TRAINING MANUAL

ON ENVIRONMENT AND CLIMATE CHANGE

FOR ENVIRONMENTAL ORGANIZATIONS

(Private Sector, NGOs and Cooperatives)

REMA, 2014

Training Manual on Environment and Climate Change for Environmental Organizations

(Private Sector, NGOs and Cooperatives)

Theogene NGABOYAMAHINA and TUSHABE Rachael

Department of Environmental Education and Mainstreaming (DEEM)
Rwanda Environment Management Authority (REMA)
P.O.Box 7436 Kigali/Rwanda
Tel: +250 252 580101
Email : remainfo@rema.gov.rw
Website : www.rema.gov.rw

FOREWORD

Rwanda's economy is heavily dependent on its environment and natural resources. Environmental degradation exacerbated by climate change through increased floods, landslides and droughts undermines economic growth. Research has estimated that climate change could result in additional net economic costs (on top of existing climate variability) for Rwanda that are at least equivalent to a loss of almost 1% of GDP each year by 2030. A key priority therefore is to increase the resilience of Rwanda to cope with these extreme conditions (REMA, Rwanda Country Situation Analysis, 2011).

Therefore, three priority areas namely (i) Mainstreaming Environmental Sustainability into productive and social sectors, (ii) reducing vulnerability to climate change and (iii) preventing and controlling pollution, were set for Environment and Climate Change as cross cutting issues in the Economic Development and Poverty Reduction Strategy (EDPRS II).

Rwanda Environment Management Authority (REMA) has a key role to play towards the achievement of the national goal of sustainable development as set in out in the EDPRS II and Vision 2020. In order to achieve its mission, REMA initiates and coordinates activities that support central and decentralized institutions, communities and Private Sector to address environmental and Climate change issues.

This manual is intended to strengthen trainings on environment and climate change by different stakeholders involved in environmental conservation such as Non-Governmental Organizations (NGOs), Cooperatives, Community Based Organizations (CBOs), Private Sector and Learning Institutions.

The manual is composed of different topics based on compilation of relevant subject literature, observation and experience. It provides environmental Organizations trainers with relevant knowledge and skills that are needed to mainstream Environment and Climate Change into their programs and activities. It will assist trainers in preparing and delivering training courses in the most effective manner.

We are pleased to acknowledge the contribution made by REMA staff in the preparation of this training manual.

Dr. Rose MUKANKOMEJE
Director General of REMA

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ACRONYMS

CBO : Community Based Organizations

CCD : Climate Compatible Development

CDKN : Climate and Development Knowledge Network

DDT : Dichlorodiphenyltrichloroethane

EDPRS : Economic Development and Poverty Reduction Strategy

EIA : Environmental Impact Assessment

EICV :Enquête Intégrale sur les Conditions de Vie des Ménages (Integrated Household Living Conditions Survey)

EO : Environmental Organization

ESCAP : Economic and Social Commission for Asia and the Pacific

FONERWA : Rwanda's National Environment and Climate Change Fund

MINIRENA : Ministry of Natural Resources

NAMAS : Nationally Appropriate Mitigation Actions.

NAPAs : National Adaptation Programmes of Action

NGO : Non-Governmental Organizations

PCBs : Polychlorinated Biphenyls

POPs : Persistent Organic Pollutants

REMA : Rwanda Environment Management Authority

SD : Sustainable Development

SEI : Stockholm Environment Institute

UNEP : United Nations Environment Programme

UNFCCC : United Nations Framework Convention on Climate Change

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INTRODUCTION

Evidences have shown that rational management of environment and natural resources and Climate change impacts contributes directly to improved health, livelihoods, pro-poor growth and a reduction in environmental risks. This derives from the fact that the majority of Rwandans livelihoods depend on environment and natural resources; agriculture, accounts for more than 90% of the labour force and Over 86.3% depend on fuel wood energy (EICV3).

In an effort to ensure inclusive growth and sustainability, Rwanda Environment Management Authority (REMA) has made available the guidelines for mainstreaming environment and climate change adaptation and mitigation into different development sectors such as Agriculture, Energy, Health and Infrastructure. REMA conducted also various training on environment and climate change reserved to different stakeholders involved in environmental conservation (Non-Governmental Organizations (NGOs), Cooperatives, Community Based Organizations (CBOs), Private Sector and Learning Institutions…)

Considering the role played by environmental Organizations in training and capacity building on environment and climate change, there is a need to make a cohesive coordination of all trainings conducted by environmental Organizations and better equip their trainers with necessary training materials. In this context, REMA elaborated this training manual on environment and climate change reserved to trainers of environmental Organizations.

The overall purpose of this training manual is to provide environmental Organizations trainers with relevant knowledge and skills that are needed to mainstream Environment and Climate Change into their programs and activities.

The specific objectives are to assist trainers (1) identifying local environmental Organizations needs and priorities in environmental management, (2) custom design training courses to meet these needs, (3) integrate environment and climate change in programs and activities of environmental Organizations, and (4) encourage networking of environmental Organizations to facilitate exchange of information and develop new skills.

This tool should be applied and adapted with reference to environmental organisation's needs. These should be identified at the start of the process and before training commences, by incorporating local source information and case studies which can be used to make training more relevant, useful and interesting to course participants.

This manual gives an overview on training methodologies, definition of key concept in environment and climate change. It also highlights global environmental and climate change challenges, linking poverty-environment/sustainable development.

It shows also how to mainstreaming environment and climate change in planning and budgeting of environmental Organizations and their role in promoting sustainable development in Rwanda. This manual will help also trainers to prepare courses on environmental laws and policy, Environmental Impact Assessment (EIA), pollution control, climate change in Rwanda and adaptation –mitigation measures.

SECTION I: TRAINING METHODOLOGY

1. TRAINING NEEDS ASSESSMENT

The starting point of training is usually a **training needs assessment**. In this stage, the trainer is expected to be able to properly identify and determine training requirements and needs.

1.1 Why should you design a training session?

A training session is organised when there is a need to be filled in your organisation. Knowledge is a necessary but not sufficient condition for employees to perform their jobs. A training program can serve a range of diverse purposes; organizations initiate training programs for many different reasons (Drew, 2001).In any event, many persons will need to be trained in the new skills required by technology changes.

Environmental organizations (EO) need to train their staff and members in order to mainstream environment and climate change in their plans and activities. Training of Environmental organizations is a good opportunity to allow members to meet other organizations and share experience. In this process the trainer must also be able to lay out specific training and development objectives. These objectives must be directed toward the requirements of the organization and must be appropriate for the capabilities of EO's members who will receive training (ESCAP, 2001).

1.2 Characteristics of an effective trainer

Teaching and training is only effective if it promotes learning. Learning involves acquiring new knowledge, skills and attitudes that result in some change in our ability to do something. In competence-based training we seek to promote a change that results in greater competence to perform certain desired work functions (ESCAP, 2001).

Knowledge + Practice = Skills

An effective trainer cans (Drew, 2001):

- Creates, seeks, and finds opportunities for learning.
- "Read" their audience, and appeals to them with different training techniques.
- Uses a variety of methods to present their message(s) to their audience(s).
- Understands the advantages and disadvantages of various training methods, and uses the best method for a given training situation.

Advices:

- Base your training on the needs identified in the training needs analysis, and adapts the materials accordingly.
- Develop materials and exercises which specifically reflect local situations.
- Plan to incorporate the experience and knowledge of participants

2. TRAINING DESIGN AND EVALUATION

After assessing the training needs, the trainer is required to design training. This design includes training methods, evaluation schemes, required materials/equipment and support staff.

2.1 Training design

1) Learn about the people you will be training.

- Who will be trained? (Know about your audience, their background, group age, education level, social status… in short, anything that tells you a little about who these people are. When differences are less pronounced, you might consider sending out some information for participants to read, so that they will all at least have the same minimum baseline of knowledge when they arrive.

2) Determine the needs of your target audience.

- What do you train people? (choose training topics)
- What information or skills do trainees need to know?
- How do they see you?
- The trainer must also be prepared to conduct training in courses. This obligation typically includes presentation of instruction, management of practical sessions, leading discussions, coordinating trainee evaluation and feedback, and oversight of incidental matters such as refreshments, security, accommodations, and the like. Trainers need to be proficient in the use of training aids and materials.

3) Consider the scope of your organization's needs and resources.

- How much will the training cost?
- What resources are necessary? (Trainers, rooms, materials, facilities….)
- How much time for your training session?

4) Develop specific objectives for the training.

They should be all *Specific*, *Measurable, Achievable and Relevant Timed (S.M.A.R.T).*

5) *Develop the content of your training session*

6) *Decide on a format for your training.*

7) Recruit participants.

2.2 Training materials

The training materials will include:

- Course agenda: Describes the course content. Includes duration, breaks,
- Attendance list : Participants document training attendance
- Hand-outs: Include pertinent course summaries to be used for reference during and after the course
- Presentations: Used to support verbal presentation. Reach visual learners
- Visual aids: Flip charts, posters to be used for posting frequently referenced training concepts.

The following figures shows a summary of a training design cycles

Figure 1: Training cycle

Source: http://www.trainity.co.za/trainingdesign.html

2.3 Training evaluation

Elaborate participant evaluations form, to be filled out at the end of the training. This evaluation allow to conduct a systematic assessment of the performance of trainees, in order to refine and improve future trainings

3. TRAINING METHODS

There are several training methods. Before choosing a training method, the trainer will consider the following elements:

- ✓ Identify the type of learning outcome that you want training to influence
- ✓ Consider the extent to which the learning method facilitates learning and transfer of training
- ✓ Evaluate the costs related to development and use of the method
- ✓ Consider the effectiveness of the training method

Using different methods will allow trainer to conduct an effective training. The table nº 1 explains some methods to be used during training of environmental Organizations.

