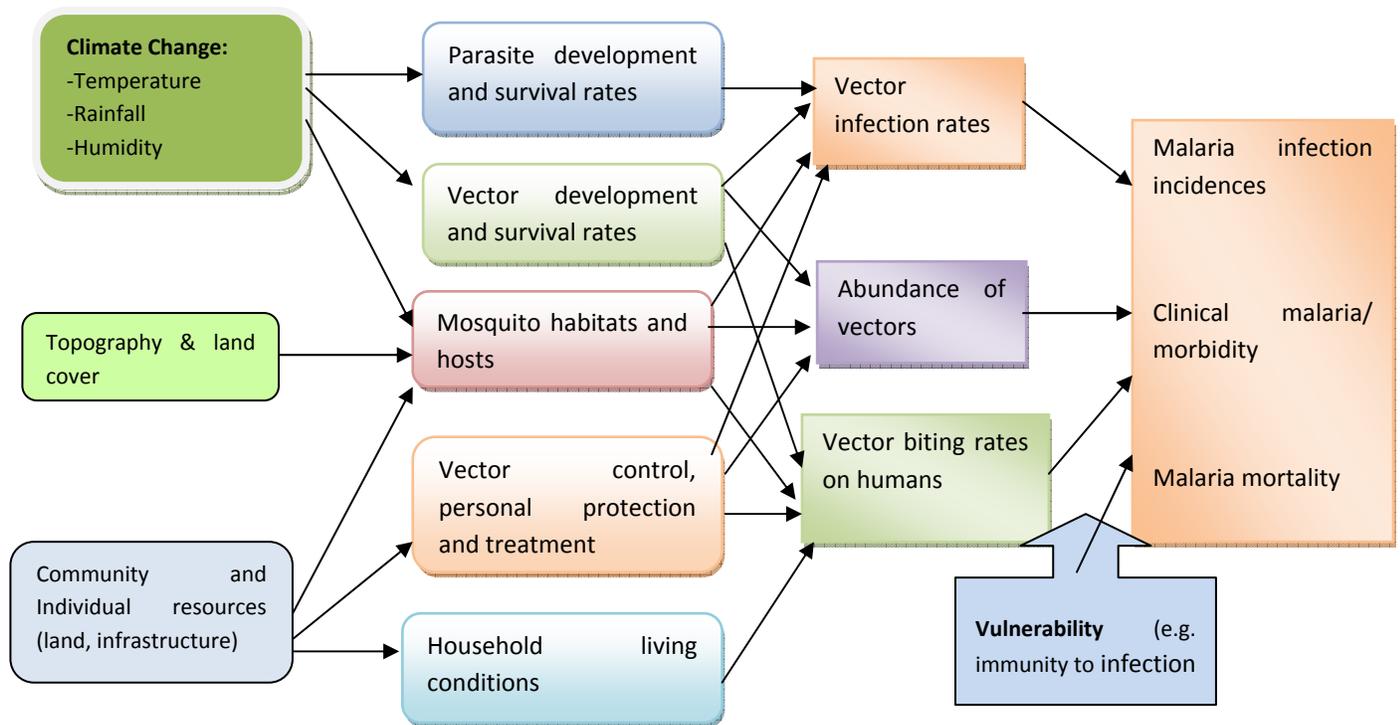


Climate change vulnerability assessment should focus on 4 dimensions:

- **Physical vulnerability** to and influence on weather patterns;
- **Social vulnerability and community resilience:** certain socio-demographic groups (pastoral communities, fishing communities, urban poor, populations living in steep hill slopes, refugees and displaced persons, and rural smallholder producers) may be at higher risks, and so special attention should be paid to them;
- **Governance** – institutional and policy framework; political will and coherence;
- **Economic vulnerability** – mostly the costs of health burden on the economy and the reverse i.e. the implications of economic vulnerability on the health sector.

A fundamental first task in the climate change impact and vulnerability assessment is to establish a clear understanding of the links between climate change and health. An illustration of the link between climate change and malaria epidemiology is presented in figure 6 (modified from McMichael *et al* In WHO, 2003).

Figure 6: Causal links between Climate Change and Malaria Epidemiology



Modified from: WHO, 2003: Health and Global Environmental Change Series 1; p 41.



Step 2: Identify and Analyse Adaptation and Mitigation Options

After establishing the health sector's vulnerability, a range of adaptation policy options will be generated. These are programmes and activities that can be undertaken to help adapt the sector policies and plans to climate change shocks (adaptation) and/ or reduce climate change drivers (mitigation). These options should be subjected to an analytical process where decisions are made to select the most appropriate in terms of effectiveness, technical and economic feasibility. These interventions could include existing, new or untried interventions. Each option should be thoroughly analysed and those that are likely to provide the best results in terms of reducing the climate change-health burden, selected and implemented. Options that are not implemented due to constraints related to lack of technology, information or resources, or as a consequence of other policies and programmes. Table 6 provides some potential criteria for evaluating adaptation options.

Table 6: Key Evaluation Criteria when selecting Adaptation Options

	Criterion	Description
1	Cost	Costs to implement and maintain; cost sharing possibilities
2	Effectiveness	Capacity to solve problems or realize opportunities derived from climate change impacts (e.g., economic benefits, costs avoided, lives saved)
3	Ease of implementation	Potential legal, political, institutional, barriers
4	Acceptability to local stakeholders	All stakeholder identified adaptations are attractive to some stakeholders, but may not be equally attractive to all stakeholders for political, economic, social or cultural reasons
5	Acceptability to Financing Agencies/Ministries/ Donors	Are the financing agencies/ministries involved willing to support the option
6	Endorsement by Experts	Is the option consistent with international best practice; Rwanda Medical Association or other professional bodies?
7	Timeframe	Are short-term or long-term strategies more desirable; How does the timeframe needed to implement the option compare with that available (e.g., are there specific project or funding time horizons);
8	Institutional Capacity	How much additional capacity building and knowledge transfer is required to implement the adaptation
9	Size of Beneficiaries Group	Does the adaptation provide small benefits to a large number of stakeholders and people or large benefits to a small number
10	Fit with local development priorities and interests	Do the adaptation activities fit with the local development priorities (<i>Imihigo</i>) and local initiatives
11	Potential Environmental or Social Impacts	Are there possible adverse impacts on the environment or people (e.g., are additional GHG emissions likely)
12	Capacity to Sustain Over Time	Can the adaptation be successfully sustained at local, district or national level if implemented?