Table 1: Training methods

No	METHOD	DESCRIPTION	ADVANTAGES	DRAWBACKS
1	**Lectures**	When one person conveys information to a group by talking to them, with or without the use of visual aids. A formal lecture does not allow participation by the audience, and there is little or no interaction (or feedback) between the speaker and listeners. The audience is primarily there to hear what is being said.	A lecture is: - Suitable for large groups where interaction is not practical. - Efficient use of time	-The lecturer cannot be sure their message was correctly received by the audience, unless a separate discussion period is used for follow up. The successful transfer of information is completely dependent upon the skills of the lecturer (essentially it is one way communication).
2	**Talks (PRESENTATION)**	Similar to a lecture, however the audience has greater involvement and interaction with the speaker. During a talk, the audience is often allowed to briefly interrupt the speaker with questions, comments, or short discussions.	- A Talk is less formal and more comfortable for everyone. - A talk allows the audience to ask relevant questions and become fully engaged in the learning process. - Talks are often used or small to moderate size groups where the objective is to exchange information. -When time constraints are not critical,	•The speaker must have a wide knowledge of the subject matter, and be willing and able to answer questions "off the cuff". • The speaker must be able to control the audience so that questions and comments do not sidetrack the entire presentation. The speaker must also carefully monitor the time and pace of a talk. • In many cases it is more difficult to prepare a talk/presentation than a lecture because of uncertainties associated with questions or topics that may be raised by the audience.
3	**Demonstrations**	- Used when a trainer has the audience actually perform a task by showing and explaining how to do it. Effective method for teaching skills - The audience is encouraged to ask questions and request assistance as they try to do the task by themselves.	- Demonstrations are best for small groups, or when adequate staff is available to work with a large group. - It provides a hands-on experience and allows interaction with trainers.	- Demonstrations require a lot of preparation, time, materials, and patience.
4	**Discussions**	A trainer guides an open conversation (an organized exchange of ideas or viewpoints) on a selected topic through a process called "guided discovery". Discussions are appropriate if only a few major (simple) topics are being covered.	- Discussions allow multiple views and opinions to be expressed. - Discussions provide an informal atmosphere, and allow everyone to express and listen to opinions that are presented with equal weight.	- Discussions can be dominated by a strong member of the group - Discussions require a well-defined purpose or objective, a reasonable time limit, and a well-trained leader. It is not just a bunch of people sitting around a table gabbing with each other

No	METHOD	DESCRIPTION	ADVANTAGES	DRAWBACKS
5	A Case Study	When the opposing viewpoints of a realistic situation (or event) are presented to a group, and a logical analysis involving a "judgment call" must be conducted to arrive at a conclusion.	- Case studies are useful when real-life situations can be used as examples to highlight the training topic(s) being covered. - Everyone is actively engaged. Individuals are forced to make a decision, and then defend it	- The case study must be relevant, realistic, and appropriate. - The case study scenario must be carefully worded to avoid bias, or imply that one position is stronger than the other.
6	Role playing	Participants and/or trainers act out parts in an open-ended story intended to highlight conflicting viewpoints	- Excellent forum for exploring the topics of ethics and conflict resolution. - Participants can "feel a new viewpoint" through dynamic role playing.	- Role playing requires careful selection of situations to be effective - must avoid potential conflicts
7	Simulations	- A training exercise that recreates an event which could actually happen, so that participants experience the situations e.g. simulation of a first aid emergency	The simulation method is appropriate for disaster, rescue, or other crisis management training exercises	Simulations require lots of careful planning, materials, preparation, and equipment/props
8	Brainstorming	- A problem solving exercise that involves the rapid-fire recording of ideas without criticism or ranking but.	- Brainstorming is an effective method for collecting ideas. Eg. During the planning phase of an activity. -Lots of ideas are gathered, and patterns may begin to emerge	- Brainstorming requires follow up activities focused on analysing and evaluating the ideas - The recorder during the brainstorming session must be careful not to misinterpret or impose bias on any of the ideas that are proposed.
9	Buzz groups	A group is given a short time in which to derive an answer to a simple question/problem by recording ideas Efficient when there are too many people to hold a brainstorming session	. Encourage team spirit. - Buzz groups can help teams discover solutions by themselves, without the need for external assistance.	-The output of buzz groups, like brainstorming sessions, needs to be followed up with further evaluation and analysis of ideas. To be most effective, buzz groups should have experienced leaders and "idea recorders"

No	METHOD	DESCRIPTION	ADVANTAGES	DRAWBACKS
10	**Questions & Answers**	When an expert provides specific knowledge by responding to direct questions from a group. e.g. a press conference	Q&A is effective when held near the end of a training course, because participants are best prepared to ask questions Q&A sessions allow interaction with experts that might otherwise be inaccessible	Q&A sessions allow interaction with experts that might otherwise be inaccessible The Q&A session should avoid anyone from dominating the session. Avoid accusatory tone, thereby putting experts in a defensive position.
11	**Reflection**	When individuals respond to a series of questions by collecting their personal feelings and thoughts to form a conclusion	- Usually conducted at the end of a training session, as a means of reviewing and evaluating the overall experience. -Reflection emphasizes the overall benefits derived from an experience	- Reflection is usually a time consuming process, and may not yield results.

Source: Raymond A. Noe, and Mc-Draw Hill, 2005

Conclusion

Working strategies for making your training really valuable and memorable for every participant

- Find your own unique training style that will help you build and maintain rapport with your trainees.
- Your goal, as a trainer, is to teach new skills. Skills are developed through the active involvement of every participant in the learning process and repetition of the covered material.
- Using life stories to illustrate theoretical points guarantees that your trainees will remember your course much better.
- You can stimulate your trainees' thinking by engaging them in simple and funny physical activities. Do these activities at regular intervals throughout the whole course.
- Your trainees learn not only from you, but from each other as well. Let them communicate with each other, offer them a lot of group and pair work activities.
- Laughter contributes to effective learning. Pack you course with funny stories, pictures, anecdotes, etc.

Source: http://ifltrainthetrainer.com

Evaluation of Training impact

Evaluation of the training proceeds by collecting from the trainees their appraisal of the training, both its adequacy and its results in order to determine how training has influenced a participant's job performance and how that impact translates into results for the larger targeted group. This can be translated by:

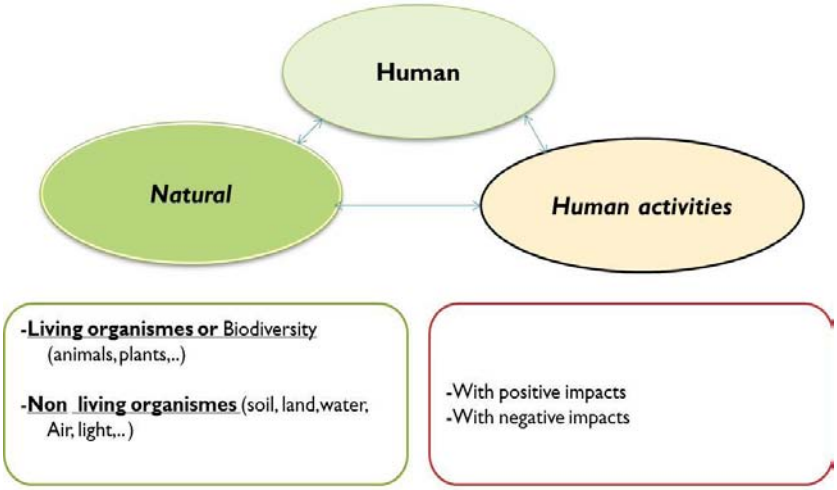
- Reaction: The degree to which participants react favourably to the training.
- Learning: To what degree participants acquire the intended knowledge, skills, attitudes, confidence and commitment based on their participation in a training event.
- Behaviour: what degree participants apply what they learned during training when they return to duty.
- Results: To what degree targeted outcomes occur as a result of the training event and subsequent reinforcement.
  See the evaluation form in the annexe.

SECTION 2: TRAINING TOPICS

TOPIC 1: DEFINITION OF KEY CONCEPTS

1.1 What is environment?

Environment may be broadly understood to mean our surroundings. It can be divided into **living** and **non-living** interactions components and **human activities**. The **human is on the top of environment** with its exceptional ability to influence and mould the environment.



1.1.1 What is 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 variability refers to the way climate fluctuates yearly above or below a long-term average value. Climate varies over seasons and years, some summers are colder than others.

UNFCCC 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".

Climate change includes major changes in temperature, precipitation, or wind patterns, among other effects, that occur over several decades or longer.

Global warming refers to the recent and on-going rise in global average temperature near Earth's surface. It is caused mostly by increasing concentrations of greenhouse gases in the atmosphere. Global warming is causing climate patterns to change. However, global warming itself represents only one aspect of climate change.

Resilience = the ability of a system, individual or group to absorb disturbances, and adapt to stress and change. By increasing adaptive capacity, reducing sensitivity and reducing exposure to adverse effects lead to an increase in resilience of humans and ecosystems.

Vulnerability to climate change = the extent to which a system, individual or group of people is susceptible to, and unable to cope with, the adverse effects of climate change.

NAPAs: National Adaptation Programmes of Action. Help LDCs build national capacities and identify priority adaptation projects with developmental benefits

NAMAS: Nationally Appropriate Mitigation Actions. These voluntary mitigation measures are consistent with a country's development strategy, and are meant to put it on a more sustainable development path

1.1.2 Sustainable development

"Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. (*World Commission on Environment and Development, 1987, p.8).*

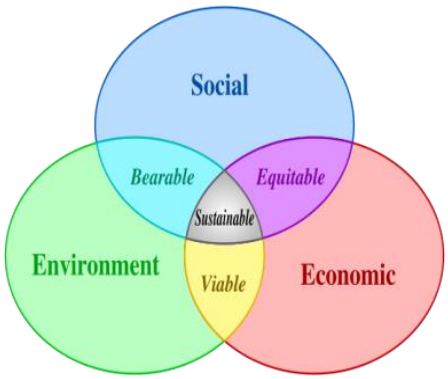
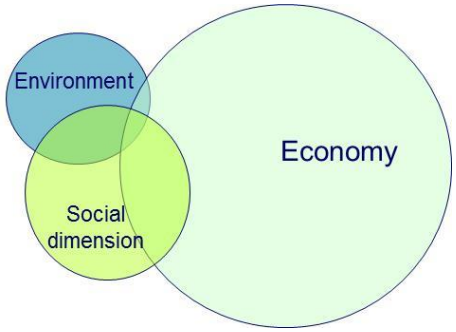


Figure 2: Pillars of sustainable development

Sustainable Development focuses on empowering people to adopt practices that enhance **social** cohesion, **economic** prosperity and **environmental** integrity. All three dimensions are equally important, so offsets in one dimension can also adversely affect the other two. In practice this is seldom the case.



In practice, the economic dimension will be more prominent, in detriment of the social and (lastly) the environmental.

The way we manage the economy and political and social institutions has critical impacts on the environment, while environmental quality and sustainability, in turn, and are vital for the performance of the economy and social well-being.

1.1.3 Green economy

Green economy is an economic development model based on sustainable development. UNEP defines green economy as an improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.

Green growth can be defined as 'a way to pursue economic growth and development, while preventing environmental degradation, biodiversity loss and unsustainable natural resource use' (OECD, 2010b).

1.1.4 Environmental Mainstreaming

Mainstreaming is the informed integration of a relevant value, theme or concern into the decisions of institutions that drive national, local and sector development policy, rules, plans, investment and action (adapted from Dalal-Clayton & Bass 2009). Various themes can be mainstreamed in development policies including environment, climate change adaptation and mitigation, gender, governance, human rights,

Environment mainstreaming is 'the informed inclusion of relevant environmental concerns into the decisions of institutions that drive national, local and sectoral development policy, rules, plans, investment and action' (Dalal-Clayton and Bass, 2009).

It is a multi-year, multi-stakeholder effort that entails working with government actors, non-governmental actors (civil society, academia, business and industry, general public and communities, and the media) and development actors' (UNDP-UNEP, 2012).

Climate change mainstreaming 'involves the integration of policies and measures to address climate change into on-going sector and development planning and decision-making, so as to ensure the long-term sustainability of investments as well as (...) reduce the sensitivity of development activities to both today's and tomorrow's climate' (Klein et al 2005: 584).

'*Climate compatible development (CCD)'* means development that minimises the harm caused by climate impacts, while maximising the many human development opportunities presented by a low emissions, more resilient. Climate change presents threats and opportunities for development. Climate compatible development seeks to minimise these threats and maximise the opportunities (CDKN, November 2010).

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2.1 State of key global environmental variables

With respect to climate change, atmospheric CO2 concentrations have reached 387 ppm [1] as compared to a safe level of 350 ppm; likewise the safe level for radiative forcing of 1 watt per meter squared ($W/m^{2)}$ has been exceeded and now stands at 1.5 W/m^2.

In terms of biodiversity loss, species are becoming extinct at a rate between 100 and 1000 times the natural rate, something that had not occurred since the last global mass extinction. The main cause is land use change (into agricultural land), as well as the introduction of new species.

Human action has significantly altered the nitrogen and phosphorous cycles, mainly due to the addition of N and P to satisfy the requirements of modern agriculture.

There is no doubt that the earth's climate is getting warmer. Observed trends are clear and all point in the same direction. Manifestations of this change notably include increased average air temperatures, increased average ocean temperatures, widespread melting of snow and ice, and rising sea levels. As a result, changes are observed in physical systems (e.g. melting of the permafrost, alterations in hydrological patterns and flows) and in biological systems (e.g. shift in the range of some terrestrial species, shifts in the range and abundance of plankton and fish). Many documented changes in ecosystems that are attributable at least in part to other causes are also likely to be exacerbated by climate change (e.g. losses of coastal wetlands, mangroves and coral reefs) (IPCC 2007a2007b & IPCC 2007c, World Bank 2010a).

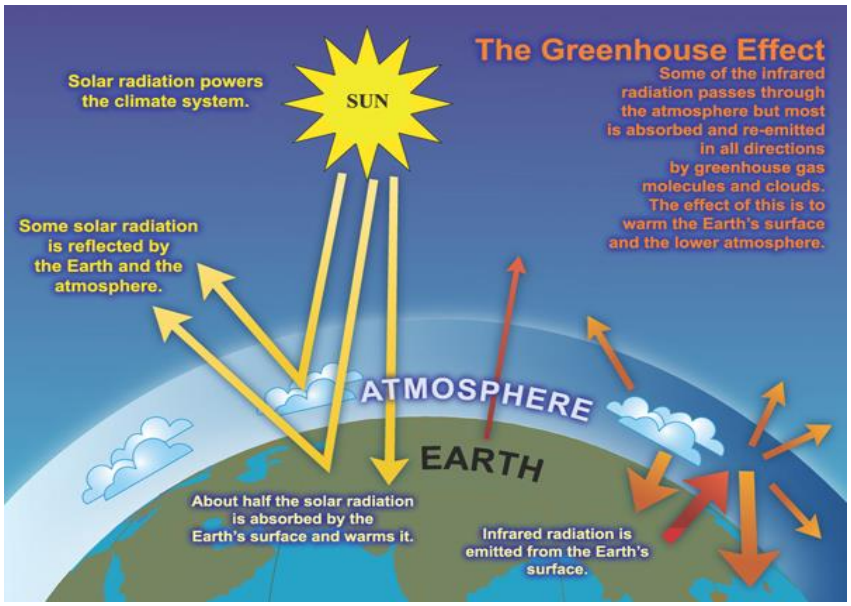
2.2 Causes of climate change: greenhouse gas emissions and the greenhouse effect

Natural variability is an inherent feature of the climate, but there is no longer any reasonable doubt that the changes we are observing today are to a large extent driven by anthropogenic emissions of long-lived greenhouse gases (GHGs). Indeed, human activities cause unprecedented emissions of such GHGs, and they have accumulated in the atmosphere at levels not observed over the past 650,000 years (IPCC 2007a & 2007b, World Bank 2010a).

Climate change is caused by the greenhouse effect, a phenomenon by which GHGs in the atmosphere trap part of the infrared radiation that the earth (heated by the sun's energy) radiates back to space (figure no 3). The greenhouse effect is a natural phenomenon, which is most useful since it allows maintaining the average global temperature at 15°C (rather than –18°C in the absence of GHGs). However, fast increasing atmospheric concentrations of GHGs as a result of ever-increasing anthropogenic emissions are now causing a very fast (by geological time) and very significant increase in temperature at the surface of the earth (IPCC 2007a, http://wwf.panda.org).

[1] Parts per million. Usually describes the concentration of something in water or soil. One ppm is equivalent to 1 milligram of something per liter of water (mg/l)

With the exception of chlorofluorocarbons (CFCs) and other halogenated compounds, which are the product of industrial activity, other major GHGs (i.e. carbon dioxide, methane, nitrous oxide and ozone[2]) are naturally present in the atmosphere. However, human-driven emissions of these gases, as a result of fossil fuel burning, agriculture and land use change, have added significantly to their natural levels in the atmosphere (IPCC 2007a & 2007b).



Source: http://wwf.panda.org/about_our_earth/aboutcc/how_cc_works/)

Figure 3: The greenhouse effect

2.3 Impact of climate change

Climate change can have biophysical impacts as well as socio-economic impacts.

Table 2: Biophysical and socio-economic impacts of climate change

Biophysical impacts	Socioeconomic impacts
Changes in t° Changes in rainfall patterns Shifts in seasons More frequent or severe storms, floods, droughts Raised sea level Erosion, desertification Changes in water quality/availability Changes in ecosystems Biodiversity loss Disease & pest outbreaks…	Damage to or destruction of infrastructure Reduced food security, malnutrition Economic disruption, loss of livelihoods, social disruption Increased mortality and morbidity Reduced availability of hydropower Conflicts, population displacement, human migrations, …

Source: EC (2009a)/GCCA Support Facility

[2] Water vapour is also a GHG. Its presence in the atmosphere results from natural processes (the hydrological cycle).

3.1 Environment and Climate Change

Human activities and the environment (in the wider sense, including climate and natural resources) are in constant interaction. On the one hand, the environment is a source of opportunities, risks and constraints for human activities; On the other hand, human activities exercise pressure and generate impacts on the natural environment

Climate is a critical aspect of the environment. *Climate change should be addressed with other environmental issues*, for two main reasons:

- It exacerbates a wide range of existing environmental trends and problems (e.g. desertification, freshwater scarcity, loss of biodiversity, air pollution).
- The way we manage environment-related issues (e.g. waste management, soil management, land use planning and management) has an impact on climate change.

3.2 Climate Change and development

Goods and services derived from ecosystems are the basis of economic development.

Economic activities, one of the indirect drivers of ecosystem changes, are also a key cause of climate change, which is in turn a direct driver of changes in ecosystem services.

Source: Millennium Ecosystem Assessment (2005) Figure B, p. 7

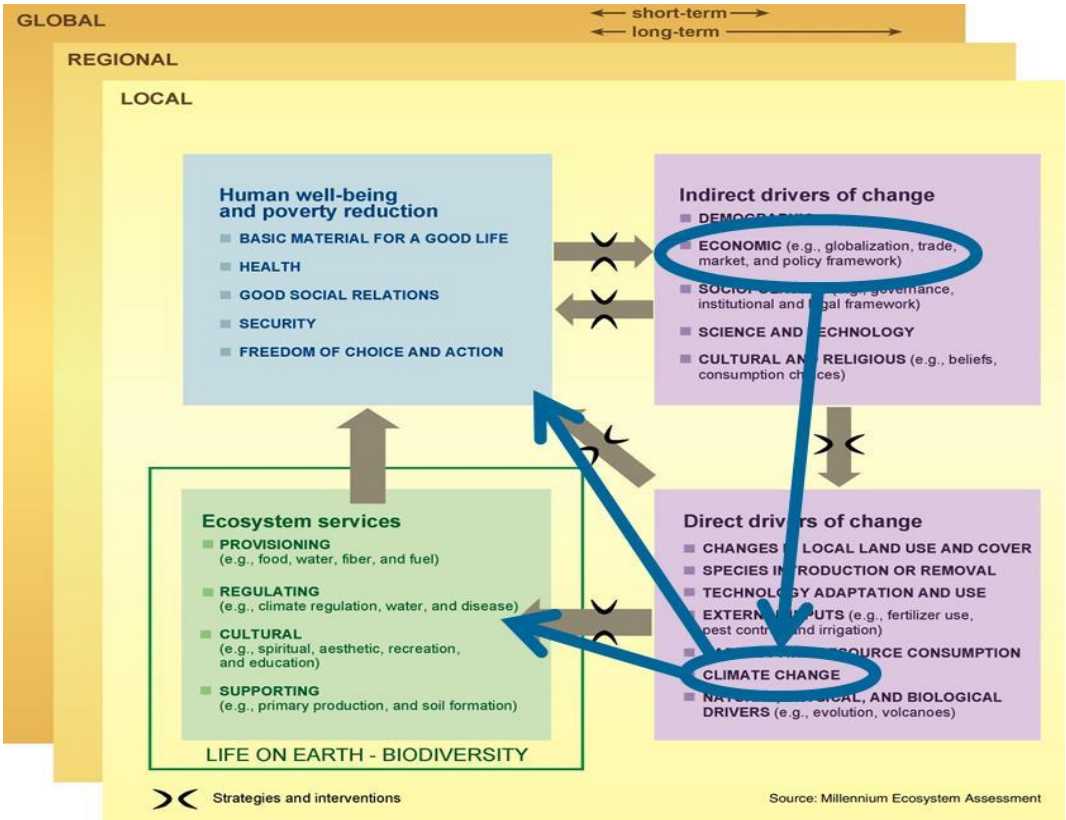


Figure 4: Environment– climate change development linkages

Climate change affects human well-being and the outcome of poverty reduction efforts, directly and through its effects on ecosystem services. Climate change is both a development issue and an environmental issue

Adaptation to climate change involves adopting measures to protect natural and human systems against the actual and expected harmful effects of climate change, to exploit any opportunities it may generate, and to ensure the sustainability of investment and development interventions in more difficult climatic conditions; it aims to reduce sensitivity and vulnerability to the effects of climate change (Klein et al 2005, IPCC 2007a, EC 2009b, World Bank 2010a).

In the context of climate change many adaptation measures overlap with development measures – and climate policy overlaps with development policy, even if their time horizons differ (Burton & van Aalst 2004, Klein et al 2005, OECD 2009a).