Modified from USAID (2007) and UNDP (2010).



3: Identify and cost Programmes and actions for climate interventions

Effective response to climate change in the health sector will require formulation and implementation of health emergency management policies and legislation. Table 7 outlines some key actions to mainstream adaptation and mitigation into the health policy processes.

Figure 7: Essential Elements of a Climate Change Adaptation Strategy

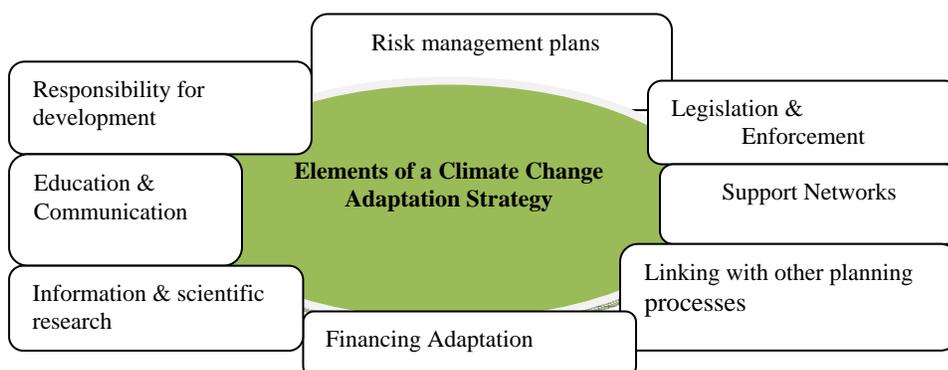


Table 7: Actions to Mainstream CCMA in various Components of the Health Policy

Strategic action	Specific actions	Expected Results
Risk Assessment	Undertake comprehensive assessments of the risks of extreme weather variability on population health & health systems	Increase understanding of vulnerability of national health and health systems to climate change; Ability of health systems to respond Identify basis for enhancing resilience of health & health systems
Integrated environment and health surveillance	<ul style="list-style-type: none"> ● Establish a functional integrated environment and health surveillance system; ● Incorporate key environmental indicators, including climate data into HMIS; ● Track environmental changes which affect health determinants. 	timely and evidence-based decisions for effective management of environmental risks to human health; reliable prediction & prevention of increased incidence in climate-sensitive diseases/illnesses
Effective management of climate-sensitive public health concerns	<ul style="list-style-type: none"> ● Integrated vector management to reduce incidence of malaria and other vector-borne diseases; ● Water safety plans (in urban areas) and point-of-use water treatment (in slums and rural areas) to reduce the incidence of water-borne diseases; ● Regulatory interventions to limit the concentrations of pollutants in ambient air to reduce incidences of respiratory infections; ● Food and nutrient supplementation; 	Reduce incidences of vector-borne diseases
Preparedness for	<ul style="list-style-type: none"> ● Formulate & implement emergency management 	Effective and timely response to climate-

Strategic action	Specific actions	Expected Results
and response to health impacts of weather, hydrological and climate related emergencies and extreme events	policies, legislation frameworks and programmes; <ul style="list-style-type: none"> ● emergency response and recovery plans; ● <i>Early warning systems</i> for health, including access to weather and epidemiological forecasts; ● <i>Prevention and control of communicable diseases</i>, mass casualty management, reproductive health, mental health & psychosocial support, environmental health, nutrition and emergency feeding, fatality management; ● <i>Human resource development</i> programmes for health emergency management, including training and education; ● <i>Develop community-based health risk reduction programmes</i> - primary health care, first aid, health education and risk communication and local emergency response planning; ● <i>Make Health facilities safer and their infrastructure more resilience</i> to climate effects; 	sensitive health problems
Research & Knowledge generation	Develop and implement a research agenda focusing on better understanding local health effects of climate change; generating and disseminating knowledge on locally-appropriate adaptation measures.	<ul style="list-style-type: none"> ● Increase understanding of the health effects of climate change on populations & health systems; ● Increase communication of climate-health links within NAPAs, NCs and national processes e.g. EDPRS.
Strengthening human & institutional capacities	Identify skills gaps; formulate & implement a capacity building action plan; Establish a climate-change & health coordination mechanism at the National Level.	<ul style="list-style-type: none"> ● National capacity for disaster prediction; disease diagnosis & emergency response;



4. Design and Implement a plan for the mainstreaming Climate change in the Health Sector

An implementation plan is prepared to guide the process of CCMA mainstreaming, and to assist in allocating resources in time and space. The first task in the implementation process is to define the stakeholder roles; determine resource requirements, and set timelines for specific outputs. A typical implementation plan for CCMA mainstreaming will normally comprise the following components:

- *Strategic plan outlining actions and timelines of involved stakeholders;*
- *Capacity building needs assessment and training plan;*
- *Budget covering expenditure needs and revenue sources;*
- *Outreach / communication plan;*
- *Sustainability plan;*
- *Plan for monitoring the performance of adaptations.*

Table 8: Matrix of Priorities for Health Adaptation Plan

Climate Change Health risks	Health consequences	Population at Risk (low) 0 - 10 (high)	Likelihood of damage (low) 0 - 10 (high)	Time S/M/L
Heat waves & cold spells				
Mudflows				
Food security & food safety				
Quality of water				
Infectious diseases				
Migration				
Quality of air				
Cardiovascular diseases				
Respiratory Tract Infections				

Whilst mainstreaming climate change adaptation into the health policy process is a long-term and continuous exercise, there are key time-bound milestones that must be achieved in the first mainstreaming strategy and adaptation plan. Table 9 summarized the key milestones, the estimated time frame for implementation and responsible institutions.