Climate change mitigation involves reducing greenhouse gas (GHG) emissions and/or enhancing the capacity of 'sinks' for GHGs (i.e. processes and mechanisms that remove greenhouse gases or their precursors from the atmosphere), for the ultimate purpose of stabilising their concentration in the atmosphere; it aims to reduce global exposure to the effects of climate change (IPCC 2007d, EC 2009b).

The environment is closely related to the Millennium Development Goals (MDGs), and environmental degradation can threaten their achievement. In EDPRS2, environment and climate change were identified as cross cutting issues.

Table 3: Relationship between the environment, climate change and the Millennium Development Goals

MILLENNIUM DEVELOPMENT GOAL	EXAMPLES OF LINKS WITH THE ENVIRONMENT	EXAMPLES OF LINKS WITH CLIMATE CHANGE
Eradicate extreme poverty and hunger (Goal 1)	Environmental degradation affects food production, e.g. through land degradation, soil erosion, soil salinization, depletion of freshwater sources. Loss of biodiversity affects access of sources of animal protein as well as medicinal plants. Environmental degradation affects health of the population, e.g. through indoor air pollution (mainly in rural areas), atmospheric pollution (urban areas), water pollution.	Climate change is projected to reduce the assets and livelihoods of many poor people, for example health, access to water, homes, and infrastructure. Climate change is expected to alter the path and rate of economic growth because of changes in natural systems and resources, infrastructure, and labour productivity. A reduction in economic growth directly affects poverty through reduced income opportunities. Climate change is projected to alter regional food security. In particular in Africa, food security is expected to worsen. Adverse impacts on food security could be seen in Latin America, as well as in South and South-East Asia.
Achieving universal primary education (Goal 2)	Deforestation and reduced freshwater availability may require children spending more time fetching these resources instead of going to school. Environmental diseases affect school attendance and capacity to concentrate. They also affect	Extreme weather events can destroy educational infrastructure and access roads. Climate change can increase the incidence of vector-borne diseases, affecting school attendance by children and teachers. Primary education offers opportunities for education on climate change adaptation and disaster risk reduction.

MILLENNIUM DEVELOPMENT GOAL	EXAMPLES OF LINKS WITH THE ENVIRONMENT	EXAMPLES OF LINKS WITH CLIMATE CHANGE
	attendance of teachers. Primary education offers opportunities for education on environmental protection.	
Promote gender equality and empower women (Goal 3)	In many societies key environmental resources are harvested by women, especially water and firewood. Degradation and scarcity of these resources will firstly affect women. Women generally have a lower adaptation capacity, e.g. in getting access to agricultural credit and insurance. In the context of degraded natural resources, women are thus more adversely affected.	In the developing world in particular, women are disproportionately involved in natural resource-dependent activities, such as agriculture, which are particularly vulnerable to climate change. Women's traditional roles as primary users and managers of natural resources, primary caregivers and labourers engaged in unpaid labour (*i.e.* subsistence farming) mean they are involved in and dependent on livelihood and resources that are put most at risk by climate change.

Conclusion

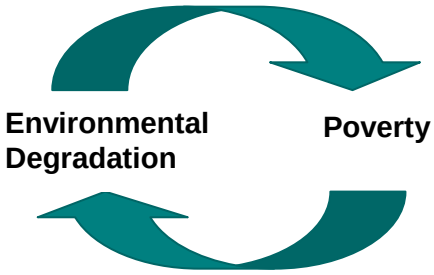
Link between environment, climate change and sustainable development

- Sustainable development is largely dependent upon successful integration of environment and climate change into economic planning and decision making.
- Without sound environmental management and consideration of climate change, development projects, programs and policies lead to significant environmental degradation that can undermine economic growth.
- Environment and climate change mainstreaming involves establishing the links between poverty and environment including climate change and identifying the policies and programmes to bring about environmental sustainability.
- The Government of Rwanda has committed to mainstream environment and climate change into national policies, plans and strategies.
- In EDPRS 2, **environment and climate change** were identified as **cross cutting issues** towards achievement of the long-term Rwanda Vision 2020 and Millennium Development Goals (MDGs).
- **Green economy** is a priority area of **economic transformation** that is considered amongst the four thematic areas of the Economic Development and Poverty Reduction Strategy (EDPRS II)

The livelihoods of more than one billion people depend directly on natural resources (flesh water, fuel, timber, food,..) and services provided by ecosystem (water purification, air and soil quality, climate regulation, protection against floods, landslides and other natural hazards,...

There is the heavy reliance on natural resources and the landscape by the poor .The poor is both victims and agents of environmental degradation. Poorer communities are most affected by decline of natural resource since they are most directly reliant on ecosystem services for their well-being.

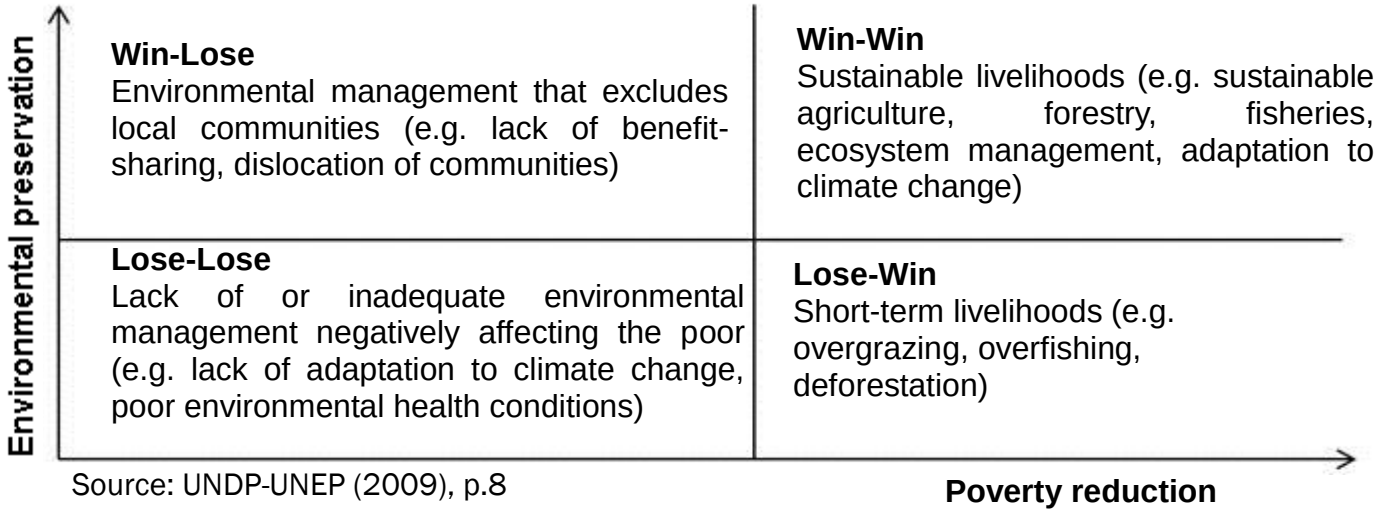
Such links often create **vicious cycles**, where a situation of poverty leads to degradation of natural resources to obtain immediate and short-term benefits, and worsening environment leads to poverty.



The challenge is thus to turn such situations into **virtuous circles** where environmental sustainability contributes effectively to long-term economic development and human well-being. The better environmental management contributes directly to improved health, pro-poor growth, improved livelihoods, and a reduction in environmental risks;

To measure sustainability, we need to relate the "**demand**" of a growing population with the "**supply**" of environmental goods and services.

What is the best approach?



Source: UNDP-UNEP (2009), p.8

TOPIC 5: Mainstreaming environment and climate change in the planning and budgeting of environmental organizations

5.1 Why mainstream environment and climate change?

Sustainable development is largely dependent upon successful integration of environment and climate change into economic planning and decision making. Without sound environmental management and consideration of climate change, development projects, programs and policies lead to significant environmental degradation that can undermine economic growth.
Environment and climate change were identified as cross cutting issues in the Economic Development and Poverty Reduction Strategy II (EDPRS 2013-2018) towards achievement of the long-term Rwanda Vision 2020 and Millennium Development Goals (MDGs).

Environmental and climate change mainstreaming is at the heart of the process of moving to green, low-carbon, climate-resilient development: green development require the integration of environmental considerations while climate-resilient development results from adaptation mainstreaming and low-emission development results from a process of mainstreaming climate change mitigation in all policy-making and planning activities.

5.2 Role of environmental organisation in mainstreaming environment and climate change

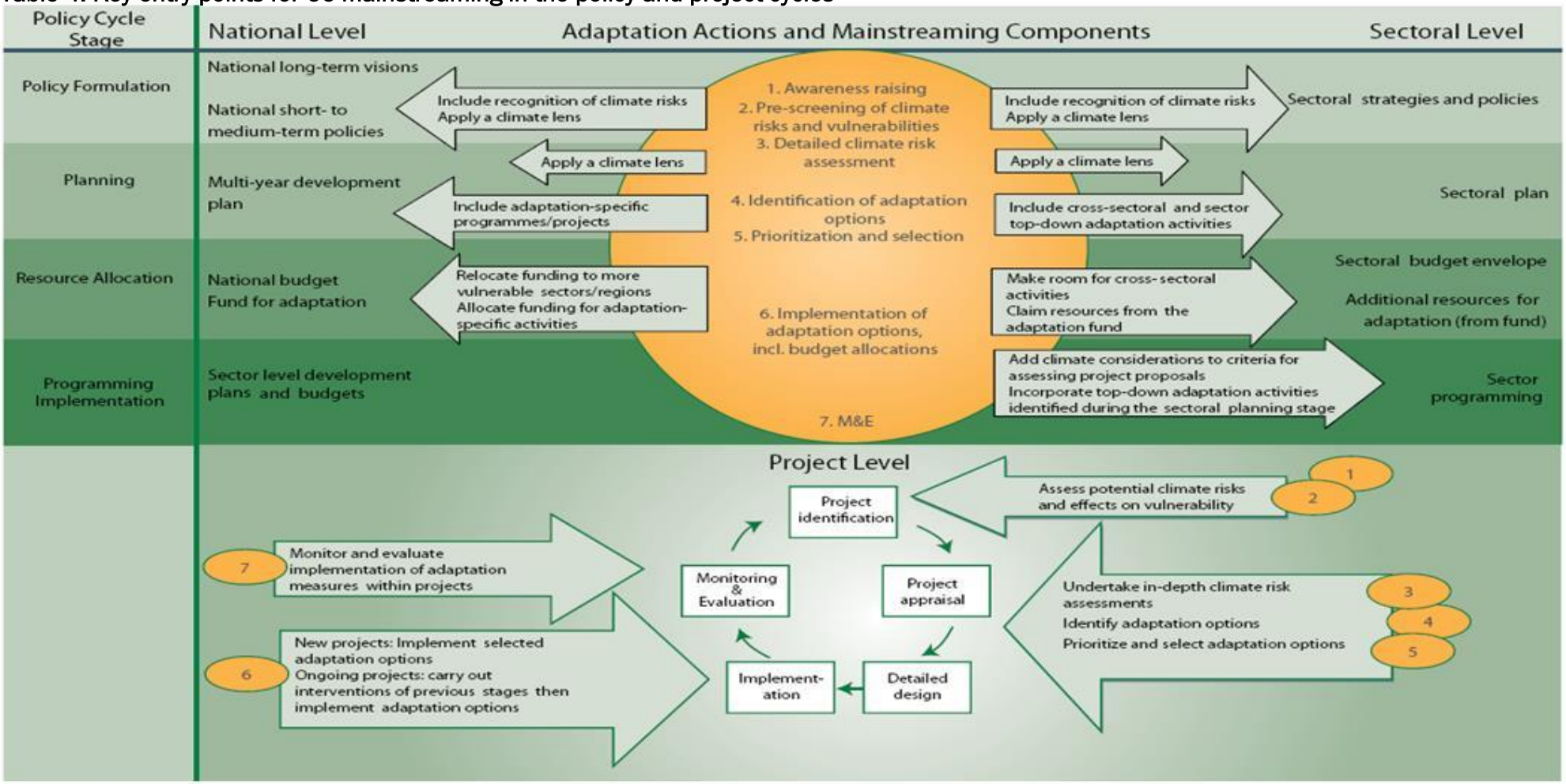
Environmental Organizations, NGOs and Private sector individuals are among key stakeholders of environment Sector. While Governments are primarily responsible for taking legal and related measures to address environmental protection and sustainable development, environmental organizations have an important role to play in the implementation of national policies and plans of plan of environment and climate change. Their activities are closely dependent on the state of the environment and natural resources (notably agriculture, water, health, forestry, fisheries, tourism), and can have adverse impacts on the environment (especially manufacturing, infrastructure, energy, transport).