Table 9: Key Milestones and Institutional Responsibilities in Health Sector Climate Change Adaptation

	Key Task/Milestone	Time frame	Responsible
1	Conduct Climate change Impact & Vulnerability Assessment for the health sector	6- 9 months	MoH/Planning Dept; Rwanda Biomedical Centre REMA-Climate Change Dept;
2	Identify & Analyse Adaptation Actions	2-3 months	MoH-Planning, Financing; RBC
3	Design costed Programmes for Climate Change Adaptation		MoH-Planning
4	Design the Adaptation Plan and Mainstreaming Agenda	1-2 months	MoH-Planning/REMA
5	Mobilise funds for mainstreaming climate change Adaptation and implementation of Adaptation actions	-	MoH through budget/donor projects; REMA/Climate Financing Facility
6	Raise Awareness of health-climate issues within the health fraternity and community level	12-36 months	MoH/Environmental Health and Communication Departments; REMA; District Council; NGOs
7	Train Health sector actors on climate change adaptation at all levels	15-24 months	MoH-Env'tal Health Dept; RBC REMA; District
8	Develop District & Community level Adaptation Plans	3-6 months	Mayor/District Executive; Director of District Hospital; Health Committees
9	Design pilot adaptation actions at local level	6-9 months	District Council

	(community & Health facility level)		NGOs
10	Implement the Health Sector Climate change Adaptation plan	60 months	MoH
11	Monitor the mainstreaming process for climate change adaptation in Health	60 months	MoH-Planning; RBC; REMA
12	Evaluate performance and Review the Adaptation and Mitigation Process	3-6 months	MoH Planning (HSSP indicators); District Council (DDP & Imihigo indicators)

The adaptation and mitigation implementation plan will normally be based on the comprehensive climate change impact and vulnerability assessment. It will typically have the following contents:

- Executive Summary
1. Background
 - a. *Potential effects of climate change on Rwanda (by province, district/ localities) generally; Potential effect on the health sector (Draw from the Climate Change Impact & Vulnerability Assessment)*
 - b. *Purpose of the Climate Change Adaptation implementation plan*
 - c. *How the plan has been developed (include stakeholder consultations and scientific analyses);*
 2. Scope and coverage of the plan and implementation process
 - a. *What is covered by the implementation plan?*
 - b. *Issues for implementation*
 - c. *Time frame for major actions and activities*
 3. Priority Activities and Actions
 - a. *Activities and actions are needed to implement the adaptation and mitigation plan*
 - b. *Key barriers to implementation*
 - c. *How will the mitigation and adaptation principles be implemented*
 4. Stakeholder Roles and Responsibilities and Coordination mechanisms
 - a. *Which institutions/agencies/ organizations will do which actions*
 - b. *Linkages, Arrangements/ procedures for coordination and support*
 5. Resource Requirements and Resource Mobilization Strategies
 - a. *Human and technical resources*
 - b. *Financing*
 - c. *Resource mobilization and capacity building*
 6. Monitoring
 - a. *Key indicators and framework for monitoring*
 - b. *Integration with poverty reduction monitoring*
 7. Annexes
 - a. *Resource toolkits (Existing guidance documents and other materials)*
 - b. *Detailed logframe*
 - c. *Glossary of key terms/ Abbreviations*



5. Monitor the CCMA Implementation Process

Climate change adaptation and mitigation activities represent a long-term investment of human, capital and financial resources. Outcomes and impacts are often felt over a long span of time. Secondly, the long-term risks posed by climate change for which adaptation is needed, may not be realized for many years (spanning decades). Many adaptation actions would normally have no precedents in similar situations. Hence, continuous monitoring is needed to optimize the outcomes, ensure that adjustments are made to keep the actions relevant and focused. A number of evaluation criteria can/should be considered, viz: cost, ease of implementation, likelihood and extent of expected benefits or adverse impacts. For the current national health policy, some key climate change adaptation and mitigation indicators are summarized in table 10.

Table 10: Key indicators for Climate change Adaptation and Mitigation in the Health Policy