The government (Ministries, institutions, sectors,..) and environmental Organizations complement each other and provide a consistent framework within which to plan and implement actions in response to environmental challenges and climate change. The ultimate goal is to ensure that the chosen development path adequately addresses both current and future vulnerability, risks and impacts.

5.3 How to mainstream environment and climate change environmental organisation's plans and activities?

Environmental and climate change mainstreaming is at the heart of the process of moving to green, low-carbon, climate-resilient development: Green development require the integration of environmental considerations while climate-resilient development results from adaptation mainstreaming and low-emission development results from a process of mainstreaming climate change mitigation in all policy-making and planning activities.

Table 4: Key entry points for CC mainstreaming in the policy and project cycles



Source: Olhoff & Schaer (2010) *Screening tools and guidelines to support the mainstreaming of climate change adaptation into development assistance:*

Environmental and climate-resilient development and low-emission development result from mainstreaming in policymaking and planning.

Table no 4 shows the key entry points for environment and climate change mainstreaming namely :

(1) awareness raising,

(2) climate risk assessment,

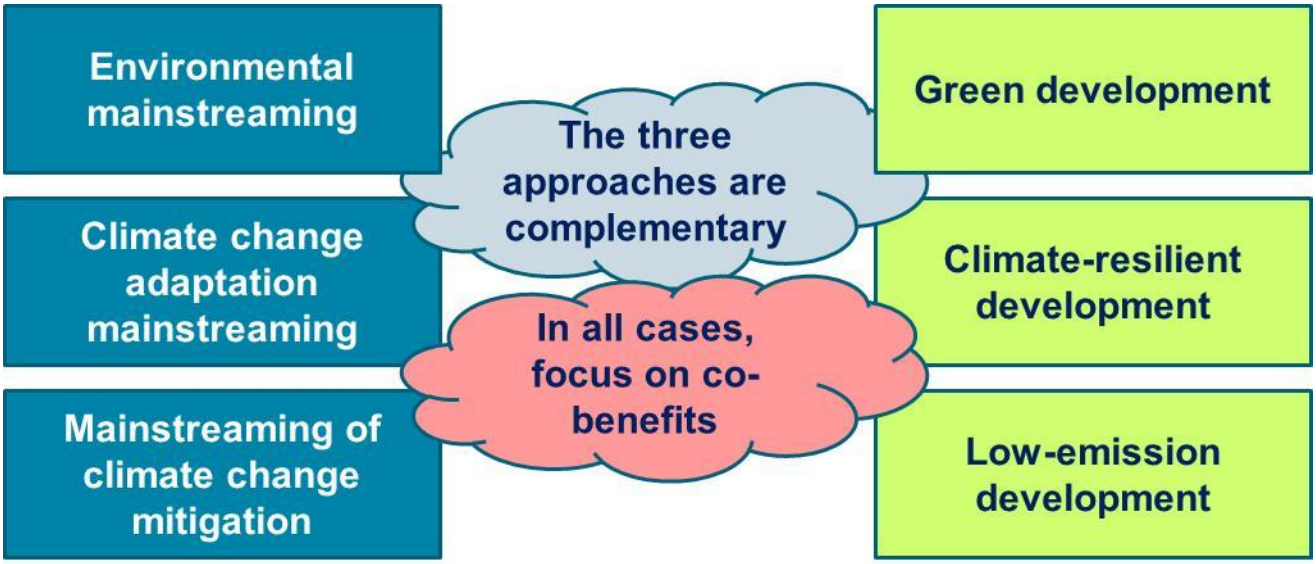
(3)identification of adaptation and mitigation measure ,

(4) budget allocation and ipmlementation,

(5) Monitoring and evaluation .

All these entry points are applied within the project cyle in line with EDPRS, Sector strategic plans and DDPs aspirations.

Moving to green, climate-resilient and low-emission development requires:



TOPIC 6: Environmental laws and policy for SD in Rwanda

Environment is governed by a policy, institutional and legal framework with a view to ensuring its functioning, protection and management for sustainable development.

Effective protection of the environment requires activity on a variety of fronts. Ones of activities are setting up proper regulations.

- Environmental policy
- Environmental laws
- Standards and guidelines
- Institutional framework

The Government has established a clear legal and institutional framework to ensure a balance between economic development and environmental protection, as well as to prevent environmental degradation. In this context, the National Environment Policy was set out in 2003. The lead government Ministry for environment is the Ministry of Natural Resources (MINIRENA). Rwanda Environmental Management Authority (REMA) is the principal agency responsible for the management of the environment in Rwanda and coordinates, monitors and supervises all activities in this field. REMA was established in November 2006 under the Organic Law N° 04/2005 of 08/04/2005 determining the modalities of protection, conservation and promotion of environment in Rwanda (art.65). The mandates, roles and functions of REMA are clearly stipulated in the Law N° 63/2013 of 27/08/2013.

6.1 Environment and Vision 2020 and EDPRS

The protection and management of environment are among the pillars of Vision 2020.

By 2020 the aim of the Government of the Republic of Rwanda is to see:

- The percentage of households involved directly in primary agriculture reduced from 90% to less than 50%;
- The rate of diseases related to environmental degradation reduced by 60%;
- The share of wood in national energy balance reduced from 94% to 50%,

6.2 Environmental Policy

Environment policy was adopted in 2003. Its overall objective is the improvement of man's well-being, the judicious utilization of natural resources and the protection and rational management of ecosystems for sustainable and fair development.

6.3 Legal Instruments

6.3.2 Constitution of Rwanda

Article 49

Every person has a right to a clean and healthy environment. Every person has the duty to protect, safeguard and promote the environment. The State shall ensure the protection of environment.

6.3.1 Organic law NO. 04/2005 OF 08/04/2005

6.3.1.1 Some key articles of the organic law

Article 2:"The environment in Rwanda constitutes a common national heritage. It is also an integral part of universal heritage".

Article 3: Every person has the duty to protect, conserve and promote environment. The State has a responsibility of protecting, conserving and promoting the environment.

Article 7: Five principles of Conservation and rational use of environment and natural resources. Those principles are:

1) Protection
2) Sustainability of environment and equal opportunities among generations
3) Polluter pays
4) Information dissemination and Community sensitization in conservation and protection of the environment
5) Cooperation

Article 60-62: Obligations of decentralized entities

Article 64: The population has the obligation to conserve the environment by individual action or through collective activities, associations of the environment, in preparing green spaces and reserved areas and other activities that promote environment.

Article 67: "Every project shall be subjected to environmental impact assessment (EIA), before obtaining authorization for its Implementation.(…) "

Article 85: "….. an agricultural activities shall respect a distance of ten (10) miters from rivers and fifty (50) meters away from the banks of lakes"….

Articles 80-94: Preventive provisions

Articles 95-110: Punitive provisions

N.B: Punitive provisions are incorporated in current penal code (off. Gazette no special of 14/6/2012)

6.3.3 Laws and ministerial orders

6.3.3.1 Laws and ministerial orders related to land and wetlands exploitation

- ✓ Oganic law n° 03/2013/ol of 16/06/2013 repealing organic law n° 08/2005 of14/07/2005 determining the use and management of land in rwanda
- ✓ Law n° 43/2013 of 16/06/2013 governing land in Rwanda

> **Article 19:** Swamp land belongs to the State. It shall not definitively be allocated to individuals and no person can use the ground of holding it for a long time to justify the definitive takeover of the land.

- ✓ Ministerial order n° 008/16.01 of13/10/2010 establishing the list of swamps and their limits and regulating their management and use

> **Article 2:** The list of swamps, their limits and modalities for their management and use are annexed to this Order.
>
> a) Swamps with use without specific conditions
> b) Swamps with Use under specific conditions
> c) Full Protected swamps

- ✓ Ministerial order n°007/16.01 of 15/07/2010 determining the length of land on shores of lakes and rivers transferred to public property

Article 2: The land within a distance of fifty (50) meters from the lakeshore is public property.

Article 3: The land within a distance of **ten (10) and five (5) meters** from the shore of big rivers and small rivers respectively is public property.
Annex to min Table 1: List of the rivers to be protected with a ten (10) meter buffer zone from the furthest reaches of successive flood water mark

- ✓ Law n° 37/2008 of 11/08/2008 on mining and quarry exploitation

6.3.3.2 Ministerial orders about banned products in Rwanda

- ✓ Law n° 57/2008 of 10/09/2008 relating to the prohibition of manufacturing, importation, use and sale of polythene bags in Rwanda
- ✓ Prime minister order n°27/03 of 23/10/2008 determining a list of prohibited drugs unless authorized or temporary permitted
- ✓ Prime minister's order n° 26/03 of 23/10/2008 determining the list of chemicals and other prohibited pollutants
- ✓ Ministerial Order N° 006/2008 of 15/08/2008 regulating importation and exportation of ozone depleting substances ,products and equipment containing such substances

6.3.3.3 Ministerial orders about air pollution

- ✓ Ministerial order n°003/16.01 of 15/07/2010 preventing activities that pollute the atmosphere

  Article 5: It is prohibited for industries to emit dark smoke from their chimneys into the air.