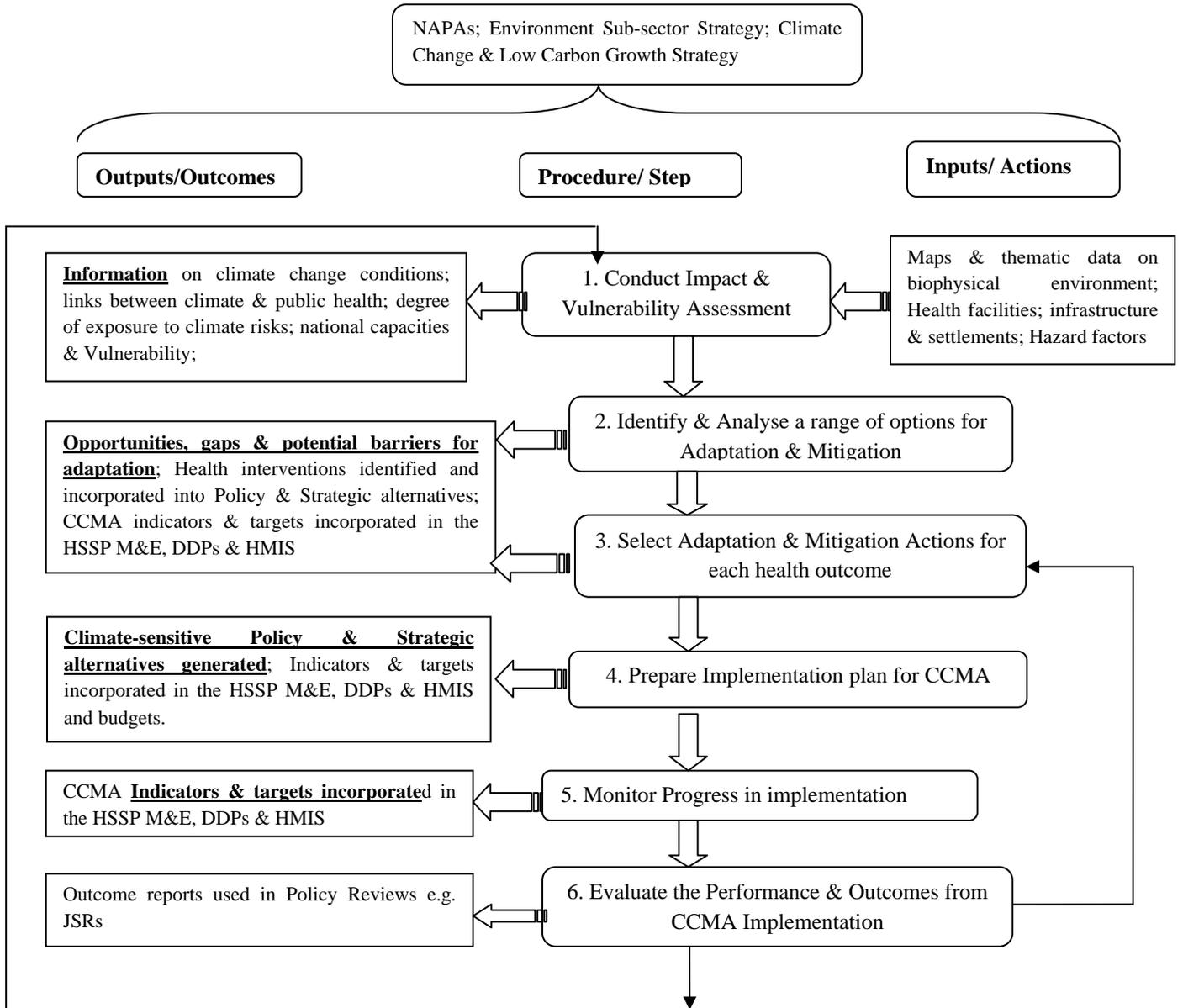
	Policy Objective	Key climate change adaptation indicators in the Health sector
1	Human Resources	<ul style="list-style-type: none"> ● % of Health practitioners with knowledge of climate change adaptation in health; ● Extent to which medical and public health training integrates climate change issues
2	Drugs, Vaccines & consumables	<ul style="list-style-type: none"> ● Proportion of Medical and Pharmaceutical operators who have and are applying knowledge of climate change adaptation in their operations;
3	Expand geographical accessibility of health services	<ul style="list-style-type: none"> ● Proportion of health facilities whose structural designs and facilities layout are adapted to climate change risks; ● Extent to which Medical procurement processes are climate-sensitive ● Proportion of health centres whose facilities (including laboratories) are climate-proofed;
4	Community- led health services development	<ul style="list-style-type: none"> ● Proportion of community health workers with information and knowledge on climate change adaptation;
5	Financial accessibility of health services	<ul style="list-style-type: none"> ● Extent to which health financing incorporates climate change adaptation and mitigation; ● Proportion of health sector funding (both Government and non government) set aside for climate-related health emergencies
6	Improve the quality and demand for health services	<ul style="list-style-type: none"> ● Proportion of health care users who have knowledge about climate change effects on health; ● Incidences of climate-sensitive disease morbidity reported at health centres;
7	Strengthen national referral hospitals, research & treatment	<ul style="list-style-type: none"> ● Proportion of health budget set aside for research on climate-sensitive health risks ● Proportion of district hospitals with climate change information and adaptation kits
8	Strengthen institutional capacity for service delivery	<ul style="list-style-type: none"> ● Existence of a national institutional coordination mechanism for implementing climate change adaptation ● Extent to which sector planning processes reflect climate change adaptation and mitigation indicators/ targets



6. Evaluate performance and Review the Adaptation and Mitigation Process

How do we know that the adaptation measures proposed/ included in the health policy processes have helped climate-proof the health sector? Regular evaluation of the interventions and subjecting the health system to a climate change check at regular intervals. The evaluation should not be separate or stand-alone. Rather, specific climate change adaptation indicators should be included in the health sector evaluation and reporting process – from policy level down to community and health facility level. All JSRs should, for instance, start reporting on their progress to adapt to climate change, and the extent to which climate change is affecting the outcomes. Evaluation of the adaptation process must be iterative, where the results will be used to inform a review or refining of the initial adaptation strategy or specific components.

Figure 8: Summary of Basic Steps for CCMA Mainstreaming in the Health Policy Process



5.3 Mainstreaming CCMA at the Local/ Health Facility level

The health facility (hospital, dispensary, health centre, *poste de sante*) is the most important place where health sector actors meet with climate change effects. The effects of climate change on health are demonstrated in the numbers of patients, the ailments that they come with, and the effect on the physical facilities and infrastructure. Other indicators include inability of diseases to respond to drugs, dysfunctional medical equipment, and slow or failed response to emergency requests as a result of power failures, inaccessible roads or poor communication. A simple tool for data collection at local level is summarized in table 11.

Table 11: Climate Vulnerability Assessment

Area:.....		Sector			District					
	Incidences of Extreme climate-health Events	Likelihood of occurrence during the period (year)			Frequency			Impact on community health		
		H	M	L	H	M	L	H	M	L
1	Floods									
2	Drought									
3	Landslides									
4	Cholera/ Dysentery outbreak									
5	Earthquakes									

A checklist in table 12 should be used to adapt health services to climate change effects at health facility level.

Table 12: Checklist for Climate change mainstreaming at health facility level

Parameter	Adaptation actions at the health facility
Waste	<ul style="list-style-type: none"> ✓ Reduce waste generation e.g. by re-using packing materials; ✓ Put in place waste collection & disposal measures that encourages recycling including compost of biodegradable materials. ✓ Use incineration technologies that use less energy and do not emit gases at every health facility. ✓ Where possible, use alternatives to waste incineration. ✓ Provide information/ awareness to community members to handle/ manage highly toxic medical wastes within/outside the health facility.
Water	<ul style="list-style-type: none"> ✓ Ensure access to drinking water at the facility; ✓ Minimize need for boiling drinking water by using other treatment measures; ✓ Conserve water through rainwater harvesting & storm water collection. ✓ Recycle & re-use water especially for use in Kitchen & laundry.
Hygiene	<ul style="list-style-type: none"> ✓ Put in place mechanisms to communicate likely epidemics like cholera and dysentery; ✓ Ensure that there are washing facilities at various points at the health facility, as well as messages on the benefits of strict hygiene maintenance, including sanitation. ✓ Put in place Operational guidelines for Health Workers to communicate hygiene information with the patients & facility visitors. Regular community outreach sessions should be organized.
Energy	<ul style="list-style-type: none"> ✓ Reduce energy consumption through efficiency & conservation measures.

	<ul style="list-style-type: none"> ✓ Ensure that each Health facility has guidelines on promoting energy efficiency and that all facility users are sensitized, understand the objectives and practice energy efficiency behavior; ✓ Provide information to patients and visitors on the need to work/cook/sleep in well ventilated buildings and avoid exposure to kitchen smoke by using cleaner energy and heating facilities. ✓ Renewable energy (e.g. solar) should be promoted. ✓ Reduce transport-related energy consumption by establishing facilities where patients can access them with limited motorized transport. Increase outpatient services to reduce ambulance needs. ✓ Procure multi-purpose transport facilities; ✓ Improve coordination in procurement and delivery of health supplies.
Nutrition	<ul style="list-style-type: none"> ✓ Establish a Nutrition & Health resource centre at every health facility with at least 2 staff trained to provide information and teach patients what to eat and how to grow, prepare and serve foods. ✓ Give priority to pregnant & breastfeeding women, children, elderly and others at risk e.g. People with HIV/AIDS. ✓ Each health facility should have a demonstration garden & kitchen for training clients/patients especially those with malnutrition problems.

5.4 Stakeholder Participation and Responsibilities in Climate Change Adaptation

Thus far, the task of climate change mainstreaming appears like a responsibility of the Government institutions, notably the Ministry of Health and REMA. This is only as far as ensuring that sector policies, strategies and plans are responsive to climate change effects. All stakeholders, including donors, private sector and individual citizens, have a role to play in climate-proofing the health sector. Some of the key stakeholders and their roles in the health sector climate change adaptation and mitigation process are summarized in table 13.

Table 13: Key Stakeholders and their roles in the Health sector climate change adaptation

	Stakeholder institution	Roles/ responsibilities
	<i>Public Sector institutions</i>	
1	Ministry of Health	<ul style="list-style-type: none"> ● Integrate climate change adaptation into health policy; health sector strategic plan (HSSP 2&3), sector budgets and operational plans; ● Conduct climate change adaptation training & awareness for health workers throughout the country; ● Review health indicators to integrate climate change adaptation.
2	REMA	<ul style="list-style-type: none"> ● Provide technical guidance and tools for climate change adaptation and mitigation; ● Monitor public health policy implementation to ensure that climate change effects are minimized; ● Mobilise funding for climate change adaptation.
3	Ministry of Finance and Economic Planning	<ul style="list-style-type: none"> ● Integrate climate change adaptation within the national budgeting and public finance management processes; ● Work with MoH to mobilize external funding for climate change adaptation; ● Monitor and ensure that climate change related health issues are given priority.
4	Ministry of Infrastructure	<ul style="list-style-type: none"> ● Integrate climate change adaptation into the public health infrastructure and ensure that all health centres are flood-proofed; ● Provide alternative road and non road communication infrastructure to increase access to climate-prone health facilities;
5	Rwanda Meteorological Services	<ul style="list-style-type: none"> ● Establish weather monitoring infrastructure at major health facilities in the country (e.g. district Hospitals); ● Provide appropriate climate data/information to Health Planning and

		Epidemiological Surveillance Units of MoH/RBC.
6	School of Public Health-NUR	<ul style="list-style-type: none"> ● Integrate climate change adaptation into public health training curriculum for undergraduate and graduate courses; ● Develop and implement a research programme on climate-sensitive climate change issues and adaptation strategies for public health
	EWASA	<ul style="list-style-type: none"> ● Integrate climate-health issues into WATSAN service delivery programs; ● Implement projects to reduce vulnerability of urban poor areas which are susceptible to water-related climate-sensitive diseases and epidemics
7	District Authorities	<ul style="list-style-type: none"> ● Mobilise communities and sensitise them on climate change effects on public health; ● Integrate climate change adaptation into the District Development Plans and <i>Imihigo</i>; ● Develop and implement climate change adaptation micro-projects at the community level; ● Monitor and report on national climate change adaptation programmes related to health within their districts.
8	<i>Non state actors</i>	
9	Private sector	<ul style="list-style-type: none"> ● Private health service providers (including health centres and pharmacies) will develop climate change awareness toolkits for their staff and clients; ● Invest in climate change adaptation/ mitigation projects for public health e.g. provision of clean water and waste management services to health facilities. ● Generate and disseminate public health-climate change adaptation information and support tools;
	Civil Society Organizations	<ul style="list-style-type: none"> ➤ Mobilize and sensitise community members and leaders about climate change and their effects on health; ➤ Develop and implement community projects for climate change adaptation in health; ➤ Mobilise financing for climate change adaptation actions at community and health facility level; ➤ Integrate climate change adaptation issues into CSOs' public health advocacy and communication strategies. ➤ Build capacity of local development actors (including faith-based organizations) in climate change adaptation.
	Donors/Development partners	<ul style="list-style-type: none"> ➤ Incorporate climate change adaptation into health financing guidelines/ strategies; ➤ Provide grant financing for climate risk assessment and climate change adaptation in all projects;

5.5 Major Challenges to climate change adaptation in the health sector

Rwanda' health sector faces a number of challenges in adapting to climate change:

1. **Availability of reliable data:** High-resolution data on weather, ecosystems, and socioeconomic data needed to assess vulnerability risks and develop adaptation models, are often lacking.
2. **Information and communication barriers:** there are gaps in awareness and understanding of risk and climate change projections especially in the health sector;
3. **Inadequate climate change risk assessment at sectoral level.** Few sectors undertake risk assessment;
4. **Complex climate regimes:** Rwanda has strong patterns of climate variability and extremes. As no single climate-health response model will work, a multi-pronged framework should be considered;

5. **Inadequate coordination** of climate change adaptation mechanisms: Projects that address climate change in Rwanda are fragmented, tend to be short-term, donor-driven and sometimes alien to community needs and interests;
6. **Financing limitations constrain investments** in vulnerability assessment, risk monitoring and risk reduction activities. Disaster Management institutions and local health units are under-funded.