6.3.3.4 Ministerial instruction nº 003 of 30/07/2013 relating to the management and exploitation of used paper

Article 4:"Public and private institution must have in public places appropriate rubbish bins for used papers".

Article 6:"All used paper must be taken to recycling factories"

***Article 7**:"The following actions are prohibited: to mixt used paper with any other biodegradable or non-biodegradable waste, to pour or drop water on used paper, to burn used paper*

6.3.3.5 Law Ministerial orders are about biodiversity, protected areas,animal and plants

- ✓ Law n° 70/2013 of 02/09/2013 governing biodiversity in Rwanda
- ✓ Ministerial order n⁰ 007/2008 of 15/08/2008 establishing the list of protected animal and plant species

DID YOU KNOW?

The following activities are prohibited:

1) Dumping or disposal of any solid, liquid waste or hazardous gaseous substances in a stream, river, lake and in their surroundings;
2) Damaging the quality of air and of the surface or underground water;
3) Non authorised bush burning;
4) Smoking in public and in any other place where many people meet;
5) Defecating or urinating in inappropriate place;
6) Spitting, discarding mucus and other human waste in any place.

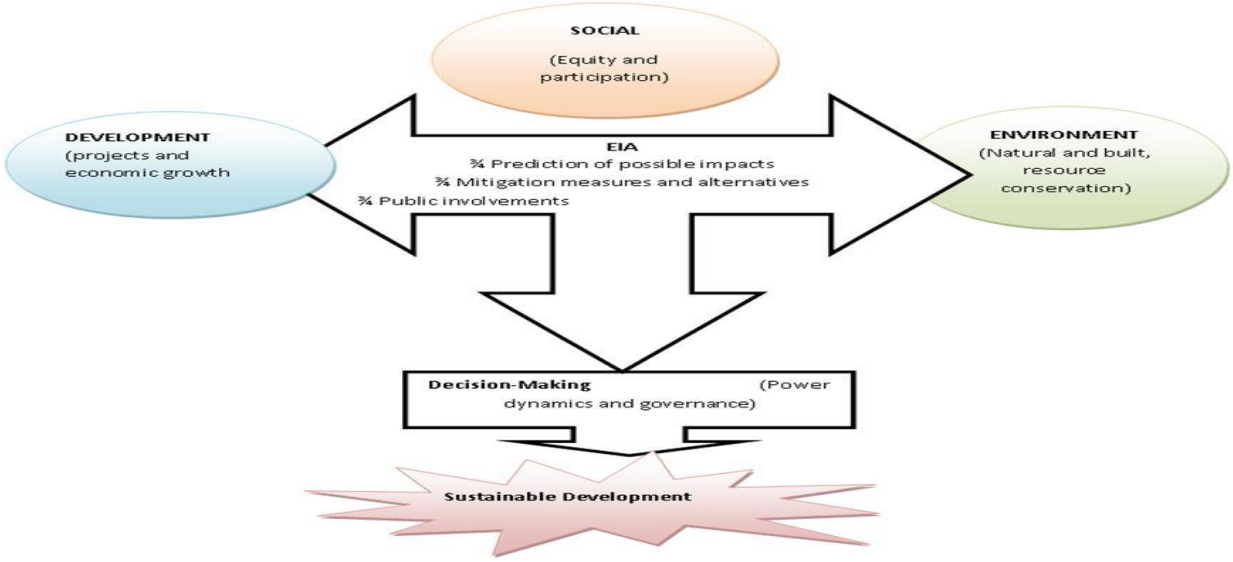
Organic law NO. 04/2005 OF 08/04/2005 art.81

TOPIC 7: Environmental Impact Assessment (EIA) in Rwanda

Environmental Impact Assessment (EIA) refers to the scientific process of examining the environmental and human consequences, both beneficial and adverse, of a proposed activity or project, and for incorporating appropriate measures to address them into project design and implementation.

On long term, EIA promotes sustainable development by ensuring that development projects do not undermine critical resources and ecological functions on the well-being, lifestyle and livelihood of communities and people who depend on them. (REMA, 2006).

The link between EIA and sustainable development



Source: adapted from Zeremariam, 2003)

Figure 5: Link between EIA and sustainable development

Environmental Impact Assessment (EIA) was established under the Organic Law n° 04/2005 of 08/04/2005, in article 67 that requires to each projects, programmes and policies that may affect the environment, to be subjected to Environmental Impact Assessment (EIA) before obtaining authorisation for implementation (REMA, 2009).

Any one or association that does not carry out EIA prior to launching any project as required is punished by suspension of his or her activities and closure of his or her association and without prejudice to be ordered to rehabilitate the damaged property, the environment, people and the property. (Organic Law n° 04/2005 of 08/04/2005, art. 95)

The list of works, activities and projects that have to undertake an environmental impact assessment are: construction and repair of international and national roads, large bridges, industries, factories, hydro-dams and electrical lines, public dams for water conservation, rain water harvesting for agricultural activities and artificial lakes, large hotels public building which accommodate more than one hundred daily, extraction of mines and public land fills among others. (GoR, 2008a).

REMA has the responsibility to develop EIA guidelines, organise the EIA procedure by undertaking screening, guiding developers on assessment procedures, conducting public hearings, reviewing EIA reports based on the terms of reference (ToR) and taking decisions on approval or disapproval of proposed projects and auditing all implemented projects (REMA, 2012). Since February 2009, Rwanda Development Board (RDB) became the EIA administrative body through its unit of Environmental Compliance, Awareness and Cleaner Production. Every year RDB receive not less than 100 projects requesting EIA certificate.

EIA process in Rwanda has four main phases, namely: 1) Environmental Impact Assessment Initiation Phase, 2) Environmental Impact Study Phase, 3) Decision-Making and Authorization Phase and 4) Monitoring (REMA, 2006)

Steps in EIA process

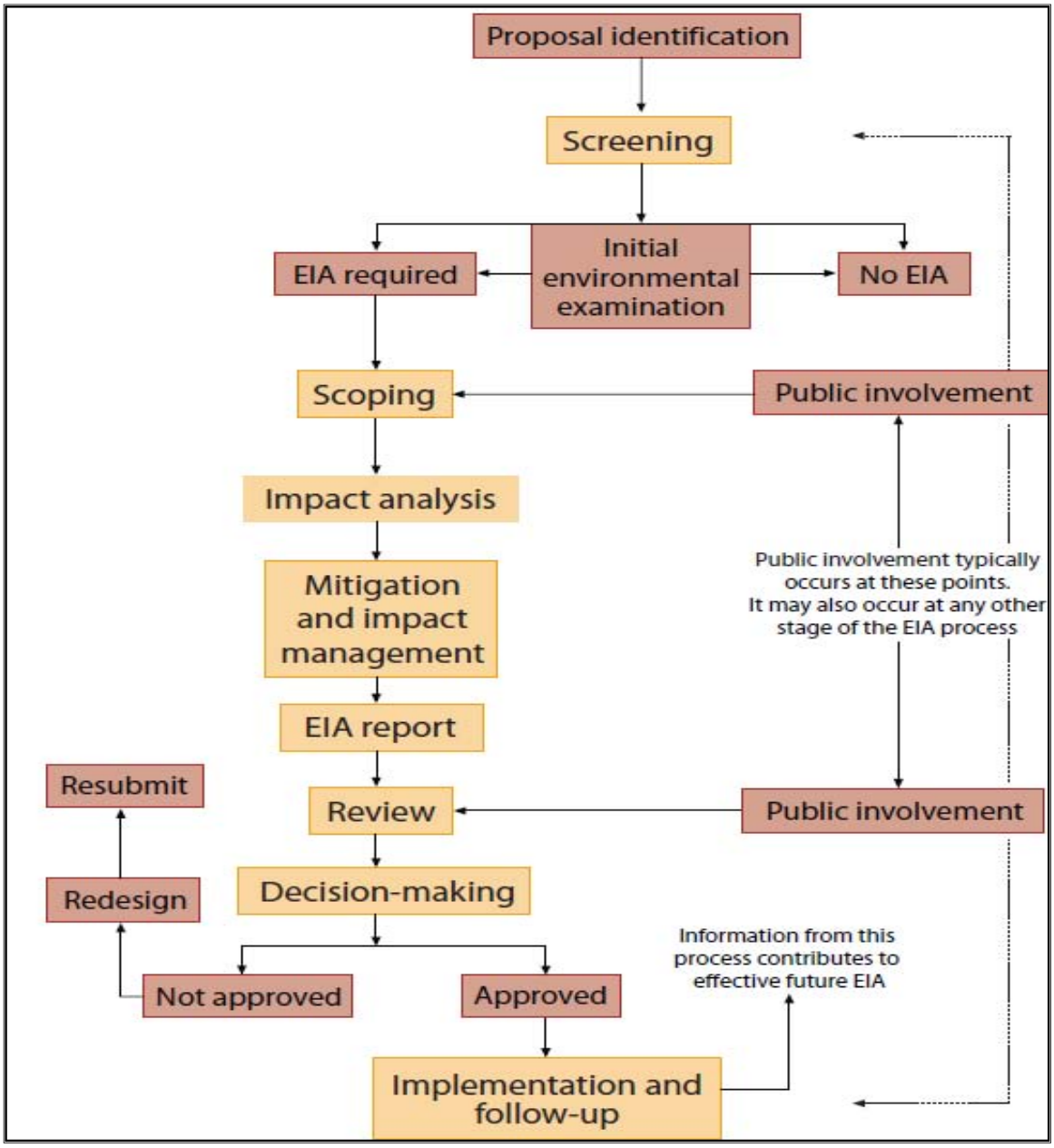


Figure 6 : Steps in EIA process

Source: UNEP, 2002

Pollution is the introduction of contaminants into an environment that causes instability, disorder, harm or discomfort to the ecosystem i.e. physical systems or living organisms. Pollution can take the form of chemical substances or energy, such as noise, heat, or light.

Pollutant is a foreign substance that makes something dirty, or impure, especially with waste from human activities. Any undesirable solid, liquid or gaseous matter in an environmental medium: "undesirability" is often concentration-dependent, low concentrations of most substances being tolerable or even essential in many cases. ...

Type of pollution

Air Pollution, Water Pollution, Land Pollution, Noise Pollution, Thermal Pollution, Electro Pollution, Visual Pollution

8.1 Air pollution

Air pollution includes air and particulate pollutants

- Contaminated soil would affect the health of a forest; some trees might have become easier to be attacked by bacterial infections.
- Carbon dioxide and other greenhouse airs from emissions from burning of fossil fuels cause global warming.
- Outdoor and indoor air pollution are both important.