5.6 Practical Actions for Effective Adaptation to Climate Change in the Health Sector

1. Build capacity - starting with awareness raising and information gathering: Capacity development will entail skills enhancement to collect, analyse and report on health and climate change effects; utilize the research information and foster learning across the health sector. The first step in building capacity is to assess information, knowledge and skills gaps.

2. Mobilise funding: Finding funds for climate change within the budget may be difficult, since the health sector already takes a big chunk of the national budget. There are several climate financing arrangements which the health sector can access. Skills in resource mobilization and project formulation should be developed with support from REMA.

3. Build Climate Change into National Legislation and health monitoring systems: there is need to build the adaptation actions into the legal frameworks – from sectoral laws to local government regulations. This will compel Governments and NGOs to integrate CCMA activities into their plans and budgets. At the district level, bylaws should be formulated to protect households from climate change-related health conditions as dysentery and cholera.

Climate change indicators should be included in the health performance monitoring systems right up to the community level. Regular performance assessment (e.g. through JSRs) should include climate change adaptation criteria and indicators.

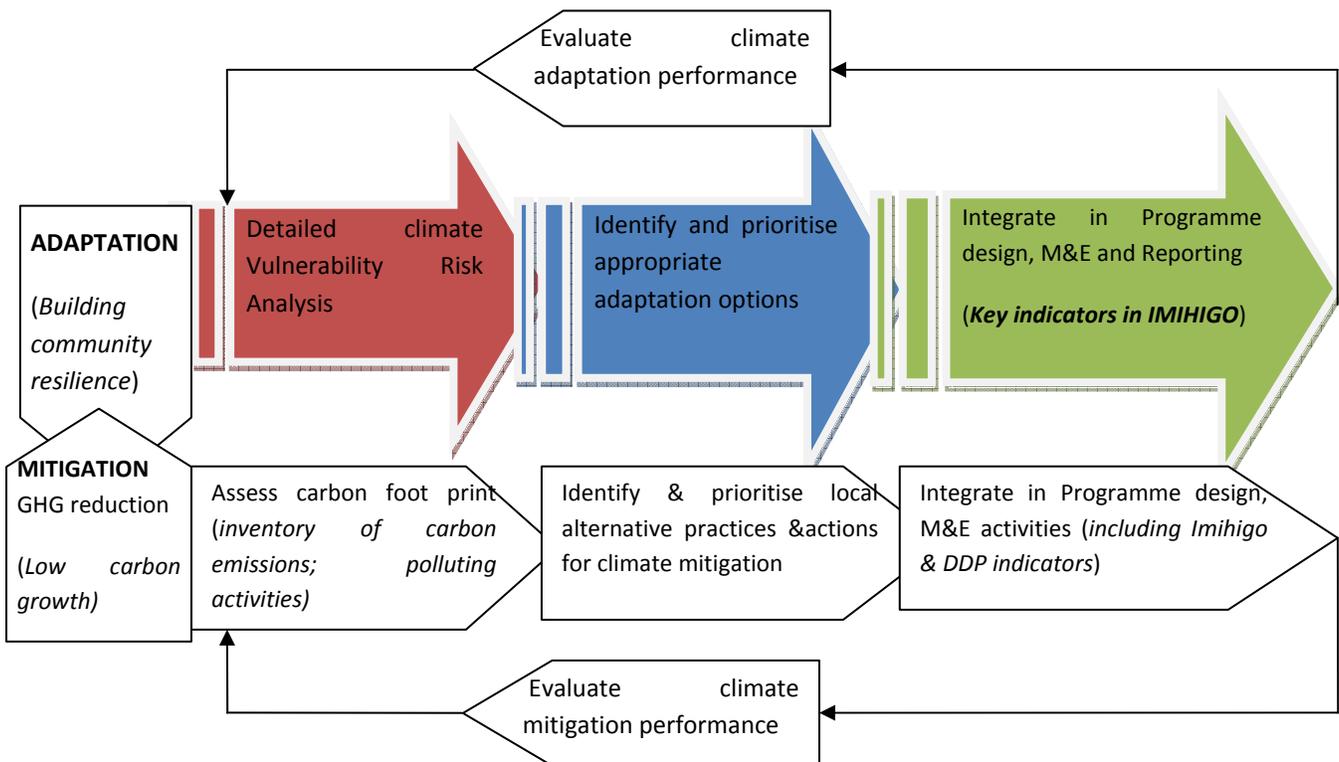
4. Work at scale and with other sectors to address climate change concerns: Climate change effects occur at wider scale but the degree of impact on health of individuals, households and communities occur at local level and are unique. Health workers should collaborate with other sectors like agriculture and water to combat climate change effects.

The health impacts of climate change are secondary i.e. they result from other sectors. E.g. malnutrition is a result of lack of adequate balanced diet, which intensifies with food insecurity. Similarly, water-related diseases result from inadequate access to clean water.

5. Regularly assess/ evaluate adaptation actions: How do you get to know that the adaptation actions being undertaken are making a difference in terms of strengthening resilience? How do you know that the most vulnerable groups are being cushioned from climate change effects? By assessing the likely impact before and evaluating the performance of adaptation approaches and actions regularly.

6. Sustain the communication and knowledge building efforts: Building community knowledge and resilience in Rwanda will require long-term communication strategies. MoH and REMA should make adaptation messages a continuous process. Every health centre should have a climate change information toolkit, and that there are at least 2 people (men and women) with the skills to sensitise patients and other community members about climate change in health and what they should do to prevent infections, accidents and other health hazards related to climate change. Health centres that have the most primary contact with the people (health posts & dispensaries) should particularly be supported. The information tools will include fact books, posters, flyers and audio-visuals e.g. film shows.

Figure 9: Logical flow of the Key Actions for local level climate adaptation and mitigation



The basic tools for local and community level climate change vulnerability assessment, and integration of mitigation measures into local plans, are included as Annex 3.

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Annexes

Annex 1: Sample Tool for Vulnerability Assessment

Annex 2: Checklist of climate change integration into Health sector policies and strategies

Annex 3: Climate Change Adaptation tools at the local level

Annex 4: Synthesis on the types of diseases and Health Hazards related to climate change

Annex 5: Definition of Key terms in Climate Change Adaptation and Mitigation

Annex 1. Matrix of Simple tools for Climate Change Impact and Vulnerability Assessment

STEP	MAIN TOOL(S)	PARTICIPANTS	KEY OUTCOME
1. Screen project activities for climate risk – using a summary of climate trends, forecasts and impacts undertake a preliminary assessment of whether climate variability/change could impact the project effectiveness, longevity and integrity.	Assess climate risk	Programme and component managers and project officers	A detailed table of the main climate change impacts that will affect project activities and results
2. Decide on the CVA pathway – decide whether to follow the CVA pathway, taking into account any existing risk management practices, human and financial resources, donor conditions and the local context.	Checklist – should the CVA pathway be followed?	Programme and component managers and project officers	List of projects that need to progress through the remaining steps of the CVA pathway.
3. Identify adaptation measures – work closely with implementation partners, local decision makers and stakeholders to identify a wide range of potential adaptation measures for tackling climate change risks and opportunities for strengthening adaptive capacity.	Climate Vulnerability and Capacity Analysis (CVCA) Hand-book; Resource Table on best practice community-based adaptation experiences.	Component Managers, project officers, partner organizations and Community members.	List of potential adaptation measures for reducing climate risk and strengthening adaptive capacity.
4. Prioritize adaptation measures to address vulnerabilities in Step 1 – consider project timeframe, budget, and technical requirements of implementing different adaptation measures.	Priority Adaptation Matrix	Programme and component managers, partner organizations and project officers.	Criteria for determining benefits and feasibility of adaptation measures; Ranking of adaptation measures in order of priority.
5. Select adaptation options for implementation – from step 4, select which options will be implemented; develop local ownership of the process and agreed measures.	Stakeholder workshop methodology	Project officers, partner organizations and community members.	Adaptation measure(s) selected by the community, along with community support and consensus.
6. Implement adaptation measures – actively engage stakeholders and partners, build capacity, and monitor and adapt the project according to any new conditions that arise.	Adaptation measures	Project officers, partner organizations and community members.	Community-based adaptation measures are implemented.

7. Evaluate adaptation and the CVA pathway – determine whether the project/programme delivers the intended benefits and/or causes any adverse outcomes.	Checklist – evaluating adaptation.	Programme and component managers and project officers	Organisational sharing and learning and applied case studies. Lessons learned to inform future project design/implementation.
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Adapted from Huxtable & Yen (2009):

ANNEX 2A: CHECKLIST MATRIX OF INTEGRATION OF CLIMATE CHANGE INTO HEALTH SECTOR

Issue	How Health is affected
Does current climate pose any threats to the thematic recommendations Which are the climate hazards	Wet Conditions facilitate multiplication of diseases and pests, floods affect movement Hot and dry seasons/droughts: livestock respiratory problems, Water and pasture shortage, low livestock production, low water levels – less hydro-power <u>livestock inputs have been left out on DSIP</u> Land Degradation facilitated by overstocking, Overgrazing
What are the current known thematic impacts of climate	Floods, droughts/Dry spell, Hailstorm Thunder/lightening, Heavy rains, high temperatures
Do you plan to integrate climate risks of the current and future in your strategies Give example/s	<ul style="list-style-type: none"> ● Under-funded Early Warning System ● Valley dams
Any evidences of climate change threat for the thematic group	<ul style="list-style-type: none"> ● Low livestock productivity during drought. ● New diseases (PPR), poor animal nutrition – pasture availability
What are the potential thematic impacts for future climate change	<ul style="list-style-type: none"> ● Effects on Production/productivity ● Markets/marketability, Natural resources management (Livestock and human conflict for water)
Do you plan to integrate risks of future climate change in your plans?	<ul style="list-style-type: none"> ● Soil conservation (mulching, tree planting etc)
Would you include some climate risk screening system	<ul style="list-style-type: none"> ● M&E system with clear climate related indicators - Early warning system strengthened.

Annex 2B: Categorising Vulnerable Populations to climate-sensitive health Hazards

Vulnerability due to demographic factors	Vulnerability due to health status
<ul style="list-style-type: none"> ● Proportion of children ● Proportion of women ● Proportion of elderly 	<ul style="list-style-type: none"> ● HIV/AIDS affected populations ● TB affected populations ● Undernourished populations ● Infectious disease burdened ● Chronic disease burdened people ● Mentally or physically disabled
Vulnerability due to culture or life condition	Vulnerability due to geographic location of populations in:

<ul style="list-style-type: none"> ● Impoverished ● Semi-pastoralist communities ● Subsistence farmers ● Fisher-folk and fishing communities ● Indentured laborers ● Displaced populations 	<ul style="list-style-type: none"> ● Unplanned urban housing ● Flood risk zones ● Drought risk zones ● Landslide and Earthquake risk zones ● Conflict zones ● Water stressed zones ● Food insecure zones
Vulnerability due to limited access to adequate:	
<ul style="list-style-type: none"> ● Health care ● Potable water ● Sanitation ● Shelter ● Livelihoods/ economic opportunities 	

Source: WHO (2010a): *Protecting Health from Climate Change - Vulnerability and Adaptation Assessment*

Annex 3: Climate Vulnerability Assessment and Adaptation Tools at the Local level