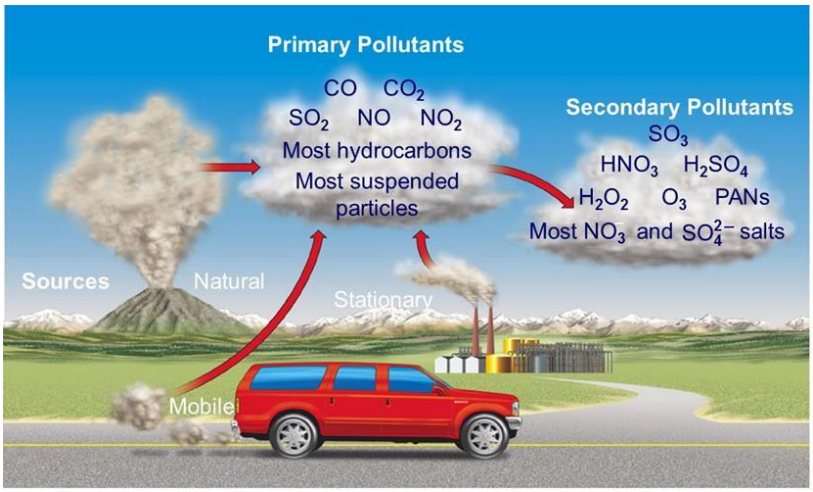


Figure 7: Type and Source of air pollutants

Source: http://geographicalconcepts.wikispaces.com/Pollution

8.1.1 Where do they come from?

Mainly from burning of fossil fuels: transportation, industrial processes solid waste disposal (incineration), combustion in stationary sources,...

- **Primary pollutants:** Emitted directly from sources such as burning of fossil fuels and factory emissions.
- **Secondary Pollutants:** are not emitted directly. Rather, they form in the air when primary pollutants react or interact (chemical and photochemical reactions NO2 (Nitrogen Dioxide), SO_3, HNO_2, H_2SO_4, H_2O_2)

8.1.2 Air pollution effects

- Air pollution effects on human health
- Air pollution effects on property
- Air pollution effects on visibility
- Air pollution effects on plants, animal

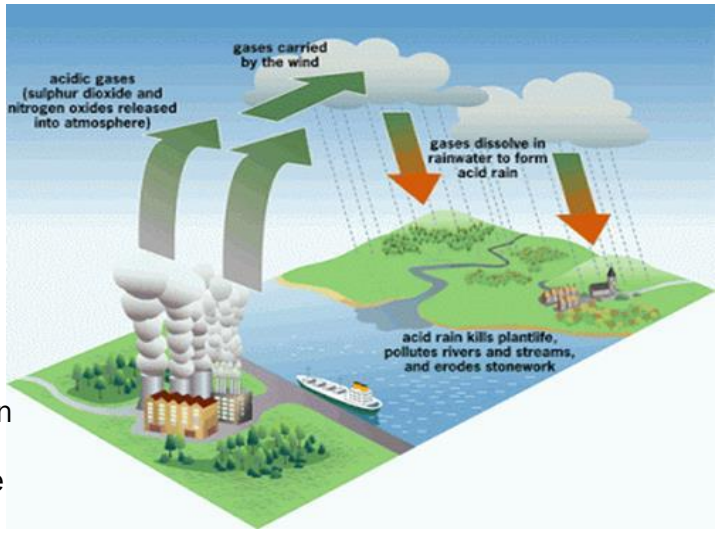


Figure 8: Formation of Acid rain

- Air pollution effects on water resource
- Air pollution effects on climate

8.1.3 Air pollution effects on human health

- **Respiratory problems:** exacerbated by the six main air pollutants: ozone, carbon monoxide, nitrogen oxides, sulphur dioxide, particulates, and volatile organic compounds (VOCs),..

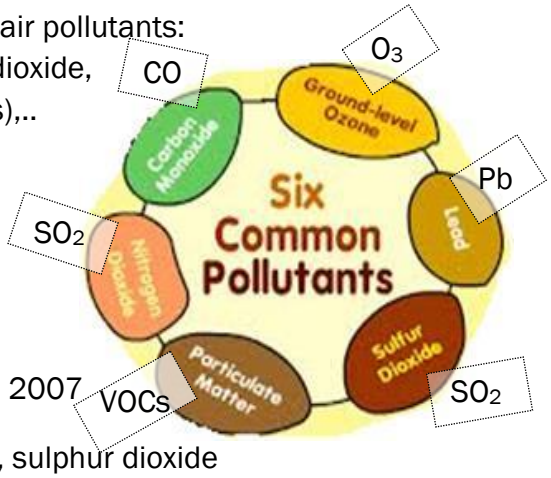


Figure 9: Six main air pollutants affecting human health

Source: Cowier, 2007

- **Heart Disease :** by emissions like carbon monoxide, sulphur dioxide
- **Nervous System :** Carbon monoxide can damage the nervous system
- **General Health:** Volatile organic compounds that are used in indoor materials like carpets, paints, and solvents can have general negative impacts on people's health. Some individuals are much more sensitive to pollutants than the others.

8.1.4 Relevant measure against pollution

8.1.4.1 Air pollution prevention and monitoring

- ✓ Promote renewable energy, to minimize burning of fossil fuels, which cause heavy air pollution (wind energy, solar energy,..)
- ✓ Encourage common transport
- ✓ Encourage energy efficient cars, which pollute less
- ✓ Reduce, Reuse and Recycle
- ✓ Laws and regulations and pollution control

8.1.4.2 Summary of prohibited substances in Rwanda

- **Why prohibition?**

- To protect people's lives from adverse originating from effects use of that substance
- To prevent negative impacts to the entire environment which could be immediate, short or long term;
- Prevent loss of national revenues in projects rehabilitation or even treatment of affected people

- **List of prohibited substances**

Table 5: List of Chemicals and other prohibited pollutants in Rwanda

CHEMICAL	IMPACTS
Chlorofluorocarbons (CFCs) **(they are used to create a cooling effect of refrigerators and air conditioners)**	Ozone depletion and global warming (greenhouse effect) This then exposes lives on earth excess UV radiations leading to eye cataracts, skin cancers, reduced immunity and reduced agricultural productivity.
Persistent Organic Pollutants (POPs) **They include chemicals like** Polychlorinated Biphenyls (**PCBs) used in transformers, pesticides especially for agricultural use such as DDT,..**	Immunosuppressant (that reduces the activation or efficacy of the immune system), cancers,
Plastics made of polythene **Plastic bags are made of polyethylene which is a petroleum product.**	-Plastic bags don't biodegrade and when littered block the easy infiltration of water into the soil; -They photo-degrade breaking down into smaller and smaller toxic bits contaminating soil and waterways. -They then enter the food-web when animals accidently ingest them. Leads to death of livestock when eaten - When burnt, emits toxic gases which pollute the atmosphere

Source: Official gazette of 1st November 2008

In Rwanda Plastic bags are confiscated especially at border posts and transported to REMA stores

DID YOU KNOW?

- **It takes 1000 years for polyethylene bags to break down**
- **The amount of petroleum used to make 1 plastic bag would drive a car about 11 meters**
- **Approximately 1 billion seabirds and mammals die each year by ingesting plastic bags.**

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.

Rwanda like other African countries is the Rwanda is recognized to be the most vulnerable nations in the world in regard to climate changes.(REMA 2010) . Its specific natural resources (e.g. water, land, soils) and the ecosystems (e.g. the natural forests, the marshlands and lakes) are overused, very fragile and geographically fragmented (limited in space and not connected) and with lower adaptive capacity.

Rwanda already has a complex existing climate, with two wet and dry seasons. Due to topography structure of Rwanda and the wind circulation of a given month or season (Inter-Tropical Convergence Zone (ITCZ) and the episodes El Nino/Southern Oscillation (ENSO), Rwanda receive rainfall almost 9 month a year from September to May (REMA,2010) .

The annual mean rainfall totals varies westward from 700 mm to 1600 mm following the topographic feature. The annual mean temperature varies eastward from 15°C to 21° from western highland to eastern plains and hills respectively.

9.1 Evidence of climate change in Rwanda

Climate Change is a reality for Rwanda. The projections (by the 2050s) indicate future increases in mean annual temperature (average monthly temperatures) of broadly 1.5 to 3 ºC and an increase in average annual rainfall with heavy precipitation events (*Higher rainfall BUT shorter rainy season)*. A key priority therefore is to increase the resilience of Rwanda to cope with these extreme events (SEI, 2009).

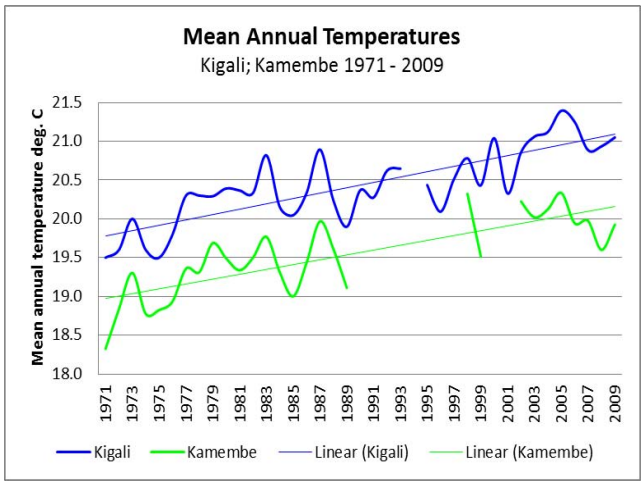


Figure 10: Increase of mean annual temperature (>2°C) over last 30 years

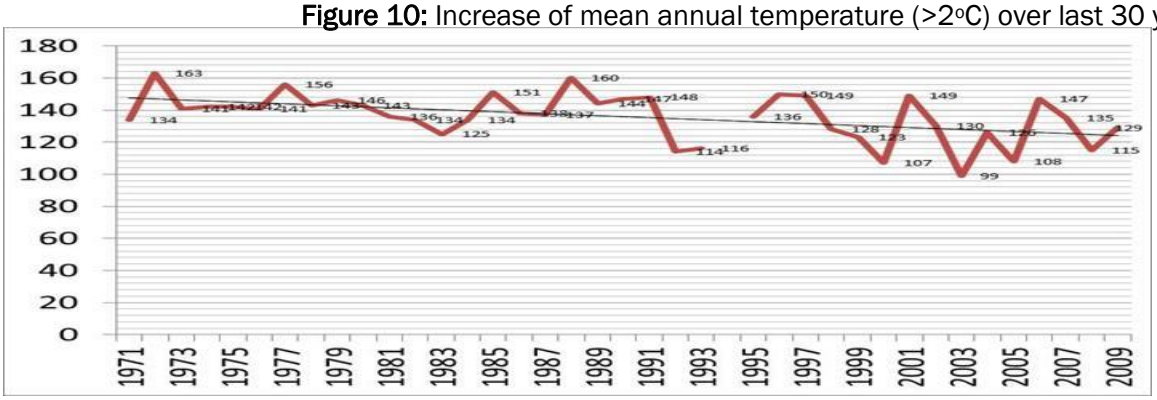


Figure 11: Annual number of rain days (days) at Kigali station

In average, the annual total number of rain-days decreased from 134 days to 124 days from 1971 to 2009

9.2 The Economic Costs of Climate Change Impacts in Rwanda

The future economic costs of climate change are very uncertain. However, aggregate models indicate that the additional net economic costs (on top of existing climate variability) could be equivalent to a loss of almost 1% of GDP each year by 2030 in Rwanda, though this excludes the future effects of floods and other extremes. This estimate is therefore considered a potential lower bound.

Periodic floods and droughts (extreme events) already cause major socio-economic impacts and reduce economic growth in Rwanda. Major flood events occurred in 1997, 2006, 2007, 2008, and 2009, where rainfall resulted in infrastructure damage, fatalities and injuries, landslides, loss and damage to agricultural crops, soil erosion and environmental degradation.

Figure 12: Flooding in Nyabihu District

The most severe of the recent events was the 2007 flood. The study has estimated that the direct measurable economic costs of this event were $4 to $22 million (equivalent to around 0.1 – 0.6% of GDP) for two districts alone. However, this only includes the direct economic costs of household damage, agricultural losses and fatalities. It does not include the wider economic costs from infrastructure damage (including loss of transport infrastructure), water system damage and contamination, soil erosion and direct and indirect effects to individuals.

The fig n° 13 shows the most affected Districts in Rwanda by high rainfall events (flooding and by droughts

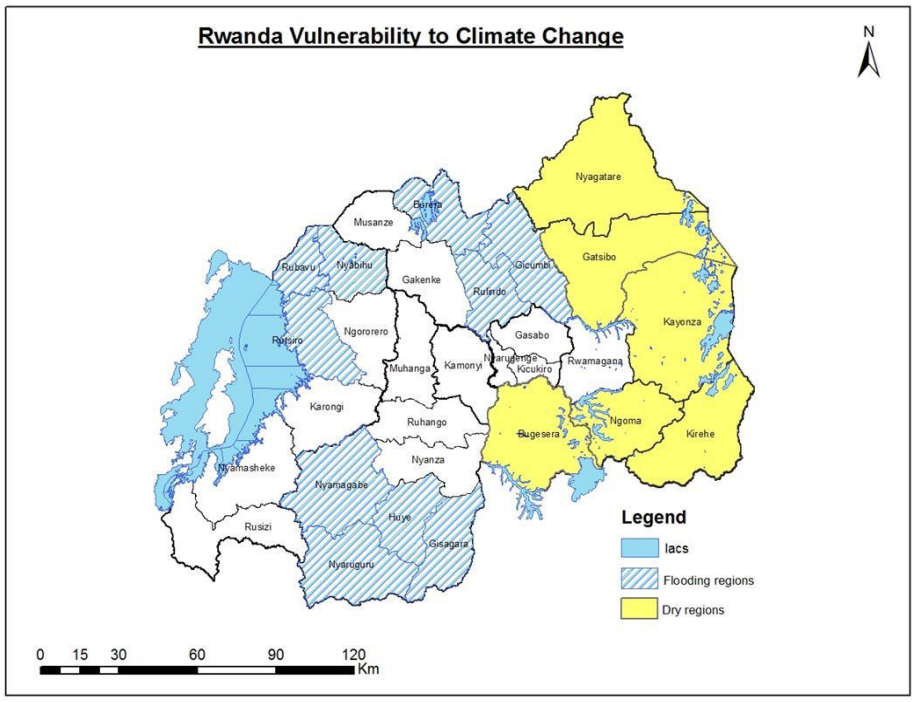
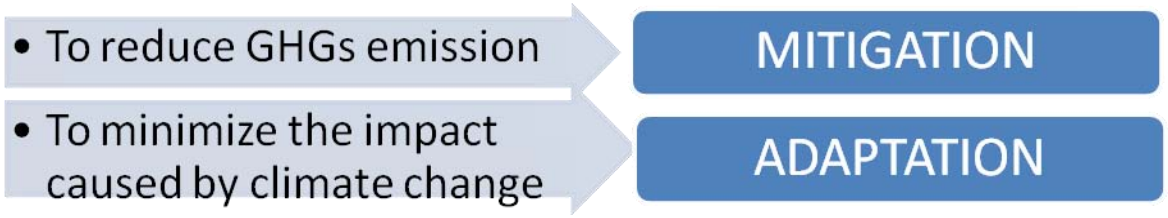


Figure 13: Most vulnerable Districts to climate change effects

9.3 Relevant adaptation/mitigation measures

There are two mechanisms to deal with climate change: mitigation and adaptation.



Mitigation' is to deal with the cause of climate change by **reducing GHG emissions**. '**Adaptation'** is a mechanism to **minimize negative impacts** stemming from climate change.

Mitigation and Adaptation activities are diverse in nature, depending on the region and the development sector, as highlighted in the table no

Table 6: Mitigation and adaptation activities

Mitigation activities	*Adaptation activities*
➢**Household level:** ✓ Cooking → Energy efficiency stoves ✓ Lighting→ Use of Compacted Fluorescent lamps to replace incandescent lamps ✓ Use of energy saving material in household ➢**Communities, Restaurants, Hotels, cottage industries:** ✓ Use of energy cooking stoves ✓ Use of alternative clean energy ✓ Heating water with solar heaters ➢**Industrial process:** ✓ Energy efficiency ✓ Alternative clean energy ✓ CDM projects ➢**Transport** ✓ Promote public transport ✓ Technical control for vehicle gas emission ✓ Promote import of relatively new vehicles **. Agriculture, land use and forestry:** ✓ Improvement of manure management and promote organic manure; ✓ Zero grazing; ✓ Afforestation, reforestation and agroforestry	➢**Agriculture and land use** ✓ Soil erosion control ✓ Irrigation ✓ Any other measure related to enhance food security ➢ **Water Resources** ✓ Rainwater harvesting (collection) ✓ Protecting lakes and river shores ✓ Sustainable use of marshland (conditions, without conditions, protected) ➢**Forestry :** ✓ Protect existing forest ; ✓ Afforestation, reforestation and agroforestry ; ➢**Infrastructure and housing :** ✓ Housing (imidugudu etc..) planning with consideration of CC impacts (floods, landslides, strong winds, lightening… ✓ Protection of infrastructures **Establishing Early Warning and Disaster Preparedness Systems**

9.4 Adaptation options – NAPA-Rwanda

NAPA Rwanda is articulated on **six (6)-priority adaptation options** to climate change which include:

1) An Integrated Water Resource Management – IWRM;
2) Setting up information systems to early warning of hydro-agro meteorological system and rapid intervention mechanisms;
3) ™ Promotion of non-agricultural income generating activities;
4) ™ Promotion of intensive agro-pastoral activities;
5) ™ Introduction of species resisting to environmental conditions;
6) ™ Development of firewood alternative sources of energy

From above six priorities NAPA team formulated 20 key adaptation options which adequately respond to most immediate and urgent needs of most poor local communities.

1) Promotion of non-rain-fed agriculture;
2) Increase agricultural techniques;
3) Introduction of species resistant to drought in arid and semi-arid zones;
4) Introduction of precocious varieties in arid and semi-arid zones;
5) Protection of basin sides in mountainous zones;
6) Promote stocking techniques of agricultural products after harvesting;
7) Reinforce early warning and rapid intervention systems;
8) Reinforce animal husbandry in permanent stalling;
9) Promote veterinary and phytosanitary services;
10) Develop alternative sources of wood energy ;
11) Rational utilization of wood energy;
12) Preparation and implementation of forestry development plan;
13) Preparation and implementation of land development plan;
14) Integrated water resources management (IWRM including rainwater);
15) Promotion of non-agricultural activities;
16) Increase the rate access of drinking water;
17) Favor access of the public to medical insurance services;
18) Prevent and fight against vectors of water-borne diseases;
19) Integration of NAPA in policies and national development plans;
20) Facilitate accessibility to health services.

9.5 Opportunities of Climate change

Trough Climate change they are many opportunities to get grants for projects related to Climate changes adaptation and mitigation: Clean Development Mechanism (CDM) projects , FONERWA, Sida-supported Natural Resources and Environment Program in Rwanda and UNDP-AAP project (Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa).

Did you know?

- **GREEN GROWTH AND CLIMATE RESILIENCE STRATEGY**
- **Vision 2050 for Rwanda: to be a developed, climate- resilient low carbon economy by 2050**
- **TRIPLE WIN' STRATEGIES :** Low emissions, Build resilience and Promote development

TOPIC 10: Role of Environmental Organizations in promoting sustainable development in Rwanda

Non-Governmental Organizations play a vital role in the mobilisation and awareness creation among the population on environmental issues. As such, they supplement the efforts of the Government and help to ensure that the concerns of the disadvantaged strata of society are taken into account in the national development process.

Environmental NGOs and private sectors are required to take a more active part in the protection of environment by ensuring that the environmental dimension are taken into consideration in all their activities, and plans.

10.1 Key intervention areas for NGOs

NGOs play a big role in *Climate-resilient development* by addressing climate vulnerability, risks and impacts in their planning, budgeting and in the implementation and monitoring of their projects.

Environmental Organizations are invited to promote Low-carbon development projects that address the three 'sectors' that are the biggest contributors to GHG emissions (namely energy generated from fossil fuel burning, agriculture, and land use change –especially deforestation)

- improving energy efficiency (across all uses/sectors);
- relying more on low-carbon technologies to generate heat and power;
- opting for more sustainable modes of transport;
- curbing deforestation (and stopping desertification);
- and modifying agricultural practices (e.g. more efficient use of nitrogen-based fertilisers, improved management of manure)

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Sample Training Evaluation Form

I am a: ❍ Training Participant (trainee) ❍ Observer ❍ Other……

Please indicate your impressions of the items listed below.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The training met my expectations.	❍	❍	❍	❍	❍
2. I will be able to apply the knowledge learned.	❍	❍	❍	❍	❍
3. The training objectives for each topic were identified and followed.	❍	❍	❍	❍	❍
4. The content was organized and easy to follow.	❍	❍	❍	❍	❍
5. The materials distributed were pertinent and useful.	❍	❍	❍	❍	❍
6. The trainer was knowledgeable.	❍	❍	❍	❍	❍
7. The quality of instruction was good.	❍	❍	❍	❍	❍
8. The trainer met the training objectives.	❍	❍	❍	❍	❍
9. Class participation and interaction were encouraged.	❍	❍	❍	❍	❍
10. Adequate time was provided for questions and discussion.	❍	❍	❍	❍	❍

11. How do you rate the training overall?

Excellent	Good	Average	Poor	Very poor
❍	❍	❍	❍	❍

10. What aspects of the training could be improved?.....

11. Other comments?.....

THANK YOU FOR YOUR PARTICIPATION!