Annex 3A: Basic Steps in Local climate change mainstreaming plans

	Basic step/ Broad action	Specific Action	Responsible	Time frame	Inputs
1	Climate change risk screening				
2	Identification & Analysis of Adaptation and Response measures				
3	Verification, Analysis and Selection of Appropriate Response options				
4	Implementation				
5	Review / Performance evaluation				

Annex 3B: Building Local capacity for Climate change Adaptation and Mitigation

	Basic Activity	WHAT (specific actions)	WHO (Target groups/individuals)	HOW (Methodology)	WHEN (Time frame)	Requirements
1	Sensitisation					
2	Training					
3	Participatory tools design and testing	Screening checklists				

4	Implementation (Supervision & monitoringsupport)					
5	Review / Performance evaluation					

Annex 4: Synthesis of the types of diseases and Health Hazards related to climate change

Diseases Categories	Diseases	Manifestation of climate phenomenon	Most affected geographical regions	Most affected Social categories	Current trend
Waterborne diseases	Malaria	Floods, high heat	Country-wide especially: -East (1000-1500m of altitude); Central plateau around wetlands (1675-1862m altitude).	-Children under five; pregnant women	Decreasing
	Intestinal Parasites (Diarrhea)	Water contamination during floods Lack of hygiene due to moisture deficit following drought	The entire country but more specifically Eastern, Western and Northern regions (Ivota)	- Children under five years ; - Pregnant women	Stable
	Cholera	-Floods; water deficit	- Lake Kivu shore ; -Ivota Region; Kigali City; -Eastern Plateau	All categories	Sporadic
Diseases related to heat	Cerebro-spinal meningitis	High heat; Drought	Central Plateau and Eastern Plateau	All categories	Sporadic
	Cardio-vascular & cerebro-vascular diseases	High heat , drought	Eastern savannahs	Old people	Sporadic
Respiratory diseases	Acute bronchitis, Bronchiolitis	High heat, drought	Entire country	All categories	Stable
Pneumonia		High heat, drought	Entire country	Children & Old people	Decreasing
Asthma		Heat, drought	Tout le pays	Children, Old people	Decreasing
Food insecurity	Malnutrition	Drought ; Floods ; Landslide	-Bugesera ; -Crête Congo Nil; Southern ;Eastern savannahs	Children under five years	Stable
	Anemia	Drought ; Floods ; Landslide	Entire country : especially Kigali City Eastern Region	-Children below one year ; - Women	Progressive
Victims of floods and landslides.	Natural disasters	Floods Landslides	North, West and South regions,	All categories of people living on high fragile hills and valleys.	Sporadic

MINELA (2010). Second National Communication of the Republic of Rwanda to the UNFCCC.

Annex 5: Definition of Key terms in Climate Change Adaptation and Mitigation

Adaptation: action or adjustment taken by society in response to the actual or potential impacts of predicted climate change, which moderates harm or exploits beneficial opportunities.

Climate: Climate in a narrow sense is usually defined as the “average weather” or more rigorously as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period is 30 years, as defined by the World Meteorological Organization (WMO). These relevant quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the *climate system*.

Climate change: Climate change refers to a statistically significant variation in either the mean state of the *climate* or in its variability, persisting for an extended period (typically decades or longer). Climate change may be due to natural internal processes or *external forces*, or to persistent *anthropogenic* changes in the composition of the *atmosphere* or in *land use*. Note that the *United Nations 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. See also *climate variability*.

Climate system: The climate system is the highly complex system consisting of five major components: the *atmosphere*, the *hydrosphere*, the *cryosphere*, the land surface and the *biosphere*, and the interactions between them. The climate system evolves in time under the influence of its own internal dynamics and because of external forces such as volcanic eruptions, solar variations, and human-induced forces such as changing composition of the atmosphere and *land-use change*.

Climate variability: Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the *climate* on all *temporal and spatial scales* beyond that of individual weather events. Variability may be due to natural internal processes within the *climate system* (internal variability), or to variations in natural or *anthropogenic external forces* (external variability). See also *climate change*.

Impacts of Climate change: Impacts of Climate change are consequences of *climate change* on natural and *human systems*. Depending on the consideration of *adaptation*, one can distinguish between potential impacts and residual impacts. Potential impacts: All impacts that may occur given a projected change in *climate*, without considering adaptation. Residual impacts: The impacts of climate change that would occur after adaptation.

Climate proofing: actions taken to protect infrastructure, systems and processes against projected climate impacts for a period into the future.

Greenhouse effect: the result of certain gases in the atmosphere (so-called greenhouse gases) absorbing energy that is radiated from the Earth's surface, and so warming the atmosphere.

Greenhouse gas: a number of anthropologically produced and naturally occurring gases whose presence in the atmosphere traps energy radiated by the Earth. This property causes the greenhouse effect. Water Vapor (H₂O), carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), and ozone (O₃) are the primary greenhouse gases in the Earth's atmosphere.

Informative: where it is inappropriate for local planning authorities to impose conditions or negotiate planning obligations, but where the local planning authorities considers that the developer should be made aware of certain matters, it is possible for them to attach a short statement known as an informative to any consent for planning permission.

Limited or low regret options: options for which the implementation costs are low while, bearing in mind the uncertainties with future climate change projections, the benefits under future climate change may potentially be large.

Mitigation: activities which seek to reduce the human effects on global warming by reducing the quantity of greenhouse gases released to the atmosphere.

Precautionary approach/principle: a principle which states that where there are threats of serious or irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation. This approach is promoted by the UNFCCC to help "achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous man-made interference with the climate system".

Sequestration: the process of increasing the carbon content of a carbon reservoir other than the atmosphere. Biological approaches to sequestration include direct removal of carbon dioxide from the atmosphere through land-use change, afforestation, reforestation and practices that enhance soil carbon in agriculture. Physical approaches include separation and disposal of carbon dioxide from flue gases and long-term storage underground.

Sink: any process, activity or mechanism that removes a greenhouse gas from the atmosphere.

Sustainable development: development which meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development tries to reconcile the needs of social and economic development with ecological conservation and environmental protection.